

**THE
MADRAS FISHERIES
COMMITTEE**

EVIDENCE

MADRAS
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1929

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CORRIGENDA.

Page 64, line 27, for 'over' read 'under'.
Page 71, line 4 from bottom, for 'adopted' read 'adapted'.
Page 74, line 43 for 'plan' read 'plant'.
Page 79, line 24, for 'and 108' read 'in 108'.
Page 93, line 5, for 'but' read 'they'.
Page 94, line 24, for 'vicarious' read 'precarious'.
Page 101, line 11 from bottom for 'we' read 'the'.
Page 103, line 42, for 'bran' read 'brine'.
Page 107, line 32, for 'your' read 'our'.
Page 110, line 33, for 'thrown' read 'turned'.
Page 127, line 19, for 'undergoing' read 'undertaking'.
Page 146, line 23 from bottom, delete 'Mr. Sathia Nadar'.
Page 165, line 40, for 'rovers' read 'rowers'.
Page 166, line 14, for 'Manapu' read 'Manapad'.
Page 173, line 3, for 'Magistrate' read 'Honorary Magistrate'.
Page 174, line 2, for 'bix' read 'big'.
Page 282, line 21, delete 'being'.
Page 286, line 24, for 'Madras' read 'India'.
Page 325, line 18, for 'lines' read 'respects'.
Page 356, line 27, for 'are not' read 'are'.
Page 360, line 24, for 'career' read 'carrier'.
Page 364, line 31, for 'hills' read 'hill tanks'.

TERMS OF REFERENCE.

- (1) To examine the objects with which the department was inaugurated;
- (2) to review the progress made in its several sections and the lines of development of the department and to make recommendations;
- (3) in particular and without prejudice to the enquiry under the two foregoing general heads—
 - (i) to examine and report on the work of the fisheries cannery at Chaliyam; and make recommendations for its future work, if it is considered necessary to retain it;
 - (ii) to review the work of the Tanur Station and the problems for the solution of which it needs to be retained in the future;
 - (iii) to examine the policy and programme of scientific research and suggest recommendations for the efficient conduct of research devoted to the attainment of practical ends;
 - (iv) to examine the progress of education among fishermen community since the department took over the control of this education and report whether without impairing the efficiency of the special type of education needed for the community its control may be transferred to the Educational Department;
 - (v) similarly to examine the progress and results of the working of the co-operative movement amongst the community and suggest measures for better organization of the movement so as to secure its full advantages to the community; should responsibility for the spread of the movement rest with the Fisheries Department or could it be entrusted to the Co-operative Department?
 - (vi) to examine the need for the several vessels (including boats) in the possession of the department and suggest whether any economy could be effected either by reducing their number or by reducing the expenditure on their maintenance;
 - (vii) to examine the policy in regard to Inland pisciculture and make recommendations as to the future plan of operations for the improvement of inland fisheries with reference to the efficacy of stocking operations hitherto conducted;
 - (viii) to examine the present organization and working of the fish-curing yards and make recommendations for cheapening the cost of maintaining the yards and devising a more efficient method of supply of salt with a view to effecting a reduction in the issue price of salt to the curers;
 - (ix) to examine the operations connected with pearl and chank fisheries and suggest measures for their economical working;—is it possible to use mechanical appliances—dredging for instance—to collect oysters dispensing with the method of diving now adopted;
 - (x) to examine the working of deep sea fishing with the help of the newly purchased trawler and report on its efficacy and usefulness;
 - (xi) to examine the organization of staff in the various grades and make recommendations, if any, as to its revision.

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THE MADRAS FISHERIES COMMITTEE.

Questionnaire.

NOTE.—It is not necessary for any witness to answer all the questions: he may limit himself to such questions as interest him.

I. AIMS OF THE DEPARTMENT.

1. What were the objects with which the Fisheries Department was inaugurated?
2. To what extent, in your opinion, were all or any of those objects achieved?
3. To what extent, if any, do you think there was failure in achieving such objects?
4. Can you assign any reasons for such failure?
5. If you consider that such objects are worth being achieved, what general remedies would you suggest?
6. In view of your answers to the above, what should, in your opinion, be the main objects of the department?
7. Please give the order in which you would place those objects according to their importance.

II. FISH FOOD SUPPLY.

8. In your opinion, is sufficient quantity of fish caught for local consumption?
9. Is fish food cheaper than other kinds of non-vegetarian food?
10. Is there any effective demand for more fish food?
11. Can greater supply create such a demand?
12. Is there any reasonable probability that any material increase in the supply is likely to be absorbed without difficulty?

III. IMPROVED METHODS OF FISHING.

13. Are the present methods of catching fish effective?
14. What improvements, if any, have been effected in recent times in this Presidency in—
 - (a) fishing craft,
 - (b) gear and tackle, and
 - (c) fishing grounds.
15. If none have been effected, what are the reasons?
16. Can you suggest any improvements?

IV. DEEP SEA FISHING.

17. How many vessels are there, including boats, in the possession of the department?
18. Is there need for all such vessels?
19. Can their number be reduced?
20. Is any retrenchment of expenditure on these vessels possible?
21. If so, to what extent?
22. When was the trawler taken possession of by the department?
23. What work in detail has it done since its arrival?
24. How far has its work been consistent with the original purpose for which it was purchased?
25. How often has it been used—
 - (a) for transport of salt,
 - (b) as a pearl fishery schooner, and
 - (c) for other purposes?

26. Was the original purpose in any way defeated by the trawler being used for other purposes?

27. Is the trawler useful and efficacious for the purpose for which it was meant?

28. Is it fitted with the apparatus necessary for research work?

29. What kind of research work was expected to be done by the trawler? Is it of a purely scientific nature, such as biological or hydrographical investigations, or is it of a practical and technological character, such as better methods of capturing fish?

30. Was the necessary staff appointed for the purpose?

31. When was Captain Cribb employed?

32. How long has he been in service?

33. What is the work turned out by him?

34. Has he been given the necessary assistance and afforded the necessary facilities?

35. Is anybody being trained under him?

36. What is the annual expenditure of maintaining the trawler?

37. Has any investigation been made regarding the existence of fish in deeper waters?

38. What is the ordinary line (distance from the shore) up to which fishermen go?

39. Why do they not go beyond that line?

40. Is it the distance or the depth that prevents them?

41. What is the longest distance from the shore which the trawler has ever covered?

42. What is its capacity for deep sea fishing?

V. FISH-CURING YARDS.

43. What was the main consideration which led to the transfer of the fish-curing yards to the Fisheries Department?

44. How far have results justified the transfer?

45. What further changes in their administration would you suggest for more efficient work and for the production of improved kinds of salted fish?

46. Shall the issue price of salt in the curing yards be further enhanced, left as it is, or reduced?

47. Can salt be supplied cheaper and more efficiently?

48. Who shall supply the salt—the Madras Government or the Government of India?

49. If the issue price is reduced, who will be benefited mainly—the fishermen, the curers, the consumers or the middlemen?

50. Can you suggest any reasons why the Government should reduce the issue price of salt and whether there are any considerations which should, in your opinion, induce the Government to lower the price?

51. Have you any idea of the quantity of fish salted?

52. Is there demand for more?

53. If so, what suggestions would you make in order to meet such demand?

54. Can the maintenance of the fish-curing yards be cheapened?

55. Are the fish-curing yards in the Presidency kept in the same way and under the same conditions as they are kept in other civilized countries?

56. If not, would you suggest any improvements?

57. Are the hygienic conditions and methods of curing satisfactory?

58. If not, what improvements would you suggest?

59. What would be the cost of effecting such improvements?

60. How is the cost to be met?

VI. FISHERIES CANNERY, CHALIYAM.

61. Are you acquainted with the working of the cannery at Chaliyam ?
62. How far has the cannery served its purpose ?
63. Was the institution used for the purpose of training outsiders ?
64. Are any persons so trained employed anywhere in the canning business after their training ?
65. Are there any canneries started on the model of the Chaliyam Cannery, and if so, what is their present condition ?
66. Is it a fact that canned fish from Malabar does not find a ready market in competition with imported canned fish ?
67. What in your opinion are the reasons ?
68. Can you make any suggestions to popularize Indian-canned fish ?
69. Have you any idea of the extent of foreign-canned fish imported into India as a whole and into the Madras Presidency in particular and by whom such fish is consumed ?

VII. EXPERIMENTAL STATION, TANUR.

70. Are you acquainted with the working of the Tanur Experimental Station ?
71. What was the purpose with which that institution was started ?
72. How far has that object been achieved ?
73. Can you suggest any improvement in the working of the station ?
74. How far, in your opinion, were the results of the experiments conducted in that station availed of—
 - (a) in fish-curing,
 - (b) in oil extraction,
 - (c) in guano preparation, and
 - (d) manufacture of fish meal,
 by fishermen and businessmen in the trade ?

VIII. INLAND FISHERIES.

75. What is the present line of operation ?
76. What is the policy of Government ?
77. What, in your opinion, is the relative importance of inland fisheries and sea fisheries in this Presidency ?
78. What is the work hitherto done to improve the rearing of fish in
 - (a) rivers,
 - (b) tanks,
 - (c) fresh-water lakes, and
 - (d) reservoirs ?
79. Are any statistics available to show the extent of fish supply from these sources ?
80. Are any figures available to show the number of fishermen professionally engaged in this business ?
81. Is any research work done in finding out what kind of fish grow in these waters with greatest facility ?
82. How many tanks are taken over from local boards and in how many districts ?
83. What is the annual compensation paid to these local boards ?
84. What is the revenue realized from leases ?
85. Is the expenditure justified ? How much does it amount to ?
86. How many fish farms are there ?
- 86 A. What is the nature of the work done there and with what results ?

87. How far do results justify the expenditure on the fish farms ?
88. Would you suggest any improvements in the methods of working ?
89. How far is the department empowered effectively to prevent the indiscriminate destruction of fish in inland waters stocked by the department ?
90. Under whose charge is each farm at present ?
91. Is such officer specially trained for the work required of him in that position ?
92. Will you please suggest any methods by which officers can be trained, say, under a specialist to be appointed, to take their places in the various fish farms conducting minor researches pertaining to particular classes of fish ?
93. In how many places are larvicidal fish reared and at what expense ?
94. What use has been made of these fish ?
95. How far is the expenditure justified by results ?
96. Can you suggest any methods of improvement ?

IX. KINDS OF FISH.

97. What are the kinds of fish that are of economic importance in your district which, in your opinion, should receive attention ?
98. Have you any problem which you consider should be solved by the Fisheries Department in connexion with fish or fisheries ?

X. PEARL FISHERIES.

99. Can you give us a history, as briefly as possible, of the pearl fisheries in this province ?
100. Can you tell us the more important problems connected with this industry ?
101. Are the operations so far conducted efficacious ?
102. Can you suggest any improvements in these operations ?
103. Can the present cost of working be reduced ?
104. Can you suggest any improved methods of pearl fishing ?
105. For instance, can mechanical appliances be utilized, thereby dispensing with diving ?
106. Should the department continue to manage pearl fisheries directly ?
107. Is it desirable or profitable to lease out the fishing rights to contractors ?
108. What are the labour problems connected with pearl fishing ?
109. Can you make any suggestions to improve labour supply or labour conditions ?
110. Is any research work done in connexion with pearl fisheries ?
111. If not, would you recommend any research ?

XI. CHANK FISHERIES.

112. Can you give us a history, as briefly as possible, of the chank fisheries in this province ?
113. Can you tell us the more important problems connected with this industry ?
114. Are the operations so far conducted effective and efficacious ?
115. Can you suggest any improvements in these operations ?
116. Can the present cost of working be reduced ?
117. Can you suggest any improved methods of catching chanks ?
118. For instance, can mechanical appliances be utilized for catching, thereby dispensing with diving ?
119. Should the department continue to manage chank fisheries directly ?

120. Is it desirable or profitable to lease out the fishing rights to contractors ?

121. How far is it, in your opinion, a legitimate function of the department to work, on lease, fisheries which are not the property of Government ?

122. Does it amount to interference with private enterprise or competition ?

123. What are the labour problems connected with chank fishing ?

124. Can you make any suggestions to improve labour supply or labour conditions ?

125. Is any research work done in connexion with chanks ?

126. If not, would you recommend any research ?

XII. RESEARCH.

127. What section of the staff is capable of doing research work at present ?

128. What is the kind of work they have been doing till now and with what result ?

129. Are the results of such research published and, if so, on what subjects ?

130. Has the investigation of any particular kind of fish been undertaken ?

131. If so, in what cases and with what results ?

132. How far is equipment provided ?

133. Is it a fact that Sardine and Mackerel have disappeared altogether on the West Coast and, if so, in what places ?

134. Is it not a fact that they appear only in particular seasons of the year ?

135. Have they disappeared to any large extent in recent years ?

136. Do you consider this abnormal ?

137. If so, what investigation or research has been made to find out the causes ?

138. Are they capable of investigation ?

139. What other kinds of fish in your opinion require investigation in this line ?

140. Is the present research staff sufficient for this purpose ?

141. If not, what recommendations would you make for increasing the staff ?

142. What is the policy and programme of the existing research section ?

143. Has any research been conducted in exploring further fishing grounds ?

144. Did the problem of exploring fishing grounds beyond the 100 fathom limit arise ?

145. Is the problem pressing just now ?

146. Do you think it is worth the while of the department to investigate the possibility of discovering new fishing grounds and of determining suitable craft and gear that will enable fishermen to go beyond their present limits ?

147. What, in your opinion, is the exact scope of research to be undertaken by the department, say within the next ten years, and what research staff and equipment do you consider necessary for that purpose ?

148. Are you acquainted with the working of the trawler "Lady Goschen" ?

149. Was any research work done by her ? If so, with what results ?

150. How far is she equipped for research work ?

151. What other equipment is needed on board the trawler for such investigation ?

any marine biological research carried on at present ?

153. If so, how far has this a bearing on the question of—

- (a) marine fisheries,
- (b) pearl fisheries, and
- (c) chank fisheries ?

154. In what other directions, if any, would you recommend that marine biological research should be undertaken ?

155. Which line of marine biological research do you consider of greatest urgency at present ?

(a) Research on Inland Fisheries.

156. On what lines has research been undertaken with regard to Inland Fisheries ?

157. Do you consider that all or any of these can be dropped for the present ? Are there any others of greater importance ?

158. Do you consider the present staff enough for the work involved ?

159. If not, what recommendations would you make ?

(b) Technological research.

160. What do you consider is the relative importance of technological research and biological research in connexion with fisheries ?

161. How far is this proportion borne out by existing staff and work ?

162. What alterations, if any, would you suggest ?

163. What work has hitherto been done in effecting improvements in boats, nets and methods of capturing fish ?

164. How far do you consider this work should be continued ?

165. What improvements over existing methods are, in your opinion, necessary in the keeping, landing and otherwise handling catches ?

166. What research has hitherto been done in connexion with—

- (a) oil contents of various classes of fish,
- (b) refinement of oil, medicinal value thereof,
- (c) fish meal,
- (d) guano,
- (e) hygienic methods of fish-curing,
- (f) canning, and
- (g) other methods of fish preservation including refrigeration ?

(c) Aquarium.

167. Do you consider an aquarium a necessary adjunct to marine biological research ?

168. Besides research, do you consider that an aquarium will be the means of providing popular education ?

169. Do you think the aquarium at present at Madras should be developed and, if so, in what directions ?

170. Do you consider that more aquaria should be established in other places and, if so, where ?

XIII. TRANSPORT.

171. What transport facilities do you consider necessary for the development of the fishing industry ?

172. How far are they already available and what improvements would you suggest ?

XIV. SOCIO-ECONOMIC WORK.

(a) Co-operation.

173. To what extent is the co-operative movement introduced among fishermen and in the fishing industry ?

174. Would you suggest any modification in organization, extent or other development ?

175. Have any benefits accrued or are they likely to accrue from the present arrangement by which officers of the Fisheries Department assist those of the Co-operative Department ?

176. Would you suggest any modification ?

177. What attempts have hitherto been made to organise co-operative societies of fishermen

- (a) for catching fish, and
- (b) for sale of fish caught ?

178. What success has attended such attempts ?

179. Would you make any suggestion for development in those directions ?

180. Do you consider that special concessions in the form of bounties or advances are necessary for the purpose of promoting co-operative societies, either catching societies or selling societies ?

181. Is it a fact that the work of the Fisheries Department with co-operative societies has up to the present been confined to the West Coast ?

182. If so, do you recommend that this work should be extended to the East Coast as well ?

(b) Education.

183. How far is the present general system of elementary education in the country suited to the needs of the fisher-folk and how far has it influenced them ?

184. Do you consider that a modified system of education is required for this community ?

185. If so, how should it be directed and controlled and by whom ?

186. What is the number of separate schools now maintained for the benefit of the fisher-folk ?

187. How far have they served their purpose ?

188. Should the system be continued and developed ?

189. Should it be extended to the East Coast ?

190. What recommendations are you prepared to make in

- (a) the curriculum,
- (b) the staff,
- (c) the equipment, and
- (d) means of providing the staff for these schools ?

191. Do you consider that the fishing industry has developed sufficiently to require technological instruction and training of apprentices in the several branches of the industry ?

192. If so, what means would you suggest and what centres would you propose for such work ?

XV. ZOOLOGICAL SPECIMEN SUPPLY.

193. Do you consider there is need for the supplying of Indian biological specimens to schools, colleges, etc. ?

194. If so, should this work be undertaken by the Fisheries Department and, if not, by whom should it be undertaken ?

195. Have you any suggestions to make in connection with this work ?

XVI. STAFF.

196. How far can the various experts required on the research staff of the Fisheries Department be combined ?

197. How far is fisheries research dependent on the administrative duties now performed by the department ?

198. How far, in your opinion, can administrative officers be entrusted with research work ?

199. To what extent can the expert officers in the department be relieved from administrative duties ?

200. Is there any need for modification of the existing administrative staff ?

201. If so, what modifications would you recommend ?

202. Is there any possibility of retrenchment in staff ?

203. Is the staff, research and administrative, at present working, sufficient for the present requirement ? Does it require any additions under the modifications which you may recommend ?

204. Do you consider that the present pay and allowances are attractive enough ? If not, what modification would you suggest ?

205. Assuming that you recommend the appointment of a Specialist, for instance a Bio Chemist, would you have him as a permanent officer of the department or would you recommend his engagement on a high salary for a limited period ? What facilities in such a case would you recommend for training Indians under such an officer ?

XVII. FINANCE.

206. What are the total receipts and expenditure of the department under the main heads ?

207. What is the expenditure on the staff including pay and allowances and on stores, stationery and office expenses ?

208. What is the expenditure on sea fishing and research ?

209. What is the expenditure on inland fishing and research ?

210. Do you consider that the expenditure on research in comparison with other heads is sufficient ?

211. What is the expenditure now incurred on technological research ?

212. What is the expenditure incurred by the department on the education of the fisher-folk ?

213. What is the expenditure now incurred by the department on fish-curing yards ?

214. What is the annual expenditure on the Chaliyam Cannery ?

215. What is the expenditure on the Tanur experimental station ?

216. What is the expenditure on the aquarium ?

217. What is the annual expenditure in connection with the supply of biological specimens ?

218. What is the annual expenditure on pearl fisheries ?

219. What is the annual expenditure on chank fisheries ?

220. Is any expenditure incurred by the department at present on co-operation among the fisher-folk ?

In answering the above questions, please give the corresponding receipts also. The latest figures available for any year may be given.

Please also give the average figures for the last five years.

MINUTES OF EVIDENCE

TAKEN BEFORE THE

MADRAS FISHERIES COMMITTEE

Monday, July 9th, 1928.

MADRAS.

PRESENT :

M.R.Ry. Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, *Kt.* (*Chairman*).

Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, *M.L.C.*

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NOTE ON THE HISTORY, PRESENT CONDITION AND FUTURE DEVELOPMENT OF THE FISHERIES DEPARTMENT BY Dr. B. SUNDARA RAJ, DIRECTOR OF FISHERIES.

I. ORIGIN OF THE DEPARTMENT.

Half a century ago Mr. H. S. Thomas and Dr. Day urged the importance of developing fisheries as an important source of food-supply. Every civilized country has a Fisheries Department or organization which has conferred benefits on the industry, trade and people. A food industry, second only to agriculture in Madras, demands the special attention of Government especially as it is in the hands of a backward community in a primitive condition, bereft of capital, initiative and knowledge. Therefore in 1907 the Government of Madras constituted a small department of fisheries on the recommendations of Sir F. A. Nicholson that a special department which will make fisheries its sole and continuous business, was absolutely essential to deal with the vast and important fishery industries

of the Presidency. They are not only an important source of food but also of manure and require years of continuous study, experiment, stimulus and assistance before they can be developed on a sound basis.

II. AIMS OF THE DEPARTMENT.

2. The principal aims of the department are—

(1) to increase the food-supply of the masses directly or indirectly (as manure) by developing to their utmost capacity the marine fisheries of the Presidency by fuller exploitation and the fresh water fisheries by culture and protection;

(2) to stimulate the main and allied industries by improving old and introducing new methods with the object of gradually augmenting catches by intensive fishing or protection and scientific pisciculture as fisher-folk show capacity and initiative and to convert the fish which cannot be consumed as food into oil, manure and other by-products;

(3) to popularize improved method and gear by providing technical instruction on up-to-date lines and exhibitions and by publishing leaflets and bulletins through the medium of its expert staff;

(4) to translate the results of scientific investigation and study into actual commercial methods and practice of the country as a whole, by framing rules and regulations as required, for the proper development of the industry, by the safeguarding of fishing rights, public and private, by working bounties (fish-curing yards) Crown monopolies (Pearl and Chank) and by safeguarding and augmenting revenues (inland fisheries);

(5) to constitute a Bureau of expert knowledge and information for reference by Government and the public in all matters concerning fish and fisheries;

(6) incidentally to stock waters with larvicidal fish to mitigate mosquito-borne diseases and to supply zoological specimens to educational institutions;

(7) to improve the material and moral condition of the fisherfolk—a backward community to which the industry is relegated by the prevailing caste system—both in the interests of general welfare and as the best means of infusing life and introducing organization and initiative for the development of the industry;

(8) in order to provide the only possible sound basis for the above to engage continuously in scientific research (biological, hydrographical, biochemical, piscicultural and statistical investigations) with the aid of a competent and qualified expert staff which will result in introducing reforms and improvements that will gradually modernize the industry in all its branches in both apparatus and methods and ultimately render it absolutely up-to-date and efficient.

3. It will be seen that the primary objects of the department from its inception have been the development of fisheries and the fishery industries to their utmost capacity as a source of food-supply to the masses, remunerative occupation to the fisherfolk, and revenue to Government and that all other activities are accessories to this final goal. A few minor activities such as larvicidal stocking and supply of biological specimens are not directly concerned with the main object but have been undertaken to meet specific needs which cannot so readily be met by any other department.

4. Thus in surveying deep-sea fishing grounds, in experimenting with methods of curing and canning, in fish farming for stocking tanks and in investigating the life-history, growth, egg, nesting habits, diseases and parasites of fish as opportunities and staff are available, the department aims at augmenting and improving food-supplies. In organizing and developing pearl, chank and inland fisheries the department aims at increasing revenue. Simultaneously by educating the fisher-children, by organizing co-operative societies to provide capital and labour and by utilizing duty-free salt to encourage the adoption of improved methods of cure, the department aims at helping the fishermen to remunerative occupation.

III. ACTIVITIES OF THE DEPARTMENT IN THE ORDER OF THEIR MAGNITUDE.

5. At present the following are the chief lines of work arranged according to the amount of expenditure which coincides with the volume of work:—

	Taken from Civil Budget Estimate for 1928-29.
	RS.
(1) Fish-curing yards	2,67,500
(2) Deep-sea fishing and research	1,34,300
(3) Inland pisciculture and oyster culture	1,22,900
(4) Pearl and chank fisheries	69,200
(5) Education and socio-economic work	65,300
(6) Industrial research at Chaliyam and Tanur	37,300
(7) Biological research and aquarium	13,850
(8) Anti-malarial operations and supply of biological specimens	5,850

6. (1) *Fish-curing yards (Budget expenditure Rs. 2,67,500).*—The yards were transferred to this department in 1924. The Salt Department is not concerned with fish-curing and the Excise Department is not interested either in salt or fish. As purveyors of cheap salt and possessing the requisite technical knowledge of the industry, fisheries officers are in the best position to administer the yards. The results of years of research and experiment in the technology of fish-curing at Tanur, would have remained unused, but for the fact that the department gained possession of the yards and has pushed reforms in the fish-curing industry by demonstration, instruction and persuasion. On the West Coast where the department took over its first yards, there is no comparison between their condition before and after it assumed control. The fisheries officers in charge of the Government fish-curing yards are given a preliminary training at the Tanur station and the new methods are taught by them to the curers. The innovations were bitterly opposed as the curers failed to realize why they should be put to extra expenditure in manufacture when fish sold equally well whether cured hygienically or otherwise, and there was actually a strike of curers at some of these yards. In spite of this, however, progress has been very fair. At present there are 108 fish-curing yards under the management of the Fisheries Department and now yards are being established wherever there is a reasonable demand for them. As the new methods of fish-curing are slightly more expensive, wholesale reform cannot be effected except very gradually as most of the curers are extremely poor. Some of the methods which have been popularized are the provision of masonry curing sheds with cemented washable floors and adequate ventilation, cemented salt vats with rounded bottoms and corners, adequate salting, drying of fish on raised "thattis" or platforms, thorough cleaning and disinfection of the troughs and vessels used for curing, etc. The use of dirty self-brine has been stopped. Demonstration sheds where the curing is carried on departmentally have been constructed in three yards and more will be constructed as funds permit. The curers have been taught the correct proportion in which salt is to be applied to the fish to produce the best results and prevent waste.

In many cases the sheds and salting tanks required are constructed by Government in the first instance and the cost subsequently recovered from curers gradually by a slight addition to the price of salt purchased by them.

The methods of curing are being constantly improved as a result of continuous experiments that are being carried on at the Tanur station in order to improve the excellence of the cured products and to increase its keeping qualities. Every doubt or difficulty and every new problem in respect of fish-curing is referred by the officers in charge of the fish-curing yards to the Tanur station for advice or solution.

The Fisheries Department since the yards came under its control has steadily followed the policy of increasing the proportion of fishermen among the ticket-holders in the fish-curing yards and such proportion is much higher to-day than before the yards were transferred to this department. Attempts have also been made to open yards exclusively for fishermen; more than half a dozen are in existence now.

The Government of India have recently declared that the control of the fish-curing yards by the Fisheries Department is constitutionally appropriate and administratively effective.

This is a striking instance of how administration of fisheries and allied industries by the department is essential if the full benefit of its researches are to be derived by the country. In advanced Western countries where the industry is in a state of perfection and considerable private enterprise, initiative and capital are readily available, a scientific department of fisheries may well rest content with research and advice; but in a backward country like India, akin to Japan half a century ago, administration and active stimulation almost amounting to compulsion by a Government fisheries department is essential. They have contributed enormously to the development of fisheries in Japan. I need hardly point out that the fish-curing yards and their staff will be of use to the department in several other directions. The yard officers are being trained into advisers in the art of curing and marketing fish, as social workers for the inculcation of thrift and co-operation and for the dissemination of progressive ideas and such new methods and industries as the department is in a position to impart from time to time as a result of its researches at the Tanur station. They are also being trained to collect statistics regarding the value and quantity of sea fish landed as well as to record observations of great scientific and economic value to fisheries such as the occurrence, abundance, food and spawning of important edible sea fish. An earlier attempt to collect such statistics was made by Sir F. A. Nicholson in 1907—vide page 65, Bulletin No. 1—but nothing was published till 1916 (Bulletin No. 9) apparently because the statistics were unreliable since at that time there were no responsible officers of the department in the yards to check them. Then although a special officer was deputed to the yards for checking, he could only deal with fishermen's boats and gear and not with landings.

7. (2) *Deep-sea fishing and research* (Rs. 1,34,300).—Prior to 1923 this was quite a small section but since the acquisition of the trawler and the entertainment of a master fisherman it has become a major activity of the department. Fishing methods now in vogue have remained primitive and inefficient. Sea fisheries are carried on all round the coast with canoes and catamarans and primitive nets and tackle and the area fished is no more than the narrow inshore belt of 5 to 6 miles width. The potentialities of the sea beyond have not been explored or ascertained. A great deal of investigation by experts is needed in surveying grounds and for effecting improvements in fishing gear and methods. Though Sir F. A. Nicholson has urged the need for work in this direction from the very inception of the department—vide paragraphs 186 to 191 of his Note on Fisheries in Japan (1907) and his subsequent letters in Bulletin No. 1 (vide page 82)—no material progress could be made in the absence of experts and a proper research vessel. The history of the work done is briefly as follows:—

In 1908 the Honorary Director discussed this question *in extenso* in his letter of 5th May 1908, pages 82 to 96, Bulletin No. 1. He concluded that steam trawlers or drifters are not needed for the present, being too far removed from indigenous craft. He therefore decided on the introduction of large sailing boats. Two boats, one a sailing vessel of 12 tons and the other a 15 horse-power motor vessel of 25 tons (Sutherland), were constructed and fishing experiments beyond the usual range of the local boats were conducted. A little later two Ratnagiri sailing boats were chartered for the same purpose for a short period. The pearl fishery steamer "Margarita" was employed as an inspection boat for deep sea fishing and research. In 1908, Mr. Hornell reported possible fishing centres and harbours of refuge for fishing boats. He also conducted a preliminary cruise on the Malabar coast and round the Laccadive Island with S.S. "Margarita" (Reports Nos. 3 and 4 of Bulletin No. 4). In 1916 two Ratnagiri boats were purchased for further experiments but were abandoned soon after. From 1917 to 1921 experiments were tried on the East Coast with Malabar canoes and nets but these also led to no useful result. It is not surprising that these experiments were not a practical success and led to no tangible results since there was no expert master fisherman to direct them. They did, however, indicate the need for a suitable large power boat for purposes of inspection and investigation. In 1919 the question of building an inspection vessel on the model of a modern steam trawler was examined by a Committee, but Government vetoed the proposal in view of the enormous cost involved. In 1924, on Mr. Hornell's recommendations, experimental

Danish seine net fishing was conducted off Cochin with a motor launch specially purchased for the purpose through the India Stores Department; under the supervision of a European master fisherman, but the motor vessel proved unsuitable in design and equipment and the experiments ceased.

The proposals to obtain a full-sized trawler for inspection, deep-sea fishing and research were again revived in 1924 for the following reasons:—

(1) New Admiralty trawlers were available at a small cost after the conclusion of the war.

(2) Previous experience with sailing boats and motor vessels had shown that the exploration of deep sea fishing grounds can only be done satisfactorily by a proper large-sized steam trawler. (Fishery research vessels in Europe, Ceylon, Federated Malay States and elsewhere are of this type.)

(3) Only such a vessel could afford the facilities and comfort required for the work to a European master fisherman.

(4) The cost of purchase and upkeep of the trawler will be more than paid for by the transport of salt to the West Coast fish-curing yards during her research cruises.

In March 1926 the department acquired the services of an expert master fisherman and a fishing vessel for the development of marine fisheries, but the Stores Department failed to exercise the necessary care and scrutiny and the vessel arrived with defective boiler and equipment.

Its immediate object is a survey of our coastal seas up to the 100 fathom line and the quantitative testing of these waters by trawling, Danish seine netting and all other up-to-date gear. The work is an enormous one and will take many years. Owing to defective gear, boiler and difficulty in obtaining suitable crew, serious work commenced only in November last. The extensive submarine plateau of some 4,000 square miles in extent off Cape Comorin, being the best known deep-sea fishing ground, was first taken up for systematic examination. A preliminary survey has been made and a report has been submitted to Government. The nature of the bottom so far ascertained has been mapped. The places where abundant fish were caught have been noted. The obstructions and dangers to trawl nets have been charted in the accompanying maps. The same ground will have to be fished at all seasons of the year before its fish contents can be accurately ascertained. The grounds will have to be tested by the Danish seine net, the American purse net, by long lines and full sets of drift nets, before the quantities and kinds of the mid-water and surface fish of the bank can be determined. The trawler is not equipped with such gear at present, nor has she a laboratory and cabin accommodation for proper research. Proposals to refit her are under the consideration of Government. Only after the conditions are fully ascertained and the grounds properly surveyed can the question be considered of equipping local boats with new gear or building larger craft for the purpose and can the possibility arise of inducing private enterprise to work the new grounds discovered with such craft and tackle.

Simultaneously with experiments in deep-sea fishing the trawler has been making observations and collections and noting data regarding temperature, salinity, plankton (fish food floating in the sea) and bottom organisms. The presence of shoals of fish, their local movements and migrations, their appearance and seasonal abundance have been definitely traced to three important causes:—

(1) Spawning.

(2) Feeding.

(3) Temperature and climatic changes.

The hilsa have long been known to migrate in shoals up the rivers and the flying fish have recently been discovered to congregate in enormous shoals along the shore for purposes of breeding only. The sardine and herring visit the coasts of Europe and America almost exclusively for their food consisting of plankton and the mackerel have been shown to migrate with the rise or fall of temperature. I need hardly emphasise therefore the importance of a study of these causes in ascertaining the whereabouts of food fish in India also. Everywhere in the world where fishery research is conducted such data are invariably collected and we cannot but follow this lead if research is to be pursued on sound lines. The Calicut and the Kursadai stations are working out the collections made by the trawler under my personal supervision and at the Madras Aquarium laboratory the samples of water collected by the trawler have been analysed for chlorine, etc.

8. (3) *Inland pisciculture and oyster culture* (Rs. 1,22,900).—The object of the work is the development of the fisheries in inland waters by protection, stocking and culture. Unlike sea fisheries, where more extensive exploitation is required, in the case of inland fisheries the chief need is the prevention of blind destructive methods of fishing and the increase and improvement of stock by fish farming. The only principle adopted by the local fishermen is to catch and destroy all fish down to the last tadpole. The adoption of piscicultural methods, fish stocking and rearing and the introduction of improved methods for the continuous fishing of deep permanent water tanks and rivers, now wholly unworked, will add enormously to the productivity of our rivers, tanks, ponds and wells.

On a rough estimate, these fisheries are capable of yielding 502,500 tons of food fish when properly developed but it is certain that under present conditions only a small part of this is actually produced. Further the fisheries in most of the tanks and rivers belong to the Crown and this is an additional reason why Government should undertake their development. Mr. Wilson, a practical fish culturist, was entertained in November 1907 to investigate the propagation of trout on the Nilgiris. Trout have since been established on the Nilgiri plateau through the medium of a trout hatchery at Avalanche. He took up investigations on the plains from 1907. Four fish farms were established as a result of his labours—

One at Sunkesula in 1909.

One at Ippur in 1914.

One at Powder Factory, Perambur, Madras, in 1915.

One at Praema in 1916-17.

Three others were started in continuation of his work:

One at Vellore in 1922.

One at Mopad—1927.

One at Chingleput—Under construction.

The purpose of the fish farms is to study the spawning, growth, food, etc., of different species of exotic and indigenous fresh water fish and breed large numbers of improved kinds in captivity for stocking canals and tanks. The fisheries of tanks and rivers were assigned to district boards some years ago, but these local bodies did nothing to improve them. The Fisheries Department has initiated a scheme whereby irrigation tanks and other inland waters are surveyed district by district and those found suitable are arranged in groups round fish farms and centres where fish breeding and rearing are carried on and whence each year fry of good varieties are distributed in large numbers to reinforce the natural stock in surrounding tanks. The fish rents from tanks and rivers were assigned to district boards years ago as a source of revenue but the boards did nothing to effect improvements. The fishing rights and revenues in these tanks are being reacquired gradually by Government, compensation being given to the district boards on the average of the previous five years' rents. The fresh water fisheries administered by the department yield a handsome profit to Government deducting all charges including compensation paid to the district boards, which is in itself an indication that the Fisheries Department has succeeded where the district boards necessarily failed through lack of expert knowledge.

The Retrenchment Committee and subsequently other critics have assigned the increase in fish rents to a general increase in prices all round and not to piscicultural operations. This doubt is eliminated in the case of the Chingleput and Nellore district tanks which were acquired in 1920-21. I give below the rentals realized for five years from the tanks in these two districts:—

Chingleput and Nellore District Tank Stocking Scheme.

—	1922-23.	1923-24.	1924-25.	1925-26.	1926-27.	Total.
	RS. A.	RS.	RS. A.	RS. A.	RS.	RS.
Receipts from fisheries ..	16,185 5	15,706	18,046 5	25,240 4	18,370	93,548

Five years are quite insufficient to judge the efficacy of stocking. As the compensation paid to the district boards since 1920-21 is Rs. 13,615 and represents the average annual rent of these fisheries for the five years ending 1917, the average increase of revenue during the five years the department controlled the fisheries is Rs. 5,004 per annum or 37 per cent and this in spite of the fact that there was insufficient rain in two of the five years (1924-25 and 1926-27). There has been an appreciable decrease in prices in some foodstuffs but no appreciable increase in prices since 1920-21 to account for the 37 per cent increase in revenue. There can be little doubt therefore that fresh-water fisheries when stocked and improved are bound to show an adequate increase of fish despite the many difficulties and uncertainties in the realization of such revenue, which is the only available index of the value of the fisheries as food for the masses.

The programme for the future is to bring the whole of the suitable tanks in the Presidency under the department's control eventually. So far detailed schemes for the development of only three districts, Nellore, Chingleput and Ganjam, have been worked out, and the last has for the present been postponed by Government. To render successful the fish stocking of inland waters much patient research and experiment are necessary. The subject is complicated owing to a tropical and dry climate, the habits of fish which are still largely unknown, the custom of the country, the nature of rivers, the irrigational use made of them and the like. Notable success has been achieved in breeding *etropus*, *gourami*, *tench* and *hilsa* though the first named is the only fish in which the work has yet progressed far enough to improve the fish supply in tanks and rivers. The following is a summary of the cultural work of the department.

Murrel.—The earliest experiments in Sunkesula farm were in murrel breeding. Though the eggs of murrel are easiest to collect and hatch the larvae after a certain stage are exceedingly difficult to rear on account of the specialized live-food they need. Adult murrel also thrive on live-food and never keep in condition on a diet of artificial food in ponds. To maintain a few select breeders in special ponds with shallow margins and an abundance of weeds suitable for nesting, on a diet of live minnows, carp and frogs and annually to transplant the fry obtained to extensive marshes with rank vegetation teeming in worms, insects and frogs was found to be the best method of cultivating them.

Carp, labeo, catla, barbus and etropus.—Preliminary experiments in rearing indigenous inland species of carp, labeo, catla and barbus were not a success. As however the best of these fish are bony and insipid, the acclimatization of estuarine and exotic species was taken up by Mr. Wilson. A backwater perch in South India *Etropus suratensis* was selected as particularly suitable for introduction into tanks and streams inland. The fact that it is a nest builder and chooses submerged rocks for attaching eggs not being known, the earliest experiments to breed the fish proved abortive. It was only after the breeding habits of the fish had been studied and suitable nests were provided in 1917 that the prolific breeding of the fish in the fish farms followed. The culture of this valuable addition to the fresh-water food fishes of the Presidency on an extensive scale, through the medium of fish farms for stocking tanks and rivers, has now been finally accomplished. That biological investigations, chiefly those relating to the habits and life history of fish, should necessarily precede successful piscicultural practice, or for that matter all schemes of economic fishery development, is here clearly demonstrated.

Gourami.—This exotic fish, well known the world over as the best fresh-water food fish, was introduced for acclimatization and cultivation in the fish farms, for stocking tanks, lakes and rivers. One hundred and twenty-two live specimens were transported from Java in April-May 1916 and 95 specimens from Mauritius in the same year. The fish have continued to thrive and breed ever since and many generations are now available. Though specially adapted for pisciculture, no experiments on intensive cultivation have been made on account of the limited accommodation available in the four fish farms that have been so far opened. It has not therefore as yet been possible to utilize them for stocking tanks.

Tench and English carp.—The first experiment to acclimatize *tench* introduced some years ago and now thriving on the Nilgiris, into the waters of the plains of the Presidency was made by bringing a consignment to

Hosur on the Mysore plateau in February 1913 and placing the fish in Jeejur and Mattigiri tanks. In February 1914, a further consignment of tench and English carp was brought down from the Nilgiris and placed in ponds in the Sunkesula farm. In September 1921, after seven years the tench bred for the first time, indicating the success of the acclimatization experiment. Unfortunately the fish and their offspring were lost in 1923. A new consignment of tench has now been brought to the farm for acclimatization. The English carp, however, have not bred so far, though they have grown and are in fine condition.

Fresh-water mullets.—The presence of stray specimens of large mullets in fresh-water tanks close to the sea in the Nellore district discovered in 1918-19 led to the experiment in cultivating in fresh-water tanks the fry of selected species abundantly available in backwaters and estuaries everywhere. Growth experiments in the Ippur fish farm have proved that mullets grow very rapidly in tanks. The conditioning of mullet fry and their transport, however, presented difficulties as large numbers died in this process. But experiments proved that if the fry are conditioned in running water in the very creeks or streams where they were taken there was no appreciable mortality. As a result of these experiments, mullet fry have been extensively employed since 1920 in stocking tanks and channels in Nellore and Chingleput districts. But the operation is still purely empirical and requires considerable research before all the facts concerning mullets and the conditions governing their growth in fresh water are ascertained and utilized. Only a few of the numerous species of mullets grow to a marketable size and of these still fewer are adapted to live in fresh water. It is therefore necessary, if mullet stocking is to yield any result, to distinguish the fry of the large fresh-water mullets from others. This has not been done so far. The characters of the fry remain yet to be determined before selective stocking of fresh-water tanks, with these fry, could be done on a practical basis. The Inspector of Fisheries (Inland) has been instructed to undertake the work under my personal supervision in the laboratory attached to the Aquarium, but little has been accomplished owing to want of time, as both of us are touring officers with much other work to do.

Hilsa.—The Cauvery in the south, and the Kistna and the Godavari in the north, are the chief rivers in this Presidency which are visited during the south-west monsoon by shoals of breeding hilsa; extensive and valuable fisheries exist in these rivers. Consequent on Dr. Day's report on the disastrous effects of anicuts which obstruct the free ascent of fish to their natural breeding grounds and facilitate their capture and destruction by fishermen in enormous numbers, Government have been taking steps since 1869 to safeguard the hilsa fisheries from possible extermination. The suggestion of Dr. Day to construct fish passes across anicuts was tried in his time at the Lower Anicut, but was found ineffective as hilsa would not ascend them. In 1909, the question was revived by Sir F. A. Nicholson. After an exhaustive enquiry fish passes as a protective measure had to be finally abandoned. The proposal for the construction of a hilsa hatchery as the only satisfactory solution of the problem was approved by Government in May 1909. The proposal was (1) to establish a hatchery at Lower Anicut (Coleroon) to strain fish artificially, fertilize and hatch the eggs and (2) to rear the fry in suitable growing grounds before liberating them into the rivers. The earliest experiments conducted were successful in founding a few eggs in earthen pots but for some reason or other the hatching of eggs in the hatchery since its construction in 1909 to 1915 was not successful. From 1915-1921 the experiments made by Mr. Wilson were continued by me, the details of the methods of impregnating hilsa eggs, their subsequent treatment and hatching on a large scale were all successfully worked out, and accomplished. The equally difficult problems of rearing the fry till they are of sufficient size before liberating them into the river, remain to be solved. The fry when hatched are mouthless, hardly 3 mm. long, float belly upwards when resting and swim at intervals by rapid corkscrew movements of the body. They are nearly as defenceless as eggs and, if hatching operations are to achieve the maximum results in increasing fish, the fry should be nursed in sheltered waters till of sufficient size to go to sea. The process of rearing the fry is one of the most difficult technical problems which confronts us and can only be solved after many experiments and prolonged research. The Collair lake and the net work of Godavari and Kistna rivers seem a very favourable locality and a hatchery has been proposed at Bezvada.

Other fish.—Besides the fish mentioned above there are numerous other fish of potential value to inland fisheries such as *catla*, *mahseer*, *labao* and *barbus* in fresh water and the *milk-fish*, *megalops*, *clops* and *polydoras* in backwaters which when thoroughly studied and effectively cultivated will enrich the fisheries of rivers, tanks and estuaries.

The conservancy of the Bhavani and Moyar and Hoginkal falls, the fish breeding and stocking of tanks and rivers, the scientific control of the fisheries including regulation of mesh, prohibition of dynamiting and poisoning and other destructive methods and the evolution of methods of continuously fishing tanks have already benefited the inland fisheries to an appreciable extent. Fish rents have decidedly increased, towns in the neighbourhood of fish farms now obtain a perennial instead of a precarious supply of fish, for instance, Kurnool, Kanigiri and Udayagiri in the Nellore district, and inland fishermen almost on the point of extinction have been protected and encouraged to form co-operative societies by the grant of leases of tanks and rivers on favourable terms to them. Besides the many benefits mentioned above which only a technical department could achieve, the main result is the undoubted addition to the food supply of the interior evidenced among other things by the rapid increase in rents.

9. (4) *Pearl and chank fisheries (Rs. 69,200).*—The aim of this section of the department is the organization and development on scientific lines of the ancient chank and pearl fisheries with a view, both, to ensure the prosperity of the fishermen who engage in these fisheries, to the exclusion of the middlemen, and to safeguard the revenues to the State.

The chank fisheries of Madras are worked off the six southern maritime districts on the East Coast. The important ones are those of Tinnevely and Rannad. The former yields from 1½ to 2 lakhs of shells per annum, the latter, leased for 15 years for the sum of Rs. 60,000 from the Raja of Rannad, usually produces from 2 to 2½ lakhs of shells. The smaller fisheries of Tanjore, South Arcot, Chingleput and Nellore are leased to contractors.

Pearl fisheries also exist off the Tinnevely and Rannad coasts. From causes still obscure the pearl banks are seldom productive. While chank fisheries are annual, the pearl fisheries are intermittent. Prior to the fisheries of the last three years there was no pearl fishery since 1908.

On an average the pearl fisheries yield somewhat more than chank fisheries. The average net revenue from either of these per year works out to about Rs. 15,011 and 14,333 respectively. These prerogatives of the Crown have been handed down from the ancient Hindu Kings. From the beginning of the 19th century these fisheries have been administered by the British. From 1801 to 1876-77 the fisheries were leased out to two cotton merchants of Tuticorin, Mr. Cocq and Mr. Barter, who undertook the entire organization and conduct of the fisheries. Difficulties with the renters and the belief that direct management of the fishery would result both in increased profits to Government and improvement in the condition under which the divers worked led the authorities to abandon the renting system in 1876. Henceforward the Port Officer of Tuticorin was Superintendent of these fisheries and organized and worked them departmentally. The anticipations of Government were justified. Against the annual rent of Rs. 7,566 realized during the 33 years prior to the resumption in 1876, Rs. 10,521, very nearly one and a half times the revenue, was realized from the chank fisheries during the subsequent 33 years up to 1908-09. Mr. H. S. Thomas in paragraph 96 of his report on the pearl and chank fisheries in 1884 recommended that if Government should ever contemplate constituting a Fisheries department, these fisheries should be combined with it and given the benefit of scientific supervision. As it was, these fisheries were under a very busy officer (Port Officer) with a daily increasing business to supervise a distant duty totally foreign to his primary duties and one for which he, in all probability, had no previous training and possibly no taste. The administration of the fisheries under these conditions was found to be unsatisfactory. In the interest of the Government revenue and of the fishing population of the coast they were transferred to the Fisheries department in 1908 when Mr. Hornell was appointed Marine Assistant. With the greater attention to management and sale of chanks by the technical department, highly gratifying results have accrued in all directions.

The highest number of chanks ever fished in any season was in the year 1915-16; the maximum revenue in any year from chank fisheries was in the year 1918-19. The average annual revenue from chanks during the 18 years under the Fisheries department was Rs. 18,229. The greater revenue was not, as attributed by the Retrenchment Committee in paragraph 272 of their report, due to the fact that the prices of chanks have increased, but to the efforts of this department as the increase in prices are offset by the increased cost of labour.

The maximum revenue from pearl fisheries during the last 100 years was in 1927-28. Taking the productive cycle of years from 1926-28, the gross revenue was Rs. 9,08,915, a higher aggregate than for any previous period of three consecutive pearling years for which we have a record.

The departmental working of the pearl and chank fisheries has benefited the divers, chank workers and merchants and the present condition of the industry is highly satisfactory and prosperous. The divers are no longer under perpetual debt to capitalists (*mudalalis*) but are independent wage-earning labourers, to whom advances for boats and equipment are made directly by Government on easy terms. The consumers, the chank workers of Bengal, have been assigned the monopoly for the purchase of shells on highly favourable terms, thus cutting out the middlemen who fleeced them almost to the point of extinction. The pearl fisheries have been retrieved from the evil repute into which they had fallen during the last 100 years or more and the Tuticorin fisheries have outshone those of Ceylon which previously has always occupied a higher position in the estimation of pearl merchants. Conditions were never more satisfactory or prosperous for pearl and chank fisheries than they have been during the last few years. More economic or efficient methods of work are difficult to conceive of. Dredging of banks to save expenditure on labour, apart from the discontentment it will cause to the large body of divers, is objectionable on technical grounds as it would destroy the banks. In consequence it has never been adopted in Ceylon or India.

The fishing for chanks as well as pearl oysters is by volunteer labour, paid by the number of shells in the case of chank and in kind in the case of pearl oysters. Facilities have to be afforded to divers free of cost such as towage to and from the fishing grounds, buoying of beds, provision of camping quarters, etc., to the mutual advantage of divers and Government.

The lease of the Rannad chank fisheries from the Raja of Rannad closes with June 1928. For the progressive improvement of the chank fishery, a renewal of the lease seems necessary.

We depend entirely on the Rannad district for divers for working the Tuticorin pearl and chank fisheries. The independent working of the Rannad chank fisheries will cause innumerable difficulties and friction in the adjustment of wages, with the fixing of prices and, worse than all, it will facilitate the illicit removal of Government shells. Further, since the pearl and chank beds are for the most part identical it will be necessary to prohibit chank fishing when there are oysters on the beds. In such a contingency the interests of Government are likely to clash with those of the Raja besides giving opportunities for the Raja's men to pilfer pearl oysters.

With a view to economy and as a means of controlling diving labour I have been enquiring for a suitable simple diving dress. A mask with an oxygen tube for breathing is largely used by Japanese divers in shallow waters. This is comparatively inexpensive and is well adapted to the warm waters of the tropics. One trial suit ordered arrived with the glass broken and the mask has been returned to the makers for repair. If the experiment succeeds, a regular body of divers could be trained and entertained on the permanent establishment of the department.

There are three motor boats and a motor inspection schooner, the annual maintenance of which costs Rs. 22,400. They are maintained for towage of chank canoes to and from the banks in the Tinnevely and Rannad districts and for the control and supervision of the fishing operations such as the return of undersized chanks while still alive to the sea, the systematic fishing of chank beds and the prevention of over-fishing of banks, the

safeguard of left-handed chanks whenever they are fished and the safe landing and storage of chank shells and so forth. The expenditure is unavoidable if the chank fisheries are to be worked efficiently. During pearl fisheries they subserve a similar function and patrol the pearl banks and pearling operations. The inspection schooner 'Lady Nicholson' is the only schooner that provides accommodation to inspecting officers for the periodic inspection, annual or biennial of pearl banks and chank beds, for buoying the beds, for fishing and for other scientific work connected with inspections. When the trawler 'Lady Goschen' is equipped with a laboratory and cabins, it might be possible to use her in the place of 'Lady Nicholson' provided the 'Lady Goschen' could spare the time amidst her varied duties. The matter can only be decided after experience of the next two or three years.

The pearl and chank fisheries are now as fully organized as present conditions permit. The benefits resulting from their departmental working are increased revenue, the improved material and moral condition of divers and the profits and satisfaction to merchants and the interested public.

10. (5) *Education and socio-economic work (Rs. 65,300).*—At the inception of the department its first and chief object of investigation and effort was naturally the development of fisheries as a source of food. Very soon it became obvious that in developing the fishing industry for the benefit of the consumer, an essential consideration in the present condition of India was the producer. Not merely does the development ultimately rest with him, under the peculiar caste system prevalent in India, but his welfare is just as important as that of the consumer. It was felt that it was not an absolutely new industry that was to be introduced to which any one in the country may and will resort but the development of an ancient and indigenous one employing vast numbers of people, forming an exclusive caste, with immemorial interest and customs, who ought to develop in the same proportion as the industry, in status, intelligence, independence and wealth. In the words of Sir F. A. Nicholson "The fisherfolk on both the coasts are in general at a very low stage of intellectual, social and economic development; their calling is despised largely by reason of the character of the material and products in which they deal and the consequent condition of their houses and hamlets; they are as a class very poor, deeply in debt, in most places so controlled or exploited by middlemen, curers, and money-lenders as to be almost serfs; *'sic vos novobis lanificatis oves'* and like the 'silly sheep' they cannot stir on their own behalf; they are among the most utterly ignorant classes of the Presidency having in general neither schools nor teachers, while their absence day and night at sea places them largely out of touch with the rest of the population with current ideas; improvident partly because of their poverty and hopelessness, partly by hereditary custom based on the fact that what the sea gives them to-day it will probably give to-morrow; partly because there is no means whatever of putting by savings or windfalls such as often happen in lucky seasons; intemperate partly because of their calling, partly from ignorance; partly again from hereditary custom which refuses to allow a son to despise or depart from even the weakness and vicious habits of his father, partly from the absence of recreations and outside rational or civilized interests or pleasures; as the Assistant Director says the toddy shop is often 'the nearest sign of civilized life', and in fact it is too often at or near the toddy shop that their village consultations are held. Their position is totally different from that of an agricultural village with its mingling of castes and classes, with its village head and other officials of standing, with its schools and shops and trade and market and often its post office and savings bank, with its longstanding communal life and often its ancient co-operative interests as in the common management of its irrigation works, its temple, and other items of village interest, or its share in the stir of life as one of a series of similar and continuous units in a union, taluk or district. The fishing hamlets mostly consist of a set of dirty huts set in foul surroundings, inhabited by an ignorant set of people, without internal or external interests except the daily capture and sale of fish without guides or teachers for almost all are on a similar level of ignorance; without public-spirited men either within or without their own community to help them; of interest to big men only as subjects of exploitation."

This is the reason why general education and influence of village schools had not perceptibly touched the fishermen of this Presidency and a new system and agency for education, specially designed to meet their needs and condition, had to be arranged *de novo*.

The first efforts of the department were necessarily of an informal and unsystematic character. From 1910, one of the Assistants of the Honorary Director of Fisheries who was himself a member of the fishing community, began the work of impressing on the members of the community, by informal talks and private conversations, the necessity and benefits of co-operative action, abstention from liquor, etc. He found the germ of co-operation in a society in Mangalore and helped to develop it. An indigenous temperance society at Malpe in the South Kanara district formed the starting point for temperance work in the district. A special fisheries school was also started in 1913 at Tanur. Gradually the number of co-operative societies, schools and temperance societies started under the auspices of the department increased. But the work was still carried on in a small and unmethodic manner.

Between 1917 and 1919 Sir F. A. Nicholson submitted to Government comprehensive schemes to establish special fishermen schools at every important fishing centre, to start co-operative societies and conduct propaganda against habits of intemperance, of extravagance and prejudices that have stood in the way of the progress of the community.

The proposals were, that Government permit this department to organize the development of the fisherfolk as a primary duty of a special department (1) by the stimulation of co-operative societies on the basis found most advisable, (2) by utilizing such societies when necessary, as channels for Government loans, (3) by training each year successive series of educated young men to live among the people in their villages in order to be the right hands of the department in organizing co-operative, economic and social societies; in inculcating thrift, temperance, self-help, in serving as advisers and arbiters in cases of difficulty; in inquiring into the conditions, indebtedness, etc., of the villagers and assisting Government in combating or removing such indebtedness; in ascertaining the need and security for loans, in establishing and teaching schools specially suited by hours and subjects to the fisher-children.

11. *Education*.—All fisher-boys above a certain tender age, work on the boats or are in attendance on the men on the beach, etc. If the boats go to sea in the early morning, the boys will not be home till the afternoon, or if only in attendance on the beach the boys will have to be there in the afternoon. If the boats are out all night, the boys coming back from the sea will be too tired for the morning school and the others will be in attendance on the beach in the afternoon. Hence most unusual and irregular hours will have to be adopted in the schools which the fisher-children attend. The hours will vary according to the time of the month (bright or dark fortnight) or according to the season, the class of fish available, etc.

The course of studies in fishery schools should also be of a special kind in some respects and should be closely connected with the industry, for they will have no background of reality for the children unless they have special application to the condition and circumstances of their lives, their parents and their immediate work. The object should be to make them better fishermen, more intelligent, more adaptive, capable of understanding and applying better methods of fishing and handling fish and better able to keep to themselves the major portion of the profits from the fish industry which now go to outsiders. Living in foul and loathsome surroundings, dealing in putrescible matter, they should possess special knowledge of hygiene and sanitation. Thrift and elementary social science should be taught because of all classes they are the most unthrifty and intemperate.

As a first step towards the starting of special schools for fishermen on a large scale the Government sanctioned in 1919 the opening of a training institute at Calicut for the training of special schoolmasters. Simultaneously the starting of four day and four night schools were also sanctioned.

In addition to the curriculum followed in ordinary training schools, the pupil teachers receive at the Fisheries Training Institute special technical instruction in fisheries and fishery science in all its branches comprising a

history of the industry a general account of the fish and fisheries of the world; some account of the little we yet know of South Indian food fish, their habits, life history, food, abundance, economic importance, etc., oceanography of the oceans generally and of the Arabian Sea and the Bay of Bengal in particular; an account of fishing craft and tackle, their origin and design including details of modern developments; a survey of fish industries, especially with the principles and practice of fish-curing, canning, refrigeration, manufacture of fish oil, guano and fish meal and other minor marine products; elements of navigation and seamanship such as use of the mariner's compass, barometers, signalling, steering, sailing, taking cross bearings, testing depths and bottom and the like, and elementary biology and nature study with emphasis on fish and animals of economic importance in the sea and fresh water. On the practical side they are given actual training in working and sailing different kinds of boats, in making and repairing canoes, oars and other appurtenances, in spinning and net making, in the use of nets, lines, etc., in catching, curing and canning fish and the manufacture of fish oil, etc., at Tanur and Chaliyam besides a series of practical exercises in improved methods of cure in the model shed provided for them in the Calicut fish-curing yard. They are also taught organizing and managing fishermen co-operative societies, hygiene, sanitation and first aid. A detailed syllabus of special studies in fishery technique for the Fisheries Training Institute was drawn up for the guidance of the staff last year.

In the fishery elementary schools for children of tender age, the object is not technical education but to adapt the whole course of general instruction in the 3 R's, nature study, etc., to their requirements, and correlate it to life in fishing villages and to the industry. As Sir F. A. Nicholson has said "The education should be directed to awakening their minds rather than to attempting industrial teaching."

The courses of study in the fishery elementary schools are (a) the compulsory subjects as per rules made under the Elementary Education Act—

- | | |
|-------------------|-----------------------|
| 1. The three R's. | 4. Manual work, |
| 2. Drawing, | 5. Physical training; |
| 3. Nature study, | |

(b) optional subjects not insisted on by the rules made under the Education Act—

1. English.
2. Civics.

Nature study as applied to fisheries is taught and includes the elements of Physics, Chemistry, Physical Geography relating to the sea, Meteorology and a study of the common objects of the sea with special emphasis on fish and other economic products suited to the age and intelligence of the pupils. The pupils are made familiar with the kinds of marketable fish, etc., and are given facts and figures concerning them, their importance, economic value and the uses to which they are put. In other words this part of the course is no other than nature study such as is taught in other schools but with special application to the sea and fisheries. Manual training includes net-making and carpentry to which will shortly be added refining of salt, simple curing of fish (such as beheading, scaling, gutting, washing, salting, drying, etc., specially emphasised in the case of girls) barking and tanning of nets, preparation of fish manure, domestic gardening, knotting and splicing, preparation of rigging and sail, the elements of signalling and the like. English is taught in some of the schools. Civics includes lessons on co-operation, sanitation, temperance and history intended to help the pupils to understand the main facts in existing social and political institutions and conditions.

12. *Hours of attendance* in the day schools are in some cases the same as in ordinary schools, viz., between 10 to 1 and 2 to 4 p.m. but unusual and irregular hours have been permitted in others for reasons given in paragraph 11 above. The night schools for adults are generally, though not invariably, held between 6 and 8 p.m.

13. *The time devoted to different subjects*.—This is rather difficult to specify. The essence of the scheme of fishery elementary education organized by Sir F. A. Nicholson is that, apart from the periods especially devoted

to the study of fishery technique, every subject should be so correlated to life in fishing villages that its bearing on fisheries should be emphasised. For instance, in Arithmetic the problems will chiefly be bazaar and beach transactions, such as are likely to be familiar to fisher children and problems relating to accounts of co-operative societies or fishing syndicates in the case of higher classes, particularly classes of girls.

In drawing, the subjects chosen are related to the life and occupation of people in fishing villages.

In one sense, therefore, all the time which the children spend at school may be said to be devoted to the study of fisheries, with the exception of that devoted for language. Language text-books are not at present correlated to Fisheries Science merely because suitable ones are not available.

14. *The curriculum and the time-table.*—These are at present drawn up by headmasters of the various schools, revised by the Headmaster of the Fisheries Training Institute and approved by the Deputy Inspector of Schools of the range in which the schools are situated as required by rule 13 of the Rules made by Government under section 41 (1) of the Madras Elementary Education Act, 1920. The syllabus is under revision. When the revision is over, it will be introduced in all the Fisheries elementary schools on the West Coast. Obviously it is impossible to have a common time-table because the conditions in different schools differ. One school may require one teacher for each class while for another one teacher for two or even more classes may suffice.

A pupil educated in a fisheries school is by no means handicapped for work outside his caste occupation. The schools are duly recognized by the District Educational Councils as elementary schools. The pupils receive the grounding in the principles of the various subjects prescribed by rules framed under the Elementary Education Act. Only the illustration used in fisheries schools relate to the life and occupation of fishermen. As a matter of fact many pupils who studied up to the IV or V standard in fishery schools have joined ordinary schools for higher education and they do not feel any difficulty on account of their earlier education having been devoted more or less to special fisheries topics. The abstract principles are the same; only the concrete presentation differs. The advantages of using a concrete presentation that is familiar to the pupils is that their attention is easily attracted, that the facts (and hence the principles) impress themselves on the memory more deeply, that the pupils recognize easily the practical utility of attending schools, that a school course making use of fishery illustrations prevents the tendency to divorce the youths from their ancestral occupations and finally—and most important of all—that for the great majority of pupils, i.e., all those who actually take to fishing for livelihood in their later life the information gathered at school is of direct value.

The aims with which the whole scheme of fishery education was originally conceived and the schools organized, could only be achieved by special schools manned wholly by specially trained teachers under the control of, and in constant touch with, the department. It may be that these schools have fallen short of the ideal and that the courses of instruction therein have not reached a standard of perfection. This is largely because the Fisheries Training Institute has existed only for the last eight years and the fisheries schools are not yet fully manned by teachers trained there. The curriculum of studies at the Fisheries Training Institute also has not been the best that could be devised and has recently undergone thorough revision. But the benefits that the fisherfolk on the West Coast have derived in the matter of education and enlightenment alone, since the inception of fishery education, bear ample testimony to the value of the whole scheme. The appointment of isolated teachers in board and other schools, under the control of non-technical agencies and out of touch with the developments of the department, while probably involving nearly if not quite as much expenditure as regular fishery schools will, I fear, defeat the aims of fishery education: at any rate I am confident the marked progress in the matter of education among fishermen now seen on the West Coast could never have been achieved by any other agency.

So far thirty day-schools and four night-schools have been opened by the department. Two of the schools are of the Higher Elementary grade. At the end of 1926-27, 2,440 children were attending these schools, of whom

708 were girls. The education given is free, and the poor children are supplied with books and slates gratis. Many of the teachers belong to the fishing community and the proportion is being steadily increased.

Similar work among the East Coast fishermen has hitherto been done by the Labour Department but owing to a widespread desire on the part of the East Coast fishermen that the Fisheries Department should take over the socio-economic work among them, particularly education, the question of transferring the work to the Fisheries Department is being considered by the Government.

So great is the appreciation of the special educational work of the department that there is a constant demand for more fisheries schools from almost every fishing village of consequence. Lack of funds alone prevents compliance with these demands and a more rapid progress in this essential method of elevating the condition of the fishing people.

Last year the fishermen of South Kanara memorialized the Minister for a separate Fisheries Training Institute at Mangalore not merely for training teachers for the elementary schools but to impart technical instruction in special branches of the industry to youths and adults actually engaged in fishing and possessing special aptitude for such training. This is a direct result and a natural development of the working of the fisheries elementary schools in the district.

I have proposed the establishment of a technological school at a capital cost of about Rs. 4,000 and a recurring cost of Rs. 9,338 which will provide not merely training for pupil teachers for elementary schools in South Kanara, but training in special branches of the industry to fisher youths and adults engaged in fishing. The fishermen are willing to meet half the cost of technological courses and I have suggested that the other half should be met by the award of six scholarships to apprentices.

15. *Co-operation.*—Probably there is no community or class in India who needs more and appreciates less, the benefits of co-operation, than the fishing classes of the Presidency. Their deplorable economic condition has been described in a previous paragraph. Though a large community they do not thrive as well as they might, because the profits of the calling are uncertain, and occasionally it happens that catches are very meagre for two or three years in succession. A good fishing season lasts for about nine months in a year, and no fishing is carried on during the monsoons. The profits made in a good season would certainly be sufficient to carry the fisherman and his family over the non-fishing months, but by a long-standing habit, probably confirmed in the course of 2,000 years or more the fishermen do not save. During the fishing months, they spend all that they earn; and for the remaining months they are content to borrow from the middlemen who of course appropriate, in lieu of principal and interest, the lion's share of the next season's catch. The result is that the fishermen, in the course of a very few years, have to surrender their boats and nets to the middlemen, whose servants they then become.

For these and other reasons unusual difficulties are experienced in the formation and working of co-operative societies among fishermen. Very few of them possess any immovable property. Their entire worldly belongings of any value consist, in most cases, of their boats and nets (often not even this) and their physical labour. As these are not recognized as assets, on the security of which banks could advance loans, the fishermen co-operative societies have found it impossible to raise loans, from the District and Urban Banks for the formation of their initial working capital. Until as recently as 1926, every one of these societies had to provide their own working capital by means of share capital accumulated by monthly contributions from the members. To a people naturally averse to thrifty and saving habits, the compulsory saving necessitated by this condition has served as a deterrent to their combining into co-operative organizations. Further, as the fishermen are out for fishing in the sea, most of the day and often till late at night, the ordinary officers of the Co-operative Department, and even the unofficial co-operative union, are unable to get into touch with them for the conduct of co-operative work among them, nor are they able, owing to the same reason, to maintain effective supervision over societies

already formed. Officers of the Co-operative Department and union supervisors are handicapped because they have to travel far from their normal field of work to inspect fishermen co-operative societies whose members live on the sea-shore and who can be got only at very inconvenient hours. The inspecting officers have to wait indefinitely for fishermen who have gone to sea to come back, and when they do come back they are so tired that they are seldom able to render any help to the inspecting officers. Further, supervisors are generally of higher caste than fishermen and have no facility for staying in a fishing village. Thus the inspecting agents of the Co-operative Department have neither the inclination nor facilities for working the fishermen societies. Very little progress was therefore made in co-operative work among fishermen till about the year 1914, when the officers of the Fisheries Department at the instance of and in collaboration with the Co-operative Department began actively to interest themselves in the work.

There has been a steady increase in the number of special societies for fishermen since then. At the end of June 1927 the number of such societies totalled 80 for the Presidency. The work of keeping a society functioning, after it has been formed, has been the hardest task of all. The fishermen are over-ready to take out loans; but the loans are not repaid when due, and the instalments accumulate. Some societies have already become defunct. For the reasons stated the regular co-operative supervising and inspecting staff was unable to do anything to improve their condition. The Fishery Officers that were available in the years previous to 1917 were so few in number that they could make but little impression on the work that had to be done. From 1917, however, when the Fisheries Department took over a few of the fish-curing yards, and with them the staff of those yards, the officers in charge of these yards were utilized to help in the management of the societies and the collection of arrears; and things began to improve. From 1919 with the opening of fishery elementary schools the staff of these schools also helped in forming and supervising fishermen co-operative societies. When in 1924, the rest of the yards in the Presidency came under the control of the department, the agency for carrying out such work was greatly strengthened with strikingly beneficial results on the co-operative societies. The Fishery Officers in charge of the yards who are always present in the village are just the persons who will always know when large catches are landed there and by whom; for the arrival of fish has to be notified to the yard officers instantly, so that they might be in readiness to issue salt for curing before the fish turn bad. These officers also know the catches made in the neighbourhood as they have been assigned the duty of collecting statistics of landing even beyond the limits of their village. In 1924-25 in consultation with the Assistant Registrar of Co-operative Societies, South Kanara, a system of group examiners was tried and 13 societies were brought under it. The group examiners were found not to have sufficient influence to improve the condition of the societies. The co-operative society in the Ponnani taluk appealed to the District Co-operative Bank for the organization of a union for the better supervision of fishermen co-operative societies. The idea did not appeal to the bank as the supervision funds collected from fishermen co-operative societies would not enable the District Co-operative Bank or a local union to pay for a Supervisor. It was conceded that fishermen societies cannot be improved unless there is more intensive supervision than that which a local or district co-operative union can afford. The only solution was therefore to entrust the work of the supervision to the Fisheries Department. The findings of the Committee on Co-operation in Madras this year are also to the effect that the Fisheries Department should be responsible for all fishermen societies that responsibility and that the Special Inspectors allotted to undertake should work under it. In districts where this is not the case, the societies should continue under the Labour Department until the Fisheries Department is in a position to undertake their supervision. In recognition of the fact that Fishery Officers are in the best position to supervise co-operative work among fishermen, the Inspectors of Fisheries on the West Coast have been invested with powers to inspect the books of the societies. And recently the Assistant Director (Coast) has been invested with powers under sections 17 (3), 35, 36 and 37 of the Co-operative Societies Act and under rules viii-A and xiv of the rules framed under section 43 of the Act. The reorganization of the fish-curing yards now under the consideration of

Government would, if sanctioned, enable the department to exercise still closer supervision over the work of fishermen co-operative societies.

Several societies have already been rescued from a state of collapse, and put on a satisfactory footing, by the exertions of the Fishery Officers. Some societies continue to exist solely owing to the encouragement and supervision given by these officers. The slightest relaxation of departmental supervision has produced neglect and mismanagement. On the other hand some societies have reached such a strong position as to have become independent of further departmental help of any kind. There is still a great deal to be done, towards restoring the old societies and forming new ones, which cannot be dealt with, owing to the limited staff of fishery officers available and the small amount of time that they can spare from their more immediate duties.

Apart from the work of supervision and the staff for it, efforts are necessary to wean the fishermen from the thralldom of middlemen capitalists by granting loans on the securities of their boats and nets. In 1926 at the instance of this department the Government started a new form of direct help to fishermen by giving two new societies, formed for the purpose, a loan of Rs. 1,500 each to buy a set of fishing equipment on the condition that the working of these societies is closely supervised by the Fisheries Department. This has helped to remove another outstanding difficulty, that of financing fishermen co-operative societies who possess no assets recognized by the banks. The security for the loan is the fishing boats and nets purchased with the loan. The Government have allowed the society in question to repay the loan in small instalments from the profits made by them, by fishing conducted with these boats and nets. This is yet another reason why the Fisheries Department should supervise co-operation among fishermen. Already the societies have paid back 30 per cent of the loan.

16. *Other socio-economic work.*—The officers of the Fisheries Department are doing a great deal of social service work among the fisherfolk. As officers issuing cheap salt for fish-curing, they exercise great influence in the fishing villages. This influence, as well as reasoned advice, is being employed to wean the people from habit of intemperance, improvidence and extravagance. Organization of temperance and literary associations, common good funds, habits of cleanliness, increased knowledge of the world, realization of their slavery to merchants and money-lenders and a desire to escape from it, feeling of self-respect, self and mutual help, all these have been constantly promoted by the officers of the department. Even social disputes have been settled. Small private quarrels, which ultimately develop into disastrous communal feuds, are settled promptly by the watchfulness of the Fisheries Officer, if one is available in the neighbourhood.

The staff available to do all this work is, as already stated, very small. But nevertheless the results of their work have been astonishing. There is now a thorough awakening among the fishing classes, especially on the West Coast, where the bulk of the work has been done, and social and economic improvement among the fishermen, directly due to the work of the Fisheries Department, has been most gratifying.

As a result of the spread of education among the fisherfolk on the West Coast and the keen interest taken by the departmental officers, there is appreciable improvement in temperance among the younger generation. The marked improvement in remote villages like Kottakadapuram, Talikulam and Kundazhiyur is significant. The fishermen of Nattika, Blangad and Puthenkadapuram, also have begun to copy the example of the above villages.

The Sri Jnanodaya Samaj, a temperance association started by Mogayars (South Kanara fishermen) with its branches at almost all fishing villages, chiefly of the Mangalore taluk, is continuing its work on a modest scale, though it has lost much of its initial vigour.

The Moonillakar Hindu fishermen of Kanhangad, Balla, Hosdrug and Ajanur villages, have started an association, under the name of "Dewara Yuvajana Samaj," their object being the social uplift of their community. They have organized a day and a night school at Kanhangad which are

being well attended. The day school has now been taken over by the Taluk Board. The Samaj has requested the Fisheries Department to take over the management of both the day and night schools.

An association organized by the Mogayar fishermen of the South Kanara district under the name of "The South Kanara Mogaveera Mahajana Sabha" has been registered under Act XXI of 1860. The society proposes to exercise control in all social matters affecting the community and aims at improving its social and economic status. It proposes to cut down extravagant expenses at marriages and other social functions, to preach temperance and to collect funds for the educational improvement of the community. It is understood that about Rs. 14,000 have been already collected and Rs. 7,000 spent. There is yet another organization which goes by the name of "The Mogaveera Clerks' Association" at Bombay formed by the South Kanara Mogaveera fishermen. The object of this association is to grant scholarships to Mogaveera youth, undertaking higher education. About a dozen scholarships of the total value of Rs. 400 per annum are now being granted by this society to poor and deserving youths of the community. The funds collected by the association so far amount to Rs. 7,000.

A lady teacher who till recently was employed in the Blangad Fishery school, organized on her own initiative a weekly meeting for young fishermen and other kindred ones. These meetings were regularly attended by the girls, who had left Fisheries schools and they were taking a very active part at the weekly meetings by house-to-house visits. The meetings were going on for about four months. With the commencement of the fishing season attendance dwindled, but there seems every reason to hope that it will revive again during the ensuing monsoon.

The educational and socio-economic work among fishermen started by Government on the West Coast in 1909, has therefore already borne ample fruit. A great impetus to education, social and economic uplift of the fisher communities, has been thereby given. There can be little doubt that the teachers selected from the youths of the community, educated and specially trained at the Fisheries Training Institute at Calicut and now spread throughout the villages along the coast, are the ultimate source of the inspiration and upheaval one sees to-day among the fisherfolk of the West Coast.

17. (6) *Industrial Research at Chaliyam and Tanur*—(Rs. 37,300)—*Cannery*.—Canning is not an indigenous method. The earliest attempts at canning fish in South India were made by a French settler (M. Josselin) at Mahe who owned a small private factory which canned only sardines in oil. When the Fisheries Department first framed proposals for starting a cannery on the West Coast (where alone the most suitable fish for canning, viz., sardines, are found in abundance), it was contemplated that the Government factory should co-operate with the Mahe cannery. The Government factory was actually set up near Calicut in 1911 and commenced work in January 1912. Owing to the death of the French canner, his services were not available. The first experiments proved a decided success and produced goods of a fair quality which found favour with those of the public to whom samples were sent. Owing to the expansion of business and the purchase of a can-making plant, the factory was shifted from Calicut to Chaliyam on the other side of the Beypore river in 1914.

The immediate object of the cannery was to demonstrate the possibility of canning fish in India so as to produce an article which could rival Western products in delicacy of flavour and keeping quality. This was successfully achieved by the cannery. It was also proved that a number of other fishes and also prawns could be advantageously canned. A large number of new recipes were discovered and adopted. The peculiar merit of the Chaliyam products is their delicate flavouring with condiments not available anywhere else in the world.

The experiments were not unattended with technical difficulties, such as the hard bones and scales of the Indian sardines and the rapid deterioration, especially of prawns, in the Indian climate. Nevertheless the quality of the Chaliyam products has been approved by experts and compared very favourably with similar class of articles produced in Europe and America.

Owing to accumulated stock after the war, the cannery suspended operations in 1925. Almost the whole stock has since been sold in Burma. Proposals for working the cannery as a commercial concern on remunerative lines are before Government. I have pointed out that an attempt to run the cannery as a business concern was made since 1924, during the first year 1924-25 as a fully working concern and during 1925-26 with the manufacture suspended and that two years and a few months were too brief to decide the commercial possibilities of the fish-canning industry, especially as this industry took nearly eleven years to be established in an advanced Western country like America with its industrial resources and facilities. Besides the extremely short time, hardly three years, allowed to the Chaliyam cannery to prove its commercial possibilities, there are several other adverse factors that have operated against its financial success in the past:—

(1) In estimating the financial condition of the cannery as a commercial concern the whole of the capital expenditure on plant, buildings, etc., which necessarily during its experimental stage was heavy, as is the case with all pioneer work, had been taken into account without any reference to the market value of the assets. In the balance sheets of the commercial auditors the assets of the cannery are valued at about Rs. 1,10,728 but the real value of building, etc., would seem to have been about Rs. 20,000 to Rs. 30,000 when the cannery assumed the role of a commercial concern in 1924. This has obviously vitiated the accounts.

(2) The cannery manufactured sardine tins of 7 oz. and 12 oz. and not the ordinary trade tins (viz., 3½ oz.). The retailers all over the country demand that the cannery's tins should be of this popular size and openable by a key. For some reason the dies purchased for the cannery from the beginning, though declared by the manufacturers and the Stores Department to be designed for the manufacture of tins openable by a key, have not so far stamped tins which are capable of being opened by a key. These two defects are the main reasons for the difficulty experienced in selling the old stock at the cannery.

(3) A review of purchases made for the cannery revealed an appalling drain on the slender resources of the concern resulting from orders placed through the Stores Department of the High Commissioner, to comply with financial codes, instead of in the cheapest markets. Dies ordered were found to be badly tempered. The tins manufactured could not be opened by a key. Rubber gaskets were inelastic or arrived in a sticky condition, both equally unserviceable. If tin plates and oil were of good quality the price paid was so disproportionately high as to enhance the manufacturing cost above the ruling prices of tinned sardines in the market. No commercial concern, certainly not an incipient industry, could be run to commercial profit under such conditions. To cite only one instance the cannery paid Rs. 42 for a box of 56 tin plates, whereas a local firm quoted Rs. 20-8-0 for a box of 112 tin plates of slightly smaller size and harder quality. These plates, it is true, were not altogether suitable for our purpose, but there can be no doubt that suitable ones could have been obtained for much less than the price actually paid.

(4) One of the primary causes for the unduly high manufacturing cost of the cannery has been the heavy overhead charges resulting from the very short number of working days, about a 100 in the best year as against 265 idle days. Unlike, for instance, a soap factory, raw material is not continuously available but at the same time, in common with other industries requiring great skill and experience the skilled labour of the cannery requires to be kept from year to year and paid throughout the idle days, if the standard of its manufacture and the quality of its goods are to be maintained. The only conceivable remedy and the one resorted to by most private concerns is some by-industry which, if it will not yield profits, may at least help to pay the skilled labour during the off-season. In a cannery in which Government permits no interests outside tinning fish, it is difficult to provide a suitable by-industry.

My recommendations were briefly that the cannery should be continued as it has not yet been given a chance to prove the commercial possibilities of canning as a remunerative industry, especially as two private canneries started on the model of the Chaliyam cannery had not prospered, because the

problems involved in the successful prosecution of the industry are complex and varied. "The Malabar Canneries" have been wound up having lost their market through the use of bad oil. "Nanu Freres" had sustained a heavy loss. If the industry successfully piloted through its initial stage by Sir F. A. Nicholson, is to be established on commercial lines as a remunerative enterprise, apparently it is the duty of the State to lead the way. The cannery has, therefore, yet to perform an important part of its work. If the cannery is to be continued to test the commercial possibilities of the concern, I recommended that it should be worked with the following economies :—

(1) Its assets should be revalued and the capital investment involved should be accurately determined for purposes of depreciation and interest;

(2) the cannery should manufacture tins of approved trade size already in the market;

(3) the management of the cannery and the Tanur research station should be combined with a view to reduce the overhead charges which at present amounts to nearly 50 per cent of the cost of manufacture;

(4) if possible, a suitable by-industry should be undertaken to fill up idle time at the cannery;

(5) the purchase of its Europe stores should be exempt from the stores purchase rules and full liberty should be given for the purchase of machinery, tin plate, etc., from the cheapest markets.

If it is decided, however, not to continue the cannery as a commercial concern in view of the existence of two or three private concerns, its continuance is necessary as an important institution for the training of students and apprentices and officers and as a place of research. Many problems connected with canning still remain to be solved, such as the softening of hard bones and scales, the determination of a suitable cheap oil for canning, and the many questions connected with the technique of canning, storage of tins in the tropics, deterioration of tinned goods, etc.

18. *Tanur*.—In 1908 an experimental station was opened at Ennur with a view *inter alia* to experiment in salting, curing and preservation of fish. Ennur was however found not very well suited for the work and so the experiments were transferred to Cannanore which was found to offer better facilities. The station was finally shifted in 1911 to Tanur as most advantageously placed for supplies of fish. The methods of fish-curing in use are generally primitive and susceptible of great improvement in regard to flavour, appearance, cleanliness and keeping quality of the products. The chief indigenous method is to salt the fish, usually by sun-drying. Long and patient endeavour to ascertain improvements in methods that are yet inexpensive to adopt has been made by the department at the Tanur experimental station. Here numerous experiments have been conducted with generally gratifying results. To introduce the improvements ascertained into the trade particularly in regard to cleanliness and sanitation, proper salting and drying, rules have been framed in the public fish-curing yards. Progress in improvement has been slow owing both to the ignorant conservatism of the curers and to factitious opposition. With patience these obstacles are being overcome. Even now there is a notable improvement on the West Coast in the cleanliness of the products of these yards, but the produce is not yet up to the mark. As an experiment, the usual supply from Tanur to the Coimbatore Jail was stopped and the private curers from one of the model fish-curing yards who has adopted the improved method were asked to supply with the result that the jail stopped the order and complained of inferior quality. The work in the East Coast yards commenced only three years ago and reforms there are even more difficult than on the West Coast, on account of the extreme poverty of the East Coast curers. A beginning however has been made.

The defects from which cured fish suffer are (1) "Pink eye," a type of mould, (2) "Rusting," a red discolouration after long storage due to a chemical change in the fat of the fish and (3) in the case of semi-dried prawns, a special product of the station, the formation after a time of a white excrescence. During the last three years the Tanur station has been specially investigating these problems. Harmless ingredients (turmeric, mustard, etc.) in imperceptible proportions of about 1 in 20 of salt have

been noted as excellent preventives. More recently pickling mackerel in brine in closed barrels free from light and air has prevented pink eye and rusting completely for months on end though an absolute remedy has not yet been discovered. The fish were subsequently dried for sale as salt fish according to demand and fetched excellent prices. The occurrence of salt excrescence was found to be connected with the length of time for which the prawns are cooked. By limiting the cooking to an absolute minimum the defect was found not to appear for a considerable time. Another remarkable preservative, sodium hypochlorite, which is absolutely innocuous and turns into common salt on application to fish, still remains to be tried. Only a few preliminary experiments have so far been done with it. Beyond a distance of 20 miles from the sea coast, reached by runners and jutkas fresh fish as a rule does not reach markets in the interior though the motor buses and railways have extended the range to some extent where they exist. Ninety-five per cent of the population in the interior will eat fresh fish if they can get it. With a powerful preservative and sterilizer such as sodium hypochlorite, it is hoped to preserve fresh fish free from taint sufficiently long for transport to the interior. A small laboratory electrolyser for the manufacture of sodium hypochlorite has been purchased for initial trials.

19. *Refrigeration*.—A certain amount of fresh fish packed in ice reaches Bangalore and Coimbatore and the Nilgiri Hill stations as well as Trichinopoly and Madura from the nearest sea ports by rail. Beyond this there is little or no trade with interior markets in fresh fish from the coast. Large potential markets for fresh fish exist there and the only set-back to the trade has been lack of efficient means of transport, want of ice and cold storage facilities. The first difficulty has to a large extent been overcome by the development of motor-bus traffic within the last few years. The technique of fish refrigeration alone remains to be mastered and if found to be remunerative could be taught to the fish vendors and merchants. Packing of fish in ice is the only method in use and proper refrigeration is unknown. Iced fish are, as a rule, tasteless as the tissues undergo radical physical and chemical changes. Fish which are stale and decomposed are often indiscriminately iced by ignorant merchants to the detriment of the trade. I addressed Government in 1924 for provision of funds to carry out preliminary experiments but the Government postponed the experiments. This should be part of the work of the research station in the immediate future. The owner of a private fish-curing yard has imported this year a small ice-making plant with a view to start trade in refrigerated fish in the interior of the South Kanara district on the suggestions made in my annual report for 1926-27, paragraph 23, and has applied to me for technical advice and assistance.

The Tanur station has accomplished much in determining the correct proportion of salt for curing, methods of sun-drying, and the relative values of various methods of cure, including most of those adopted in England and America. Its products are far superior to those of the bazaar (karuvad). There is still an indefinitely large programme of work for the station.

Prior to the experiments of the department in 1908 the amount of sardine oil produced on the West Coast was inconsiderable and of the worst possible quality. The usual method was to obtain the oil by the putrefaction of a mass of sardines in a worn-out and filthy dug out canoe. It was also a wasteful process for the proteid and other residue were thrown into the sea. Similarly when fertilizer was made from sardine, the ancient and accepted procedure was to spread the sardines on the sand of the open beach and so dry them in the sun. This had two drawbacks—large quantities of valuable oils of no manurial value were wasted and the product became so highly impregnated with sand that analysis not infrequently showed the resultant mass to contain as much as 40 per cent of this useless adulterant. The experiments made by the department had unexampled and swift success. It was found that a simple and quite inexpensive plant could be devised to separate the oil and fertilizer effectively and profitably. The high quality of the oil and fertilizer (fish guano as it is called technically) reacted favourably upon prices and has rendered this new industry so profitable that there are now hundreds of small private factories not one of which existed before.

No more striking proofs of the success of the Tanur oil and guano experiments is needed than the fact that in the 647 private oil and guano factories on the West Coast in 1922-23 the last abundant year for sardine, about 32,000 tons of guano and 12,000 tons of oil were manufactured approximating to a total value of 36 lakhs.

But it must be remembered that only a beginning has been made in an industry which promises to be highly remunerative. The articles produced are still inferior in quality, the oil contains too much stearine, and the guano has a heavy admixture of sand. Without a Government station the rising business which is largely the result of the standard quality of Tanur goods will rapidly decline in the hands of ignorant and often unscrupulous factory owners who have not yet acquired the necessary technical knowledge.

Moreover, the station has yet a good deal to investigate as regards the industrial possibilities of fish oil and its by-products. Beyond the first comparatively simple process of expressing the oil from fish, successfully copied by private producers, nothing has been done by them towards refining the oil up to the standard required by the various consumer industries, or of converting the scrap (residual fish) to a much more valuable product than guano, viz., fish meal.

The crude oil which forms the bulk of that manufactured by private factories does not come up to the standard required by the arsenals, tanneries, and other consuming industries. The bulk of this oil is sold to the jute mills in Bengal or to Germany for refinement, involving a loss of nearly 600 per cent in the selling price. The crude oil fetches Rs. 80 to 90 per ton during the manufacturing season. But the oil refined at Tanur was sold for Rs. 650 per ton. If Tanur ceases experiment, the arsenals and tanneries who have been induced to try the West Coast oil will be driven back to the foreign markets for their requirements to the detriment of the nascent industry on the West Coast. Refinement is thus the next step in the oil industry and a most important one if it is to be established on a sound financial basis. The refinement of oil at Tanur consists in the elimination of stearine, acidity, colour, and smell. It has not hitherto been possible to remove the colour and odour entirely but a great deal has been accomplished and investigation towards perfecting the process must continue. A moderately refined oil has been produced by the station on a commercial scale and marketed as already noted at a very high percentage of profit, but fully refined oil remains yet to be made. A further advance has been made in converting fish scrap (pressed fish) into fish meal, a valuable food for domestic animals and even for human consumption. The fertilizer or guano sells at about Rs. 80 per ton. A ton of fish meal is priced at Rs. 280. Success has been attained in producing fish meal from all the common fishes of the West Coast and comparatively cheap methods of producing the meal and sterilizing it have been evolved. The elimination of the objectionably high oil content of the meal is under investigation. When all the details in the manufacture of fish meal have been mastered, and the processes taught to private manufacturers on the coast, it will confer considerable financial benefits on the industry.

We are still at a critical stage in the development of the fish oil and fish meal industry which owes its very inception to Tanur and, unless it is controlled and guided and further developed with the help of that station, it will suffer a serious reverse in the commercial world. Even in advanced countries where industries are fully developed, the march of science involves a constant revision of methods and processes to maintain them up-to-date and to afford them the advantages of new discoveries; both America and Japan maintain more than one research station exclusively for this purpose.

20. (7) *Biological research and aquarium (Rs. 13,850).*—It is evident that one if not the chief aim of a technical department of fisheries is *scientific research*, the results of which alone can furnish sound data for the administration of fisheries and their protection and development. Wherever administration has been attempted without sufficient scientific knowledge or investigation, it has led to needlessly vexatious legislation and restrictions, which have often been found to be unwarranted and even positively harmful by experience and independent research subsequently. The history of fishery

administration in England, which deals with the greatest fishing industry in the world, presents many notable instances such as the repeals of several Acts passed to restrict the operation of trawlers when trawlers first came into use. Research on up-to-date methods should therefore occupy the first place in all schemes of fishery development and administration. In fact, a department of fisheries which is not adequately equipped for scientific research is incapable of developmental work and cannot justify its existence because it certainly can do little good but may do a great deal of harm.

During the 18 years of its existence, the department's activities have been directed primarily towards administration and industrial development. The circumstances of its inception and the conditions of fishery monopolies and vested rights of Government at first necessitated concentration on administrative and revenue questions rather than on scientific research. In consequence, though some scientific research has necessarily been conducted from the beginning, there has, as pointed out by Government in 1924, been no definite policy pursued in regard to research except perhaps on technological lines by Sir F. A. Nicholson at Tanur and Chaliyam and to a small extent in inland pisciculture. A ten years programme of fishery research was recently drawn up and approved by Government, but there has not yet been time for more than the smallest beginning of it to be put into operation.

Fishery science, though of comparatively recent origin, has developed very rapidly in its scope and its methods, and has many ramifications into the domain of other sciences such as biology, physics, chemistry and meteorology. There are many things which a scientific department of fisheries might do for the maintenance and development of fisheries of this Presidency with the assistance of a thoroughly competent and earnest scientific staff actively engaged in research in all departments of its varied activities and with up-to-date and well-equipped laboratories and appliances. But as funds and facilities for research are necessarily limited it is essential to concentrate first on the problems that bear most directly on the development of such fisheries as are of greatest importance to the country.

21. *Food fishes.*—Systematic research on economic food fishes, so far made, relate only to sardine and mackerel on the West Coast, to a flying fish on the East Coast and to a few fresh water fish.

A preliminary report has been issued on the oil sardine of the West Coast and another on mackerel is under preparation. This is the work accomplished by the research station at Calicut from 1921. The eggs, spawning beds, migration, reasons for uncertain periodicity, possibilities of culture in supplementing natural resources, etc., of the scores of other marine food fish remain untouched. Before any attempt at systematic research on marine fisheries can be successfully undertaken, considerable knowledge of the food and conditions of life of the fishes must be ascertained. For this purpose plankton, hydrographic and meteorological data are being collected and a general study is being made of associated animals and plants as opportunity offers.

Almost equally little is known concerning fresh-water fishes. The habits, spawning seasons and early stages of about a dozen have been worked out by Dr. Willy, Prof. Narayana Rao, Mr. Panikkar and myself, independent of the department's investigations. I have noted on the breeding habits of an important fresh water catfish and hilsa which remain to be published. Beyond this little or nothing is known regarding the majority of fresh water food fish and investigations regarding them is an immediate necessity for the development of our inland fisheries. Gourami, tench, european carp, indigenous labeos and barbels (including mahseer), and fresh water mullets are the species that concern us immediately in our stocking and breeding and should be taken up first for study.

There has been little or no opportunity in the past to study scientifically the value of the fish and fisheries of our backwaters. Etroplus is the only fish that has been extensively employed in stocking fresh water tanks. Mr. Whitehouse for two years (1919-21) carried out studies on the growth of mullets in a lagoon near Tuticorin. I have proposed a fish farm at Surla

(Ganjam district) for carrying out these studies. The backwater species that are economically the most important and demand immediate attention are—

- (1) Mulletts (*Mugil* spp.) several species.
- (2) Cock up (Bengali *begli*: *Lates calcarifer*) growing up to 3 feet and more in length. It is one of the largest Eastern sea-perches which frequents backwaters so agreeing in habits with its European relative the Bass (*Labrax lupus*) largely cultivated in Italy and France.
- (3) The Indian salmon (*Polynemus tetradactylus* and *P. spp.*) also grows to a big size, say, even 6 feet; a very highly esteemed fish for table.
- (4) The milk fish (*Chanos chanos*) and the allied species *Elops indicus* and *Megalops cyprinoids*, all of which attain a large size, are esteemed food fish. The first of these has been extensively cultivated for centuries in Java and the third in the Federated Malay States and all the three would appear to be highly suitable for cultural treatment.
- (5) Sea breams (*Chrysophrys berda* and *C. datnia*).
- (6) The Indian "Whiting" (*Sillago*).
- (7) *Scatophagus argus*.—This is a good fish frequenting backwaters. It tastes very like pomfrets.
- (8) Soles (*Cynoglossus* spp. and the Plaice-like *Pseudorhombus arsius* and *Psettodes erumei*): these are esteemed great delicacies and the last is a shoaling fish of great economic importance in estuaries.

22. *Shell fish fisheries*—(1) *Pearl oyster*.—The essential problem of the irregular periodicity of Indian pearl fisheries as opposed to the annual pearl fishery in the Red Sea, Persian Gulf and elsewhere has not yet been solved. Much less have remedies been suggested or tried. The Government this year sanctioned some preliminary research on pearl oyster at Krusadai Island. Preliminary experiments in keeping stock oysters alive in wire cages have been successful. Young pearl oysters have also been found in the shallow waters around the island. Both augur well for the future success of work at the station for the pearl oysters.

The Krusadai station will carry out studies in the habits, food, environment, spawning and early stages of pearl oyster and cultural work. Concurrently with experiments on live oysters and their culture, I proposed to Government that the trawler should investigate deeper banks with dredges to locate, if possible, pearl oyster beds if there be any beyond the 10-fathom line. Diving as practised is limited to 10 or 11 fathoms but the pearl oyster need not necessarily be confined to that depth. It is quite possible that their range extends to greater depths and that only in exceptional years of abundance, their spat spread to banks within 10 fathoms. If so the irregular periodicity of pearl fisheries could be explained by the fact that the mother beds lie in depths beyond 10 fathoms which have never been reached by the local diver. The Government have sanctioned the scheme.

The dredging operations are in progress. It may be necessary to continue the work next year also as the area to be covered is large and unexpected difficulties have also been encountered in the work.

(2) The next important shell-fish is the chank which is the subject of an important fishery in six southern districts. Some initial work on the anatomy, spawning, etc., of the chank has already been done by Mr. Hornell. The chief food of the chank, its seasonal migration if any, its age and its rate of growth are important for determining whether the chank beds are subject to depletion or are capable of further exploitation and whether the chank is susceptible to artificial culture to augment natural stock. All of this remains yet to be investigated at Krusadai Island.

23. *Edible oyster*.—Next in importance is the edible oyster, *Ostrea Madrasensis*, found everywhere in estuaries and backwaters, but in large beds of economic importance only in a few places like Pulicat, Sonapur, etc. Though shell fish is discarded by caste Hindus and Muhammadans they are of value not only as sources of food supply to other classes but also as commercial products for an extensive export trade. Tinned oysters are considered delicacies

and desiccated oysters are esteemed in Malaya and in China. The cultivation of oysters at Pulicat was suggested in 1907. A certain amount of preliminary investigation on the spawning, age and growth of the oyster was done in that year, but no culture was attempted. The research was taken up last year as an oyster famine occurred at Pulicat partly due to destruction of the beds by a shell pit contractor, partly to adverse weather conditions. The eggs, early stages and conditions of a salinity for breeding have been investigated by my Personal Assistant. Thorough or systematic work could not be done for want of time. This will constitute one of the first items of work for the Fisheries Biologist when appointed. A scheme to investigate possibilities of oyster trade with Calcutta by conserving the extensive oyster beds at Sonapur, Ganjam, has been pending with Government for the last two years. There are numerous other molluscs of food value and economic importance for chunam burning. Chief among them are the sea-mussel, *Mytilus*, the arc shell *Arca*, the clam *Meretrix*, which enters into the dietary of the poor classes everywhere. Studies of these will be taken up as time and opportunity offers.

24. *Cuttel fish and squids*.—Fair numbers are caught and sold in the market everywhere. Extensive fisheries for these exist in Palk Bay and the Gulf of Mannar. Nothing is yet known regarding them.

25. *Prawn and shrimp fisheries*.—Extensive and highly valuable prawn fisheries exist all along the coast both at sea and in estuaries and backwaters. Practically no attention has been paid to these. The prawn fishery of the Collair lake has been partly studied. It is worth some lakhs of rupees and lasts for a couple of months during south-west monsoon. These fisheries are subject to great fluctuations which require investigation. From the little attention I have been able to devote to the Collair lake fishery, the prawns seem to congregate for breeding purposes and like the hilsa they are captured and destroyed during this period. Whether this is prejudicial to the fishery can be determined only by further research.

26. *Crab fisheries*.—The most important edible crab of Madras (*Scylla serrata*) occurs in sufficient numbers to provide a fishery only in a few estuaries. There is a complaint that this crab is dwindling in numbers in Pulicat lake through overfishing. The fishery has never been scientifically studied and nothing is known regarding the crab to enable measures to be concerted for its protection. From a few of my personal observations it appears that the crab is admirably suited by its habits for intensive cultivation for the market. The other commercially important crabs are *Neptunus*, *Charybdis*, and *Thalamita*. These in turn will require attention.

27. *Turtle fisheries*.—The sea turtles are abundant, at certain seasons in the Laccadives and in the islands off the Gulf of Mannar. Regular turtle fisheries exist in the Gulf of Mannar where the common green turtle is captured and sold as food and the rarer hawksbill, which yields the highly priced tortoise shell, is netted occasionally. Unlike the Singhalese fishermen of Ceylon, the turtle fishermen of Pamban resort to the destructive method of killing the hawksbill outright for the sake of its shell. The flesh is poisonous and is consequently never used. The leathery turtle is also found on these islands and is captured almost exclusively for its oil. The industry is crude, and unnecessarily destructive. It is susceptible of great improvement; but, before practical steps for reform are undertaken, biological studies on the habits, food growth, etc., of these turtles are essential.

28. *Plankton research*.—By "Plankton" is meant the minute life that floats suspended in water, usually sea-water, and drifts about with wind and current. It is composed of a heterogeneous collection of microscopic animals and plants which vary in total quantity as well as relative abundance of individual species at different seasons and from year to year. Such variations have been co-related to changes in the physical and chemical character of sea-water and to wind and weather. Besides minute organisms, it also consists, according to locality and time, of the eggs and young stages of many animals, including several food fishes. The plankton is the food alike of some adult fish, such as sardine, herring and mackerel and of young fish of all kinds. The eggs and larvae in the plankton ultimately produce the

shoals of food fish that yield valuable fisheries. The fundamental importance of plankton studies in regard to fishery problems has therefore long been recognized by all investigators.

The character, composition, distribution and relative abundance of the plankton as a whole, and its constituent elements in particular, have been the subjects of intensive study wherever fishery investigations are conducted in the world. Such studies have enabled Western fishery experts to forecast an abundant or poor fishing season and even to enable fishermen to detect far below the surface the presence of shoals of herring and mackerel, by the dominant character of the plankton. It is needless, therefore, to emphasize the importance of plankton studies in India. While all organisms of the plankton in Western countries are well known, many of them in Indian seas have not even been determined. Except some half a dozen plankton fish eggs, the numerous varieties of eggs of our important sea-fish have not even been studied; while quantitative studies of plankton such as have enabled Western scientists to estimate the productivity of their seas and fishing banks have not even been attempted.

A preliminary study of some organism of the plankton off Calicut was made in 1921-22 (vide report No. 5 of Bulletin No. 17). These studies are continuing at the Calicut research station. In view of its fundamental importance it is obvious that plankton research should be adopted immediately as one of the main items of research in each of the proposed biological stations, since systematic and continuous study for a series of years is required before any results of value are likely to emerge.

29. Hydrographical and meteorological investigations.—Recent developments in fishery science has shown the enormous importance of salinity, density, chemical composition, temperature and weather conditions on fisheries. The connexion is so vital that no fishery investigation is complete without hydrographical and meteorological data. It is needless to point out that the breeding of fish, their health and disease, the maturation and hatching of their eggs, the subsequent growth of their larvae, the dispersion and distribution of young fish as well as the production of the minute organisms at sea and in fresh water which form the food of young and adult fish, all depend very largely on the physical and chemical character of the water. Observations of this character though highly specialized are inseparable from biological studies and must be accurately recorded by competent staff whose whole business it should be. The Inspector on board the trawler has made a start in hydrographical and meteorological observations at sea. Similar work in fresh water is awaiting the creation of the research section of the department under a qualified biologist.

30. Statistics.—Yet another important method of studying fisheries scientifically is the compilation of accurate statistics. It is true that the existing conditions under which the fisheries are worked and the extreme ignorance and conservatism of the fishing classes make this difficult. But, since the acquisition in 1924 of fish-curing yards in all the important sea-coast villages of the Presidency, the opportunity has been seized to gather if not accurate at least approximate statistics of catches. The officers concerned required considerable preliminary training. Statistics of landings have been gathered on the West Coast for the past three years. Though they relate to only one coast and though only one year has yet been reported on, study and analysis have yielded valuable and far-reaching results. The statistics for 1925-26 with a review has been submitted to Government with the request that it may be published as a supplement to the annual report. A proposal to draw up similar statistics for inland fisheries with the assistance of village officers is to be put before the Conference of Collectors this year.

During the last 20 years, the attention of the department has been concentrated on administrative and industrial questions. Nowhere has it failed to fulfil its duties more than in the field of biological research. Consequently the large administrative operations involved in conducting the pearl and chank fisheries and in controlling inland and (to a small extent) marine fisheries rest, I regret to confess, mainly on an empirical and not on a sound scientific basis.

To rectify this Government called for and approved a ten years programme of research. The proposals may be briefly outlined as follows:—

The coastline of the Presidency should be divided into four natural sections based on physical and biological conditions peculiar to each:—

(1) The West Coast (Malabar and South Kanara). This it is proposed should constitute one section though the conditions north of Mangalore in some respects differ from those prevailing in Malabar and may justify a division of the West Coast into two sections later.

(2) Palk Bay and the Gulf of Mannar constitute a distinct region with fishery problems peculiar to itself.

(3) The exposed surf-beaten coast of the Carnatic from Point Calimere up to the Kistna river present problems more or less of a uniform character and may comprise the third section.

(4) The Northern Circars with its large rivers and estuaries has distinctly characteristic problems of its own and should constitute a separate section.

At least four laboratories or research stations with competent staff are essential, one for each of the four sections mentioned:—

(1) The Calicut research station will investigate problems relating to the West Coast. Before this can be properly done it needs to be provided with adequate staff and an aquarium.

(2) The Krusadai Island biological station, partially sanctioned, will deal with problems to Palk Bay and the Gulf of Mannar with special reference to chank and pearl fisheries. The work at this station will be very heavy and a special staff is necessary as also an aquarium.

(3) The aquarium at Madras should be enlarged and suitably staffed to provide a properly equipped laboratory for the Madras coast.

(4) The proposed research station at Vizagapatam with its aquarium is intended to investigate the fishery problems of the Northern Circars.

I propose that each of the four stations should be fully equipped for biological, hydrographical and piscicultural work, without further delay. The need for these stations has become specially urgent as the trawler has commenced her exploring cruises and the research stations will have to serve as the base of her operations for their respective sections of the coast.

The material and data collected by the trawler will have to be stored and worked out at the stations. Otherwise it will be largely wasted. A great deal of work will need to be done systematically from day to day such as the collection of plankton and its examination, daily observations on currents, temperature, salinity, Ph., of the shore water and the continued research and collection of data on fish and fisheries peculiar to each section of the coast, involving regular capture or purchase of fish from the market, measurements of fish, examination of their stomach contents, gonads, scales and other parts, observations on their abundance or scarcity, their habits, migration, early stages, shoaling and spawning seasons, etc. In addition the statistics collected by the yard officers as already described have to be compiled and studied. This will constitute the routine work of the stations. But in addition there will always be special lines of investigation relating to specific problems to be taken up.

None of the inland fish farms possesses research staff or appliances or apparatus for limnological work. The general problems connected with fresh-water fisheries could be worked out at a central station in Madras city. The acquisition of the Chetput brickfields will provide the necessary sites and ponds. A central laboratory for limnological work should be established here with an appropriate staff. The laboratory and the staff will work under the Fisheries Biologist. Fish differ in the different districts together with local conditions. Field laboratories with portable apparatus will require to be established at the different fish farms as scientific study progresses and necessity arises.

31. (8) *Anti-malarial operations and supply of biological specimens to educational institutions (Rs. 5,850).*—These have no direct bearing on the aims and work of the department. They are side developments incidental to it.

(1) *Larvicidal work.*—Ever since the discovery in 1905 that the island of Barbados enjoys an immunity from malaria through the presence in its inland waters of innumerable small minnows thenceforward called 'the Barbados millions' which effectively destroy mosquitos, and thus prevent the incidence of malaria, the principle has gained wide acceptance in scientific and medical circles that fish play a very important part in regulating and diminishing the degree of malarial infection in any given locality. Early larvicidal work consisted of the transport of the "Millions" from Barbados and their introduction into the waters of malarial tracts. But it was not long before zoologists discovered that there are other fishes possessing all the requisite attributes to render them efficient larvicides.

Since 1909 experiments have been made in Bengal, Madras and elsewhere to ascertain which of the small tank fish of India are useful in destroying mosquito larvæ. In the comparative tests made with indigenous species and the much vaunted 'Barbados Millions,' Indian fish were found to be even superior to the latter. It was therefore needless to go to the expense of importing these or other foreign fish into India for this purpose.

At the instance of the Health Department, Mr. Wilson carried out investigations at the Government fish farm, Sunkesula, from the year 1912-13 with South Indian species of larvicidal fish to determine which were best for the control of malaria. The effectiveness of fish breeding to destroy mosquito larvæ in tanks, ponds and wells was conclusively demonstrated by him to the medical profession, local bodies and the public and a practical paper giving detailed instruction about the kind of fish suitable for fresh and salt brackish waters and the manner of using them to destroy noxious larvæ was read by him at the 'All-India Malaria Conference.' This paper is published in Bulletin No. 111 by the Madras Fisheries Department. Two of the Government fish farms, Ippur and Præma, specialize in breeding larvicidal fish.

The work of the department in fighting malaria with such fish consists of three phases—

(a) breeding the fish and distributing them to municipalities, local bodies and private individuals;

(b) periodical stocking of mosquito breeding pools in specially malarious localities with such larvicides;

(c) conversion of mosquito infested sheets of water into fish breeding ponds which also serve the purpose of fry distribution centres for the stocking of irrigation tanks.

The department is able to supply specially selected larvicides in large numbers at the nominal cost of Rs. 10 per 1,000. But in spite of the earnest recommendations of the Government, Municipal and local authorities do not as yet avail themselves at all adequately of the facilities offered them to obtain a good strain of these useful little fish. They appear either careless of the value of this cheap means of combating malaria or else depend upon local supply of what are too often species of inferior larvicidal quality.

The second form of operation is more directly under the control of the department and consequently much greater progress has been made in this method of fighting malaria. Inadequacy of staff and want of funds alone restrict operations. Mosquito breeding water-holes, ponds and streams in several localities in the Cuddapah district and throughout the Nallamalais in the Kurnool district have been treated with hundreds of thousands of larvæ eating fish. Appreciable decrease in the incidence of malaria is reported from Nallamalais. The extension of operations to other malaria infected regions should be taken up as funds are available, especially in the agency tracts of the Ganjam, Vizagapatam and Godavari districts, in the Wynad taluk of the Malabar district, the Gudalur taluk of the Nilgiri district, etc.

The third line of attack on malarious waters is perhaps even more important. Two schemes have already been completed, viz., the conversion of the Fort Moats at Chingleput and Vellore into fish farms. In both the cases until the operations were commenced these moats formed stagnant pools overgrown with dense pond vegetation and supremely suitable as harbourage to mosquito larvæ. As a consequence malaria was endemic within both the forts, an extremely serious condition seeing that a large reformatory for boys is located within the Chingleput Fort whilst a Police Training school is located within that of Vellore. The moats have now ceased to harbour mosquito larvæ and have concurrently become ideal fish breeding ponds whence large supplies of fry will become available for stocking the large number of tanks in the districts of Chingleput and Nellore.

In the course of larvicidal operations it was found that fish-traps, basket-traps and other contrivances were extensively in use in irrigation channels, paddy fields and field drains throughout the country which destroy large numbers of immature food-fish and the small mosquito destroying species. As the waters standing in paddy fields presumably fall within the definition of private waters under the Indian Fisheries Act IV of 1897 (the only piece of fishery legislation available) the Madras Government did not see their way to frame rules prohibiting the use of these objectionable methods of fishing. If full benefits from larvicidal fish are to be derived, ways and methods must be found for preventing such wholesale destruction of these. This is one of the instances where the absence of adequate fishery legislation hampers development.

32. *Biological specimen supply.*—The numerous fishery operations conducted or controlled by the department, particularly chank and pearl oyster diving, and the periodical dredging of pearl and chank beds, result incidentally in the collection of numerous specimens of animals and plants of considerable value to students of natural science.

In view of the difficulties hampering the study of zoology in Indian Colleges owing to lack of actual zoological specimens a supply station was begun in 1918. The extent of the demand for such specimens will be evident from the list, attached as enclosure, of institutions which obtained supplies from the station during 1926-27.

It may be noted that the bulk of the specimens has been supplied outside the Presidency. The prices charged are calculated just to cover the cost of preparation.

Unfortunately it is extremely difficult to cover expenditure as desired by Government as any increase in the rates charged will diminish the demand greatly; either the poorer colleges will try to do with lessened supplies, or they will revert to the outside sources from which they obtained their specimens previous to our attempt to cater for Indian Colleges with Indian material. Most of their material was previously obtained from the Naples Biological station or from the Plymouth Marine Laboratory which are both heavily subsidized by Government and public bodies, and which run their supply departments from altruistic motives. The service is an educational one and should not be wholly commercialized, for this will lay an impossible burden upon it. What is wanted is a small subsidy which will enable the supply to be carried on upon improved lines and meet any small deficit on working. Seeing that the supply is an All-India one, the Educational department of the Imperial Government might well be asked to provide the small sum that is necessary. Rupees 3,000 per annum would suffice.

IV. ACTIVITIES OF THE DEPARTMENT IN THE ORDER OF THEIR IMPORTANCE.

33. The aim of the department has been defined as the development of fisheries as a source of food supply and as otherwise contributing to the national wealth of the country. If this is conceded the programme of work relating to the fisheries should be classified as follows in the order of their importance:—

- (1) Development of marine food fisheries.
- (2) Development of inland food fisheries.

(3) Development of pearl and chank and other minor fisheries.

(4) Improvement of the material and moral condition of the fisherfolk as the only method of improving the fishing industry.

34. The main lines of activity of the department at the present time, arranged in the order of their relative cost and magnitude, given in paragraph 5 above does not materially differ from this arrangement.

Item 1, Fish-curing yards, and 2, Deep sea fishery research, are the largest items of work absorbing the major portion of the expenditure of the department and relate to marine food fisheries. The technological experiments carried on at Chaliyam and Tanur (item 6) really form a sub-item of the same major head.

The items 3, 4 and 5 are in their natural order. Item 7, Fishery Research, is not a separate head but comprises the scientific work relating to both marine and fresh water fisheries and should be absorbed in these two items.

Item 8, Anti-malarial operations and Biological specimens supply, are petty heads of expenditure, only incidentally connected with fisheries. They therefore occupy the last place.

35. However haphazard the nature of the various developments of the department may have been historically, it will be seen that the relative value and degree of concentration on the various lines of activity pursued are not out of proportion to the importance of the subjects with which they deal. I am unable to suggest or to conceive of any totally different arrangement in the relative position and importance of existing activities. The defects in organization and work relate only to details or subdivisions of the major activities. The most important of these, I consider, is the want of staff and facilities for biological and technological research. What the department desperately needs is a large addition to its scientific and expert staff so that fisheries research may take the primary place that the development of fisheries demands for it. I shall revert to this question in greater detail in a later section of the note.

36. If due emphasis is laid on research one important result in all the major activities of the department would be a corresponding increase in what may be called unremunerative expenditure which cannot be set off against receipts in the annual balance sheets of the department. If the primary place that research should occupy in fishery activities is conceded here as it is in all other countries of the world the department will become a scientific one and should not be expected to counterbalance its expenditure by revenue. Wherever it is possible without subordinating its primary aims, every effort may however be made to secure revenues. The Finance Department, as well as the general public, have been inclined to gauge the success of the department's operations mainly by profits earned. As a result, an undue fear of cost has compelled the department to concentrate on the administrative revenue-yielding aspects of its work and to neglect pure research and experiment. As instances I may refer to the Retrenchment Committee's findings, the proposals by Mr. Hornell for the abolition of the Marine Biologist and Marine Assistant, the closure of the cannery within a year and a half of the commencement of its work as a commercial concern, the enhancement of the issue price of salt in fish-curing yards and the constant demand for making the oyster and biological supply section self-supporting. Consequently the administrative side of the department is fairly well organized while the organization of the research side has only just begun.

V. PROPOSED REORGANIZATION OF STAFF.

At present the department has no machinery for the instruction of the men who are required for its administrative and scientific duties. We have officers ranging from Rs. 30 to Rs. 750 per mensem occupying posts of great responsibility and requiring technical and scientific knowledge besides administrative experience and practical training. In actual fact none of these officers possess all the necessary qualifications. The men in the higher rank carry on their duties in a satisfactory manner because they have natural

ability and long experience and have equipped themselves with a working knowledge of their duties. Nevertheless they would achieve still better results if they had had the benefit of a thorough grounding in the theory and practice of fisheries at the start. Such senior men are difficult to duplicate or replace. Coming to subordinate ranks, the majority have no technical knowledge or training worth the name, and I regret to say most of them have not the calibre to cope, in their untrained condition, with the difficulties and problems that beset them when, as often happens, they have to take responsible charge of operations. The following is a list of the present officers with their pay and qualifications:—

Designation.	Pay. Rs.	Qualifications.
Assistant Director (Coast)	250—25—500 —50—750	B.A., History; had undergone co-operative training and possesses vast administrative experience.
Assistant Director (Inland)	250—25—500	B.A., History; has a working knowledge of fish farms and tank stocking operations.
Superintendent, Pearl and Chank Fisheries.	200—20—400	Matriculation; has put in long years of service in the department and has intimate knowledge of the conduct of the pearl and chank fisheries work.
Inspector of Fisheries, Vizagapatam.	70—250	B.A., Zoology; has undergone two years' course in the Medical College.
Inspector of Fisheries (North), West Coast.	70—250	Intermediate; possesses experience in socio-economic work.
Inspector of Fisheries (Central) ..	70—250	B.A., History; holds a permanent appointment in the Salt department, as Assistant Inspector; possesses administrative experience having worked in the Secretariat for some years.
Inspector of Fisheries (South) ..	70—250	S.S.L.C.; has experience in canning and socio-economic work.
Inspector of Fisheries (Inland) ..	70—250	Intermediate, one part in B.A. (Zoology).
Inspector of Pearl and Chank Fisheries.	70—250	S.S.L.C.; has experience in pearl and chank fisheries work and has nautical experience.
Inspector of Fisheries, Trawler ..	70—250	B.A., Zoology; has considerable experience in socio-economics and inshore fishing experiments.
Research Assistant, Ennur	70—250	Matriculation; has undergone special training under Mr. Hornell in the zoological specimen supply work.
Research Assistant, Tanur	70—250	B.A., Chemistry; has undergone training in the Indian Institute of Science, Bangalore, for a year.
Research Assistant, Kruasalai	70—250	M.A., Zoology.
Research Assistant, West Hill	70—250	B.A., Zoology.
Laboratory Assistant, Ennur ..	65—4—125	Unpassed; exempted; has undergone training in pisciculture at the Ennur station.
Laboratory Assistant, Aquarium ..	65—4—125	S.S.L.C.; one part in chemistry (Intermediate); has undergone training in pisciculture at the Tanur station.
Survey Assistant	50—2½—100	Unpassed; exempted; advanced drawing and painting, etc.
Chank Fishery supervisor	50—2—80	Matriculation.
Assistant Inspector, Headquarters ..	40—3—70	Middle school, first-class; undergone training in levelling and surveying.

Designation.	Pay.	Qualifications
	RS.	
Assistant Inspector, Kurnool ..	40-3-70	S.S.L.C.; has undergone training in pisciculture at the Ennur station.
Do. Vellore ..	40-3-70	Do. do.
Do. Chingleput ..	40-3-70	Do. do.
Do. Nellore ..	40-3-70	Do. do.
Do. Mopad ..	40-3-70	Unpassed; exempted.
Sub-Inspectors, Fish-curing yards (26) West Coast.	55-80	S.S.L.C. men.
Sub-Inspector of Fish-curing yards (Northern Circars).	35	Unpassed; exempted.
Sub-Inspector, Fish-curing yards under the Superintendent, Pearl and Chank Fisheries.	35	S.S.L.C.
Sub-Inspector, Fish-curing yards under Assistant Director (Inland).	35	Do.
Chank fishery overseers (3) ..	35-60	Do.
Mechanic, Cannery ..	35-3-80	Post held in abeyance.
Do. Tanur ..	35-3-80	Drivers' test.
Sub-Assistant Inspectors (2) under Assistant Director (Inland).	30-1-45	Unpassed; exempted.
Canning overseer ..	30-1-45	Post held in abeyance.
Church Island overseer ..	30-1-45	Unpassed; exempted.
Fieldmen (4) under Assistant Director (Inland).	23-1-35	Unpassed.
Fieldman, Ennur ..	20-1-35	Do.
Laboratory attendant ..	20-1-35	Do.
Petty yard officers (48) ..	20-1-25	Do.
Keepers, Aquarium (3) ..	23-1-35	Do.

I have come to realize that if we continue simply to choose the most intelligent applicants, to give them what training we can and then put them in charge of responsible work, the activities of the department will be seriously handicapped, especially on the research side; and real development will cease, as such men need far more supervision than can possibly be given. Every Government department requiring the application of science and technology to its operations has passed through the same stage that this department now finds itself in. Each has begun in a tentative way with the human material available on the spot and has had eventually to develop an organization specially devised to train the recruits needed for replacement and extension. The Forest, Public Works and Agricultural departments are instances in point. They have found this development necessary in the course of their evolution and fisheries cannot reasonably be expected to form an exception to the rule.

We have reached a limit. Future progress in all sections of the department, dealing as they do with matters varying from fishing experiments to trade organization, require more and more expert knowledge and direction. In the initial stages, for instance, of fish-curing, canning or manufacturing of fish oil and guano, trade methods and practices, as well as recipes from books, have been tried, with considerable initial success. Now that the preliminary work has been done, however, the problems that remain to be solved call for expert technical knowledge. The most immediate technical and scientific problems before the department are—

- (1) the tracing of sardine and mackerel and other fish shoals when they leave the coast, the methods of capturing them in deeper water with enlarged boats and special gear;
- (2) the softening of the bones in tinned Malabar sardines;
- (3) the determination of the periods of safe storage of canned goods;
- (4) the prevention of the dark discolouration in prawn tins;
- (5) the elimination of excess oil in fish meal, the correct method of manufacture of medicinal fish oil with maximum vitamin, and the refining of fish oil for various industries;
- (6) the detection of the causes of the irregular periodicity of the pearl fisheries and the discovery of remedies;

- (7) the formulation of measures to prevent undue depletion of chank beds;
- (8) the artificial culture of Hilsa and other food fish in backwaters and rivers.

All of these and other less emergent questions demand the application of highly technical and up-to-date methods by experts.

What is therefore required is an entirely new departure which will ensure expert attention to all scientific operations and experiments on the one hand, and will provide on the other the staff and machinery which will make possible the training of apprentices for all the administrative posts and the subordinate ranks of the department. The staff of the department should therefore consist of two classes of officers—

- (1) experts with their assistants and staff for research, and
- (2) administrative officers with their assistants and staff for executive duties.

Such a distinction, I find, exists in Fisheries departments in other countries. In Great Britain, for instance, the research laboratories at Lowestoft, Conway, and elsewhere are staffed by qualified biologists, hydrographers, chemists and statisticians, while executive officers (Superintendents, Inspectors, Water Bailiffs, etc.), are stationed at important centres for administering laws and regulations relating to fisheries and gathering statistics relating to these and allied industries. The latter are largely men with practical experience of fishery work and a grounding in fishery science but are not experts in any branch of that science. Such a distinction has perhaps been unnecessary here in the past, but I consider that the time has now arrived when we must make it.

With this end in view I proposed the re-entertainment of Captain Cribb as fishing expert when the trawler was purchased and have been redesignating the subordinate posts in the department according to the nature of their duties. For technological work at the Chaliyam Cannery and Tanur particularly, as well as for other chemical investigations relating to fisheries and pisciculture, I have submitted proposals for the appointment of a qualified *Fisheries chemist*. The intensive biological investigations relating to pearl and chank, marine and inland fisheries likewise require the services of a whole time biologist for their effective and proper prosecution. I would propose that a competent and fully qualified biologist with brilliant Western academical degrees in Natural Science and, if possible, Fishery Science with some experience of biological research work with a knowledge of Indian Zoology if that could be had should be carefully selected and entertained as Fisheries Biologist on a suitable salary which I will for the present fix as Rs. 750-50-1,200 or thereabouts. He should be competent to supervise and guide the work of the Assistant Biologists and control the work of the Biological stations; besides he should be an understudy of the Director and should be kept in touch with all major schemes so that he could act for the Director when the latter goes on leave and ultimately take his place when the present Director retires. Of all the experts he is obviously the one that could be trained to take place of the Director and therefore great care should be exercised to entertain a sufficiently young man of brilliant attainments and absolutely first-rate qualifications and merit. The above are the urgent present requirements on the research side of the department's work. Other experts may become necessary as the work develops; for instance, a qualified *Pisciculturist* when the number of hatcheries increases, a *Hydrographer* when hydrographic operations are extensively carried on and possibly a *Statistician* and *Economist*.

The expert staff of the research section when appointed will provide the requisite machinery for the training of the rest of the Fisheries staff from Assistant Directors to Overseers and the subordinate research staff at least from Research assistants to Laboratory attendants.

The training of experts is at present out of the question as there is no institution in the whole of India that provides courses in the higher branches of fishery science. If such existed, we could obtain men with a sound grounding in fishery science, who, after training and experience in the department, would be capable of taking the position of experts. At present experts with foreign training will almost certainly have to be selected.

The improved curriculum of studies in the Fisheries Training Institute will also require assistance from the experts who should supervise studies relating to their subjects and examine the students in them. The fishery elementary education has already had the desired effect in creating an interest for advanced technical education in fisheries among sections of the West Coast fishermen. A scheme for providing such technical education has been submitted to Government. The Fisheries Training Institute at Calicut and those proposed at Mangalore, Vizagapatam and Madras, with the assistance and help from the experts of the department will provide the means of imparting such education and training recruits for the department.

The staff required for the efficient running of the department may now be considered under the two sections *Research* and *Administration*.

I. Research Section.

1. Fishing and Sailing Expert.

Fishing and Sailing Expert now styled Assistant Director (Marine). Captain Cribb is a specialist in fishing and constitutes the only expert officer among the present Assistant Directors. His wide and varied experience in European and Eastern seas and his long professional career as a North Sea fisherman from the eighties, in sailing vessels and subsequently in steam and motor vessels, has specially fitted him for his task in India. His work is the improvement of fishing craft, gear and methods, and the exploration of deep sea fishing grounds. He has rare qualifications for the task. He is on a short term contract of three years from 12th March 1926. Defects in the trawler and difficulties with its crew delayed serious work till last October. He has only another year of service. I am proposing that his contract should be extended for another three years. He has already been provided with the staff necessary for his present requirements.

2. Fisheries Biologist.

The two Research Assistants already working in the biological stations at West Hill and Krusadai are local graduates and have yet to be trained in fishery research. These or other men from the department should be sent to a Western University for training and on their return be appointed as Assistant Biologists. All the four marine biological stations at Calicut, Krusadai, Madras and Vizagapatam and the freshwater biological station proposed at Chetput, should be under a qualified Assistant Biologist. Besides the Assistant Biologists each biological station should have the following subordinate staff:—

One Research Assistant, a local Honours B.A., or M.A.;
A Laboratory Assistant;
A Laboratory Attendant; and
Two peons.

One Assistant Biologist is also required to work on board the trawler, with the present Inspector and peon under him.

3. Fisheries Chemist.

Under him there should be a Research Assistant with staff on the scale indicated in the preceding paragraph, viz., a Laboratory Assistant, a laboratory attendant and a peon. He can probably work at the Industries laboratory in the Leather Trades Institute till a laboratory designed to meet his requirements is established on the West Coast, where most of his work will, for the present, lie.

4. Other Experts.

Other experts such as a hydrographer, pisciculturist, statistician, etc., are not at present urgently required as the work done is not so large or extensive as to require whole-time officers and I can continue to supervise them in addition to my other duties.

II. Administrative Section.

If the aims of the department and its present activities as I have tried to show above are accepted the present executive staff is the bare minimum and in several cases inadequate to cope with the increasing work in the different sections. There is certainly no superfluity which calls for curtailment. The department is run on the most economical and, if I may be permitted to say so, stingy lines. The gazetted officers of the department, with one possible exception, are not on the usual provincial service grade. One Assistant Director's maximum pay stops with Rs. 500 and that of the Superintendent, Pearl and Chank Fisheries, practically an Assistant Director, with Rs. 400. This has led to considerable dissatisfaction which necessarily reflects on the quality of work done.

On the West Coast before the fish-curing yards were taken over by the department there was a socio-economic Sub-Assistant (Inspector), an Inspector of oil and guano factories, two Assistant Inspectors to assist the Assistant Director (Coast), in the inspection of about 6 to 10 fish-curing yards. When, however, over 50 fish-curing yards were transferred and the work increased fourfold, the number of inspecting officers was reduced to 3, who are now called Inspectors of Fisheries. The posts of both socio-economic Sub-Assistant and oil and guano Inspector were abolished and the 3 Inspectors were transferred to the fish-curing yards. They have therefore been obliged to concentrate their attention chiefly on these yards and the inspection of oil and guano factories as well as co-operative societies and socio-economics propaganda as a whole have not received adequate attention. The fish-curing yards on the East Coast suffer from want of adequate inspecting staff and the fact that the men in charge of most of them are ill-educated peons.

The duties of the four controlling officers on the East and West Coasts are at present somewhat ill defined. I would suggest the following organization and allocation of work for the future.

The Superintendent, Pearl and Chank Fisheries, should be raised to the rank of Assistant Director in status and pay (250—25—500—50—750). The Assistant Director (Inland) should be on the same grade of pay and Vizagapatam should be the headquarters of a third Assistant Director on the East Coast. The territorial jurisdiction as well as the duties of the three officers should be fixed as follows:—

The jurisdiction of the Assistant Director (Southern Division) at present styled Superintendent, Pearl and Chank Fisheries, will comprise the districts of Tinnevely, Ramnad, Madura, Trichinopoly and Tanjore.

That of the Assistant Director, Northern Division (proposed), will consist of the districts of Northern Circars including Guntur, Coimbatore, Nilgiris, Malabar and South Kanara will form the Western Division under the Assistant Director at present styled Assistant Director of Fisheries (Coast). The remaining districts will constitute a Central Division under the Assistant Director at present styled Assistant Director (Inland).

The Assistant Directors should be in charge of all executive duties connected with the management and development of fisheries and socio-economic work among fishermen in their respective areas. These duties will comprise:—

(1) Executive work relating to marine fisheries, supervision of the inland fisheries already under the control of the department, the gradual acquisition of freshwater fisheries in new districts, and anti-malarial operations.

(2) The control of fish-curing yards.

(3) The establishment of schools, formation of co-operative societies and other socio-economic work on the West Coast and ultimately probably on the East Coast also.

(4) Such special duties pertaining to the different sections as the inspection of oil and guano factories in the western division, the conduct of pearl and chank fisheries and the resuscitation of a chank bangle industry in the southern division, deep water fishing experiments in perennial tanks in the central division, and the development of the Collair Lake prawn fishery and Hilsa operations in the northern division.

The subordinate staffs of the four divisions may remain as at present except for the staff attached to the fish-curing yards. I have submitted to Government a reorganization scheme according to which the West Coast would be divided into four sections under four Inspectors and ten sub-sections each under a Sub-Inspector. The East Coast would be divided as at present into three sections each under one Inspector but the northern and southern sections would each have two Sub-Inspectors and the central section one. All peons in charge of yards would be replaced by Petty Yard Officers. The additional staff would not only inspect fish-curing yards and collect fisheries statistics more efficiently than now but would also at least on the West Coast be in charge of socio-economic work and the inspection of oil and guano factories. Such a revision of the establishment I have shown could be made without extra cost. But, for the supervision of the co-operative societies when their number and scope increases and for the proper development of socio-economic work on the East Coast, the transfer of which to this department has been proposed to Government, some further additional staff will be necessary.

In the inland section the existing staff is adequate for present needs. As the work expands some additional staff will be needed for the new fish farms and hatcheries and tank stocking work especially in districts where they have not yet been started.

Director.

The work of the Director is obvious. He should possess administrative experience, knowledge of Indian needs, habits, social conditions, prejudices, conflicting interests, trade, etc., combined with a good knowledge of all sections of fishery work, industrial and scientific, throughout the world. These qualifications will enable him so to combine the work of the experts and that of the administrative officers as to obtain optimum results. He should shape and control the general policy and lines of action and sanction them in the order of their importance, he should co-ordinate, regulate and criticize, the work of the different sections, help the experts and the executive staff with instructions, suggestions and advice as required and have sufficient leisure to discuss the general lines of work and if necessary the details of operations with Government and with his subordinate staff. He should elaborate new schemes, negotiate with other departments and bodies, write reports, books and bulletins, review papers that will be published from time to time by the experts, and generally stimulate and push the work of the whole department. He will have to be thoroughly posted up with work in all sections of the department so as to be in a position to supervise and control the work of the experts on the one hand and that of the administrative officers on the other. If burdened as at present with administrative clerical and account duties, without proper assistance in the headquarters office, and with the entire work down to the most petty experiments scientific and technological, he will get neither time nor opportunity to devote his best to the more important and legitimate duties of the Director. The appointment of the Fisheries biologist and Fisheries chemist will set the Director free from the detailed supervision of most experiments and research. It is unnecessarily difficult to supervise the operations from a single centre like Madras, for they have to be carried out in various places and require whole-time officers to deal with them. I refer to pearl fishery research at Krusadai, the routine and special work at the research station at Calicut and the laboratory at Ennur, fish-curing, fish meal and oil experiments at Tanur, details of canning processes at Chaliyam, etc. So long as I am Director, since I have specialized in pisciculture I hope I shall be able to continue to devote close supervision over the work of the fish farms, hatcheries, and cultural experiments with marine brackish and fresh water fish. In addition, the collection and compilation of fisheries statistics, the hydrographical and meteorological investigations at sea and inland stations must continue to receive my personal attention.

Personal Assistant.

If the Personal Assistant is made a gazetted officer it will relieve the Director of administrative accounts and clerical routine which now claims much of his attention and time to the detriment of more important work.

This is bound to increase in volume and scope with the appointment of the additional Assistant Directors and Experts and the enlargement of the scope of operations on the research and the administrative sides. The Government refused the gazetting of the Personal Assistant in 1921. The number of leave applications, contingent bills, vouchers, the procedure connected with the new scheme for the control of expenditure, attesting the cancellation of sub-vouchers as the only drawing and countersigning officer, have all increased to a considerable extent since 1921. The transfer of the fish-curing yards, the purchase of the trawler and the additional schools have resulted in increasing the staff to four times the number in 1921, with corresponding increase in administrative, account and clerical routine. I therefore consider that the proposal should now be reconsidered. This will incidentally enable the Personal Assistant to deal with disbursements of pay and amounts drawn on travelling allowance and contingent bills. These often have to be dealt with by someone at headquarters during my absence on tour though I am personally held responsible for such payments. It will also give him the necessary status to interview officially the Collector of Salt, Collector of Customs, Presidency Port Officer, Deputy Conservator of the Port Trust, and other heads of departments when I am away.

Manager.

If the post of Personal Assistant is gazetted he should have the assistance of a Manager in the control of the office and to relieve him of part of his routine duties such as the checking of bills, pay, travelling allowance and contingent bills, cash book and chitta, monthly detailed contingent bills, checking of stationery and forms, arrear list, personal registers, etc. The Manager should also check and scrutinize the drafts and disposals put up by the clerks now submitted direct to the Personal Assistant which occupies a considerable portion of his time.

Statement showing the existing and future staff of the Fisheries department, where additions or alterations are proposed in the note.

Particulars of sections.	Existing staff.				Proposed staff.			
	Name of post.	Number.	Scale of pay.	Average cost.	Name of post.	Number.	Scale of pay.	Average cost.
1. Direction.								
Direction ..	Personal Assistant, Non-Gazetted.	1	RS.	RS. A. P.	Personal Assistant, Gazetted (Deputy Collector's cadre). Manager ..	1	RS.	RS. A. P.
			200—10—250	237 8 0			300—850	630 0 0
				237 8 0	1	150—10—250	211 2 0	
								841 2 0
2. Research Section.								
Deep sea fishing and re- search.	Assistant Director (Marine).	1	750—50—850	796 11 0	Fishing and Sailing Expert.	1	750—50—1,000	916 11 0
					Assistant Biologist ..	1	300—25—650	498 5 0
Technological research.	Research Assistant ..	1	70—5—120—10—250.	796 11 0				1,415 0 0
				160 0 0	Fisheries Chemist ..	1	750	750 0 0
					Research Assistant ..	1	70—5—120—10—250	160 0 0
					Laboratory Assistant ..	1	65—4—125	103 14 0
					Laboratory Attendant ..	1	23—35	31 1 0
	Peon ..	1	15—20	17 11 0				
			160 0 0					1,062 10 0
Biological research. Marine Bio- logical	.....	..	....	..	Fisheries Biologist	1	750—50—1,200	1,030 0 0
	Research Assistant ..	1	70—5—120—10—250	160 0 0	Assistant Biologist ..	1	300—25—650	498 5 0

Krusadai station and Rameswaram aquarium.	Peon ..	..	12—18	15 7 0	Research Assistant ..	..	70—5—120—10—250	160 0 0
					Laboratory Assistant ..	..	60—4—120	93 5 0
					Laboratory Attendant ..	..	20—35	28 5 0
					Peons ..	..	12—18	30 14 0
					Keeper ..	..	35—60	47 8 0
					Do. ..	..	20—35	28 5 0
				175 7 0	Special allowance at Rs. 4 per mensem each ..	..	....	88 0 0
								974 10 0
West Hill station.	Research Assistant ..	1	70—5—120—10—250	160 0 0	Assistant Biologist ..	..	300—25—650	498 5 0
	Laboratory Attendant ..	1	20—35	28 5 0	Research Assistant ..	..	70—5—120—10—250	160 0 0
	Peon ..	1	12—18	15 7 0	Laboratory Assistant ..	..	10—250	93 5 0
					Laboratory Attendant ..	..	60—4—120	28 5 0
				203 12 0	Peon ..	..	20—35	30 14 0
								810 13 0
Biological Specimen Supply Laboratory, Ennur.	Research Assistant ..	1	70—5—120—10—250	160 0 0	Assistant Biologist ..	..	300—25—650	498 5 0
	Laboratory Assistant ..	1	10—250	103 14 0	Research Assistant ..	..	70—5—120—10—250	160 0 0
	Fieldman ..	1	65—4—125	28 5 0	Laboratory Assistant ..	..	10—250	103 14 0
	Peon ..	2	20—35	30 14 0	Laboratory Attendant ..	..	65—4—125	28 5 0
					Peons ..	..	20—35	30 14 0
				323 1 0			12—18	821 6 0
Freshwater station, Chetput, Madras.	.....	..	....	..	Assistant Biologist ..	..	300—25—650	498 5 0
					Research Assistant ..	..	70—5—120—10—250	160 0 0
					Laboratory Assistant ..	..	10—250	103 14 0
					Laboratory Attendant ..	..	65—4—125	31 1 0
					Peons ..	..	23—35	35 6 0
							15—20	828 6 0
Marine Biological Station, and Vizagapatam aquarium.	.....	..	....	..	Assistant Biologist ..	..	300—25—650	498 5 0
					Research Assistant ..	..	70—5—120—10—250	160 0 0
					Laboratory Assistant ..	..	10—250	93 5 0
					Laboratory Attendant ..	..	60—4—120	28 5 0
					Peons ..	..	20—35	30 14 0
					Keeper ..	..	12—18	47 8 0
					Do. ..	..	35—60	28 5 0
							20—35	886 10 0
	Total Research ..	..	....	1,658 15 0	Total ..	..	..	7,829 7 0

Statement showing the existing and future staff of the Fisheries Department, where additions or alterations are proposed in the note---*cont.*

Particulars of sections.	Existing staff.			Proposed staff.				
	Name of post.	Number.	Scale of pay.	Average cost.	Name of post.	Number.	Scale of pay.	Average cost.
Western division.	Assistant Director of Fisheries (Coast).	1	Rs. 250-25-500-50-750	Rs. A. P. 527 12 0	Assistant Director (Western division).	1	250-25-500-50-750	527 12 0
	Inspectors ..	3	70-5-120-10-250	480 0 0	Inspectors ..	4	70-6-120-10-250	640 0 0
	Sub-Inspectors ..	29	35-80	1,527 8 0	Sub-Inspectors ..	22	35-80	1,145 0 0
	Do. for 8 months.	1	35-60	47 8 0	Petty officers ..	10	25	260 0 0
	Petty officers ..	21	20-1-25	493 8 0	Do. ..	12	22½	270 0 0
	Do. for 8 months ..	3	Do.	70 8 0	Do. ..	24	20	480 0 0
	Do. for 4 months ..	3	Do.	70 8 0	Do. for 8 months.	4	20	80 0 0
	Peons ..	126	12-18	1,953 0 0	Do. for 6 months.	1	20	20 0 0
	Peons for 8 months ..	6	12-18	93 0 0	Do. for 4 months.	2	20	40 0 0
	Do. for 6 months ..	6	12-18	93 0 0	Peons ..	108	12-18	1,674 0 0
Do. for 4 months ..	3	12-18	46 8 0	Do. for 12 months	6	Do.	93 0 0	
Southern division.	Superintendent, Pearl and Chank Fisheries.	1	200-20-400	Rs. A. P. 5,402 12 0	Assistant Director (Southern division).	1	250-25-500-50-750	5,343 12 0
	Sub-Inspector ..	1	35	322 4 0	Sub-Inspectors ..	2	35-60	95 0 0
	Petty officers ..	11	20-1-25	258 8 0	Petty officers ..	6	25	150 0 0
	Peons ..	19	12-18	296 1 0	Do. ..	2	22½	45 0 0
					Do. ..	6	20	120 0 0
					Peons ..	14	12-18	216 2 0

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Central division.	Assistant Director (Inland) ..	1	250-25-500		399 7 0	Assistant Director (Central division) ..	1	250-25-500-50-750		527 12 0
			35	20-4-25 12-18				35-60 25 22 1/2 20	154 6 0	
Northern division.	Sub-Inspector	1	35	35 0 0	35 0 0	Sub-Inspector	1	35-60	47 8 0	
	Petty officers	2	20-4-25	47 0 0	47 0 0	Petty officers	1	25	25 0 0	
	Peons ..	20	12-18	308 12 0	308 12 0	Do.	1	22 1/2	22 8 0	
						Do.	8	20	160 0 0	
					790 3 0	Peons ..	10	12-18	154 6 0	
Northern division.	Inspector	1	70-5-120-10-250	160 0 0	160 0 0	Assistant Director (Northern division).	1	250-25-500-26-750	527 12 0	
	Sub-Inspector	1	35	35 0 0	35 0 0	Inspector	1	70-250	160 0 0	
	Petty officers	3	20-4-25	70 8 0	70 8 0	Sub-Inspector	2	35-60	95 0 0	
	Peons ..	56	12-18	864 8 0	864 8 0	Petty officers	3	25	75 0 0	
					1,130 0 0	Do.	9	22 1/2	202 8 0	
			Total, Administration.	8,234 12 0	Do.	15	20	300 0 0		
					Peons ..	30	12-18	463 2 0		
								1,823 6 0		
								9,358 2 0		

4. Education—Socio-Economics Section.										
Training Institute, Calcut.	Headmaster	1	75-5-100-10-150		125 0 0	Headmaster	1	120-10-250		195 0 0
			No change in the rest of the existing staff.	10-150				120-10-250	195 0 0	
Training Institute, Mangalore.	Headmaster	1	10-150	125 0 0	125 0 0	Headmaster	1	120-10-250	195 0 0	
	Assistant	1	36-60	47 8 0	47 8 0	Assistant	1	36-60	47 8 0	
	Carpentry Instructor	1	35-60	37 8 0	37 8 0	Carpentry Instructor	1	35-60	37 8 0	
	Drawing and Drill Master	1	26-1-50	37 8 0	37 8 0	Drawing and Drill Master	1	26-1-50	37 8 0	
	Boat and Fishery Instructor.	1	25-1-50	37 8 0	37 8 0	Boat and Fishery Instructor.	1	25-1-50	37 8 0	
Training Institute, Vizagapatam.	Peon ..	1	12-18	15 7 0	15 7 0	Peon ..	1	12-18	15 7 0	
	Same as at Mangalore	6	....	380 7 0	380 7 0	Same as at Mangalore	6	....	380 7 0	

Particulars of sections.	Existing staff.			Proposed staff.				
	Name of post.	Number.	Scale of pay.	Average cost.	Name of post.	Number.	Scale of pay.	Average cost.
Training Institute, Madras.		..		Es. A. P. ..	Headmaster .. • ..	1	Rs. 120-10-250	Es. A. P. 195 0 0
					Assistant	1	40-65	52 1 0
					Carpentry Instructor	1	40-65	52 1 0
					Drawing and Drill Master ..	1	25-1-50	37 8 0
					Boat and Fishery Instructor.	1	25-1-50	37 8 0
					Peon	1	15-20	17 11 0
								391 13 0
								1,347 11 0
								19,276 6 0
								Grand total ..

4. Education—Socio-Economics Section—cont.

LIST OF INSTITUTIONS SUPPLIED WITH THE ZOOLOGICAL SPECIMENS
BY THE MADRAS FISHERIES DEPARTMENT DURING THE YEAR
1926-27.

Agra	..	..	..	{ St. John's College.
Aligarh	..	..	..	{ Agra College.
Allahabad	..	..	..	{ Muslim University.
Bangalore	..	..	..	{ The University.
Benares	..	..	..	{ Central College
Bombay	..	..	..	{ Hindu University.
Calcutta	..	..	..	{ Queen's Intermediate College.
Dehra Dun	..	..	..	{ Royal Institute of Science.
Fyzabad	..	..	..	{ The University.
Glasgow	..	..	..	{ Forest Entomologist.
Gwalior	..	..	..	{ Government Intermediate College.
Jodhpur	..	..	..	{ The University.
Karachi	..	..	..	{ State Museum.
Lahore	..	..	..	{ Do.
Lucknow	..	..	..	{ D. J. Sind College.
Multan	..	..	..	{ Victoria Museum.
Nagpur	..	..	..	{ Dayal Singh College.
Patna	..	..	..	{ Government College.
Rangoon	..	..	..	{ Santana Dharma College.
Coimbatore	..	..	..	{ The University.
Ernakulam	..	..	..	{ Isabella Thoburn College.
Madras	..	..	..	{ Multan College.
Pudukkottai	..	..	..	{ Central Museum.
Vizagapatnam	..	..	..	{ Prince of Wales Medical College.
Kurnool	..	..	..	{ Judson College.
Mysore	..	..	..	{ University College.
Calicut	..	..	..	{ Government Entomologist.
	..	..	..	{ Maharaja's College.
	..	..	..	{ Presidency College.
	..	..	..	{ Christian College.
	..	..	..	{ Women's Christian College.
	..	..	..	{ State Museum.
	..	..	..	{ Mrs. A. V. N. College.
	..	..	..	{ Government Muhammadan High School.
	..	..	..	{ Inspector-General of Education.
	..	..	..	{ Assistant Director of Fisheries.

**Dr. B. SUNDARA RAJ, M.A., Ph.D., Director of
Fisheries, Madras.**

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

1. Please see paragraphs 1 and 2 of my note on the history, present condition and future development of the Fisheries department.
- 2, 3 & 4. Please see paragraphs 7 (2) and 36 of my note referred to above.
5. Please see Section V of my note.
6. Please see paragraph 2 of my note.
7. Please see paragraphs 33, 34 and 35 of my note.

II. FISH FOOD SUPPLY.

9. Yes. It is cheaper where fresh fish is readily available in the fishing villages along the coasts and the neighbouring markets, also the vicinity

of large tanks if and when they run dry. Fish is dear because of (1) the enormous fluctuations in production (by capture or cultivation) and (2) the uneven distribution due to lack of efficient communication and preservatives.

10, 11 & 12. Yes. Apart from any considerations of food or manure supply to the country which by themselves are weighty reasons for the development of fisheries, its future prospects like that of all other industries should normally depend on demand existing or capable of creation and possibility of adequate supply. Both the requisite conditions of demand and supply exist in India. At least 95 per cent of the population of the Madras Presidency and a much higher percentage in the rest of India, where even Brahmans are fish-eaters, will eat fish if they can get it. There is therefore an existing local demand, apart from export trade in fish and fisheries products for which also there is always a considerable scope. Please see also reply to Question No. 69. In 1925-26 177,790 maunds of cured fish were exported to Ceylon from the Madras Presidency.

III. IMPROVED METHODS OF FISHING.

13. *Fishing craft*.—The fishing craft in use are primitive and inefficient. The characteristic sea-fishing craft on the East Coast is the catamaran, (a keelless raft formed by lashing together from three to five pieces, occasionally seven pieces of light rough hewn wood). A more primitive contrivance cannot be imagined. The heavy surf on the East Coast prevents small boats or canoes, being employed throughout the year. The only boats are the so-called Masula boats, built of planks sewn together, but without frames or ribs which, owing to their construction, are elastic enough to stand the surf. On the West Coast, the usual fishing vessels are crank canoes (dug-outs) the largest of which do not exceed 32 feet in length, 3 feet in width and 2½ feet in depth. They hold from two to eight men.

There is no room in catamarans, canoes or boats for the free movements necessary for using nets effectively. Only small nets could be carried; and as different nets are required for catching different kinds of fish, each net has to be necessarily of very small dimensions. The cruising distance is very limited; ordinarily it does not extend beyond the five-fathom line. The farthest limit is the ten-fathom cantour, at a distance of from five to seven miles from the coast. Very often when only one kind of net is taken out in the expectation of finding shoals of a particular species of fish, and shoals of another species appear the fishermen are unable to catch any fish at all. Owing to the smallness of the boats again, the duration of each trip is short, and ordinarily fishermen never stay out at sea for more than 24 hours. The time taken to return after the catches, when a lull or adverse wind prevails and the absence of any facility for keeping the fish alive or fresh on its way to the shore, cause it to taint in a tropical climate; and the fish becomes quite unfit for consumption. The boats and men are numerically small, compared with the length of coast, the length of fishing grounds, and the population. Less than 3 per cent of the population are fishermen, whereas in Japan nearly 3 per cent of the population are engaged in fishing. The crew employed is often disproportionately large, arguing inefficient labour, compared with the size of craft and tackle. For instance, two crews of seven men each in two boats are required to work a small 'Idam' (dip net) on the West Coast; while on the East Coast 12 to 14 men with four catamarans are required to work the Mada Valai, a rectangular dip net 48 to 60 feet long; whereas a modern British steam trawler, with its gigantic trawl or a steam drifter, with a fleet of nets miles long, has but 11 or 12 men, including the engine-room crew.

Nets.—The only nets of any size, which can at all be mentioned in comparison with the nets used in Western countries, are the Masula boat net in universal use on the East Coast, and the Rampini net in the South Kanara district; both shore seines of some size and catching powers. The ordinary nets are small and inefficient, compared for instance, with the trawl net, the Danish seine net, the American purse net, etc. Drift netting and long lining, in India, is also done on a very small scale, owing to the limited size of the fishing boats. The usual length of the long line is from 100 to 600 fathoms, carrying from 20 to 500 hooks; whereas

European long lines extend from five to six miles and carry from 5,000 to 7,000 hooks. The drift nets are in extensive use, only in the Palk Bay, the Gulf of Mannar and the Malabar coast. The length of a fleet of nets hardly exceeds 800 feet or half a mile as may be expected from the size of the fishing craft, whereas a fleet of nets employed by a steam drifter extends to miles.

Please see paragraphs 7 (2) and 8 (3) of my note.

14. (a), (b) & (c) & 15. Please see sub-paragraph under paragraph 7 (2) of my note.

16. *Future programme—Fishery cruises*.—Systematic cruises should be undertaken by the research ship "Lady Goschen," which should be well equipped for the purpose on both the East and the West Coast to continue and complete the investigations already made. The aim is to test the suitability of all available modern methods of fishing in Indian waters. The following lines of work are suggested:—

Trawling.—Systematic trial trawling with otter and beam trawl in off-shore grounds throughout the coast.

Danish seine net.—Trial netting may be made with the Danish seine net of the usual type or with suitable modifications to meet Indian conditions.

Drift net, gill net and trammel net.—A series of experiments should be conducted with the above as in the European waters to test possibilities.

American purse seine net.—In the East, Japan is the only country where the net was tried and has been adopted on a large scale. The net is said to possess enormous catching powers and is well worth a trial in the waters of this Presidency.

Long lining.—The full length of a long line should be given a trial.

Survey and charting of banks and fishing grounds.—In all cruises data of catches, depth of currents, nature of the bottom, assemblage of characteristic animals and plants should be kept for the charting of the fishing grounds for the benefit of the fishing industry.

Tank fishing.—The experiments contemplated at Mopad should be conducted till the best methods of fishing permanent water tanks are finally evolved.

IV. DEEP SEA FISHING.

17. There are one steam trawler and four motor vessels including the inspection schooner "Lady Nicholson," besides a few canoes. One of the motor vessels "Sutherland" is disabled and is unfit for further use.

18. Yes. The motor vessels "Leverett," "Sea Scout" and "Pearl" are maintained for towage of chank canoes to and from Tinnevely and Ramnad districts and for the control and supervision of the fishing operations such as the return of undersized chanks while still alive to the sea, the systematic fishing of chank beds and the prevention of over-fishing off banks, the safeguard of left-handed chanks whenever they are fished and the safe landing and storage of chank shells and so forth. During the pearl fisheries they subserve a similar function and patrol the pearl banks and pearling operations. The inspection schooner "Lady Nicholson" is the only schooner that provides accommodation to inspecting officers for the periodic inspection, annual or biennial, of pearl banks and chank beds, for buoying the beds for fishing and for other scientific work connected with inspections.

19. No reduction in the number of vessels and boats is immediately possible. When however the trawler "Lady Goschen" is equipped with a laboratory and cabins, it might be possible to use her in the place of "Lady Nicholson" provided the "Lady Goschen" could spare the time amidst her varied duties.

20. No.

21. Does not arise.

22. In April 1926.

23. She remained at Pamban where she had been sent in May 1926 for safe anchorage till October 1926. As she had insufficient crew and incomplete gear, she should not go to sea. The fishing gear supplied by the Stores Department in England was inadequate and the full equipment was obtained only in November 1926. A minimum crew was sanctioned by Government on 21st December 1926. Considerable difficulty was experienced in procuring qualified hands as none of the ports in South India including Madras, Tuticorin and Cochin are ports of call for ocean-going steamers and no arrangements therefore exist for recruiting crew for continued work at sea at any of these ports. A crew, however, was tentatively entertained by January 1927 and the trawler was able to leave for the West Coast with schooners laden with 13,000 maunds of salt on 12th January 1927. The engine crew struck work at Calicut and the vessel had to lie idle for a week on this score. She conducted a preliminary survey of the offshore fishing grounds at Calicut and a night's trawling on 24th January 1927 on her way back to Tuticorin on 28th January 1927. A few of the boiler tubes burst. She could neither be used for salt transport nor for the pearl fishery which was then about to begin. The vessel was therefore ordered to proceed immediately to Colombo to have her boiler surveyed by a competent authority and to obtain estimates for repairs. The surveyor to the Lloyds Registry of Shipping, Colombo, after examining the boiler tubes condemned all the boiler tubes (178 in number) as unsafe and wanted that these should be replaced by new tubes. The trawler returned to Tuticorin after repairs on 26th March 1927 and was engaged on pearl fishery work from that date to 30th April 1927. After the pearl fishery the trawler went to Colombo for docking and coaling on 7th May 1927. As the south-west monsoon had commenced she was ordered to come to Madras, for deep sea fishing experiments. She arrived in Madras on 26th May 1927. The set of otter boards supplied with the trawler having proved unserviceable in the fishing experiments off Calicut a new set of otter boards had to be manufactured locally.

The crew entertained at Tuticorin proved most unsatisfactory and had to be dispensed with and new crew entertained about six times in the course of the last 14 months since the trawler arrived in India. A suitable Bombay crew was entertained for the engine room. Deep sea fishing experiments off the coast of Madras commenced in September 1927. After a few experiments the trawler had to go to Colombo as the Deputy Port Conservator, Madras, reported that the weather was unsafe for the trawler to remain at Madras. In November 1927 serious work commenced. The extensive submarine plateau of some 4,000 square miles in extent off Cape Comorin being the best known deep sea fishing ground, was first taken up for systematic examination. A preliminary survey has been made and the nature of the bottom so far ascertained has been mapped. The places where abundant fish were caught have been noted. The obstructions and dangers to trawl nets have been charted in the accompanying maps.* Simultaneously with experiments in deep sea fishing the trawler has been making observations and collections and noting data regarding temperature, salinity, plankton and bottom organisms. The trawler has been sent to the Royal Indian Marine Dockyard, Bombay, for alterations.

24. The original purposes for which the trawler was purchased are—

- (1) Exploitation of deep sea fishing grounds and organized fishery research.
- (2) Pearl bank inspection and the many duties connected with the conduct of pearl fisheries.
- (3) Economic salt transport.

From the detailed work of the trawler referred to in the answer to Question No. 23, it will be seen that its work has been consistent with the original purpose for which it was purchased. The main purpose is deep sea fishing experiments and research and during her long shore trip which the trawler has to make in this connexion, she is utilized for towing schooners laden with salt to West Coast.

25. (a) From January 1927 to March 1928 in five long shore cruises for fishery research occupying 35 days; she also transported salt.

(b) She was engaged for about a month in pearl fisheries in March-April 1927.

(c) On pearl fishery research she was engaged since March 1928 for about eight weeks. The rest of her time was devoted to trawling experiments.

* Not printed.

26. No. All the scientific observations so far as they relate to specific stations opposite ports could be carried out simultaneously with deep sea fishing experiments. But the scientific investigations, particularly the hydrographical and meteorological data, should also be gathered along a series of observations taken from south to north or vice versa, i.e., along shore, for the coast as a whole, if tangible results are to be obtained within a reasonable time. The more numerous such long shore trips are the more conclusive will be the results obtained from such data as they are not peculiar to any particular spot but are general to the whole coast. Such trips will have to be carried out independent of trawling and deep sea fishing as the latter must be systematically done and proceed step by step according to the nature of the bottom to be investigated. At present such long shore journeys are performed once a fortnight and they are combined with the journeys that the trawler makes for obtaining coal and water every 24 days or so to Colombo. According to the programme approved by Government the trawler goes to Colombo ten times for coal and water during which she makes biological and hydrographical collections and observations throughout the length of the coast and transports salt to the West Coast. The extra five trips which the trawler makes are also advantageously combined with the transport of salt from Tuticorin. From the above it will be seen that the original purpose was not in any way defeated by the trawler being used for other purposes.

27. Yes. But she will require to be remodelled and equipped. Though she is said to have been remodelled to suit tropical conditions, the cabins are too hot for any one to live in. New cabins for officers and crew are necessary. A laboratory for fisheries research must be fitted up on board. Her boiler though certified and passed by the Stores Department proved defective. Several boiler tubes burst on her maiden voyage to West Coast. The surveyor to the Lloyds Registry of Shipping, Colombo, after examining the boiler condemned all the boiler tubes (178 in number) as unsafe. They were replaced at a cost of Rs. 8,000. Even so, the boiler is not absolutely sound and causes difficulties now and then. The trawl gear supplied by the Stores Department was also defective. The boards were too light and small and would not sink. Other equipments, such as, a fleet of drift nets, long lines or American Purse nets, will be obtained as work develops.

28. Please see answer to Question No. 27. The necessary apparatus for research has been purchased but could not be fitted on board the trawler for want of a laboratory room.

29. Both technological and scientific work is expected of the trawler.

30. Captain Cribb is the expert officer entertained. Vide paragraph 1 under I. Research Section in Section V of my note. The European crew entertained were disbanded immediately on arrival in India in April 1926. A suitable full complement of Indian crew was sanctioned by Government in December 1926, but could not be entertained till October 1927 for reasons stated in my answer to Question No. 23. Captain Cribb has been trying to secure a capable, intelligent and educated young man among the sea-faring classes as mate on board the "Lady Goschen" and to train him in trawling, Danish seine netting and other methods as well as in net mending, etc. He has tried several but has not found one who is either capable or interested. The usual type of seamen who obtain the Master certificate are elderly men who have put in a long series of years at sea and lack intelligence and general education. Besides they consider themselves officers as soon as they obtain such a certificate and are reluctant to study fishing or any other new profession. Recently it has been proposed to train an Inspector of the Department with practical experience of the sea for the post—vide answer to Question No. 35 infra.

31. Captain Cribb was employed as Assistant Director (Marine) on and from 13th March 1926.

32. Two years and three months.

33. He has navigated the trawler on all her cruises and has conducted trawling, dredging of pearl banks and the transport of salt.

34. Owing to the difficulty in obtaining suitable crew it cannot be stated that necessary assistance was offered to Captain Cribb. The mates appointed were all men with no aptitude for learning work.

35. One of the Inspectors, M.R.Ry. Ramaswami Nayudu, who is a local graduate in zoology, was appointed Inspector on board the trawler with a view to carry out biological research and incidentally study trawling and fishing methods. The arrangement has failed to achieve the expected result. While the Inspector has done the biological work as far as he was able to do, he has not been able to adapt himself to the life of sea or to learn anything of the fishing methods. It is evident that the two functions (technological and scientific) must be separated. I have proposed that an officer with aptitude be deputed for training to Bombay on board the I.M.M.T.S. "Dufferin." An assistant biologist will be stationed on board the trawler for carrying out scientific research.

36. The expenditure for 1926-27 was Rs. 65,671. The budget estimate for 1928-29 is Rs. 1,30,600. If the trawler was engaged throughout her expenditure will work up to the budget estimate.

37. Various Governments in India, Ceylon, Burma, and Straits Settlements, have attempted deep sea fishing. The investigations of "Golden Crown" in Bengal, "William Carrick" in Bombay and recently "The Violet" and "Nautilus" in Ceylon have proved the existence of deep sea fishing grounds which yield fairly abundant catches comparable to those of the best fishing grounds of Europe. The few experiments conducted by the "Lady Goschen" have confirmed these reports.

38. The local fishermen fish the inshore belt extending to five or six miles from the coast irrespective of depth.

39. They do not go beyond that line for the following reasons:—

(1) Food and water cannot conveniently be taken especially on the catamarans or canoes.

(2) The exposure and confinement in catamaran and dug-out canoes cannot long be borne.

(3) Much of the work has to be done by rowing or paddling.

(4) In this climate fish can nowhere and at no season remain in good condition for more than a few hours after death.

(5) No cheap or simple methods are known or at least practised for the proper treatment or preservation of the fish from taint.

40. It is the distance that prevents them.

41. On fishing cruises she has fished banks as much as 38 miles from shore off Cape Comorin.

42. The trawler if it strikes suitable fishing banks is expected to catch on the average about a ton of fish a day.

V. FISH-CURING YARDS.

43. The issue price of salt which remained in this Presidency at 10 annas a maund until 1st April 1924 was causing huge losses to the Salt Department and in the three years ending 1923-24 the loss averaged more than 1½ lakhs per year. It was these annual losses that led the Salt Department to press for the transfer of the yards to the Department of Fisheries on the bifurcation of the old Salt and Abkari Department. The Government of India declined to contribute any portion of the expenditure on fish-curing yards beyond remitting the duty on the salt supplied. The Salt Department therefore relinquished the yards as a losing concern while the Excise Department was not concerned with either fish-curing or supply of salt.

Another consideration which led to the transfer was that the Fisheries Department whose officers are in a position to improve the methods of curing and welfare of the fisherfolk generally and which is interested in the welfare of the fisherfolk more particularly than any other department should have control over the fish-curing yards.

44. Please see paragraph 6 (1) of my note. Considerable reduction and economy has been effected in the establishment connected with fish-curing yards. The price paid for salt and rates for salt transport are less than those paid when the yards were under the control of the Salt Department. Wastage of salt is being minimized during transport. Fish-curers are getting almost the full weight of the salt that they pay for which was never the case before and corruption in fish-curing yards has been appreciably reduced.

45. In paragraph 72 of my Annual Report for 1923-24, I stated that the department would set itself to train the fish-curing yard staff into expert advisers in the art of curing and marketing fish and into social workers for the inculcation of thrift, co-operation and, if possible, of dissemination of progressive ideas (new industries) that the department will be in a position to impart from time to time. Besides, with a proper trained staff in hundred and odd yards situated in the most important fishing centres it should be possible to collect statistics regarding the value and quantity of sea fish landed as well as to record observations of great scientific and economic value to the fisheries concerned, such as the occurrence, abundance, breeding and other habits of the more important edible sea fish. As it is, full advantage could not be taken of the widespread yard staff for the furtherance of these aims. I have submitted to Government a re-organization scheme according to which the West Coast would be divided into four sections under four Inspectors and ten sub-sections each under a Sub-Inspector. The East Coast would be divided as at present into three sections each under one Inspector but the northern and southern sections would each have two Sub-Inspectors and the central section one. All peons in charge of yards would be replaced by petty yard officers. The additional staff would not only inspect fish-curing yards and collect fisheries statistics more efficiently than now but would also at least on the West Coast be in charge of socio-economic work and the inspection of oil and guano factories. Such a revision of the establishment I have shown could be made without extra cost. The re-organization proposed will detach a number of men now fixed permanently at the yards for socio-economics and statistical purposes while securing at the same time protection of the salt revenue and a more efficient administration of the yards than at any time previously.

46 & 50. The issue price should be reduced. On the East Coast due to the immediate proximity of fish-curing yards to salt factories, there is practically no difference between the issue price of salt in yards and the bazaar price of the same salt. I found at Sathankuppam, for instance, that the bazaar price of salt is Rs. 3-4-0 a bag, the issue price in yards being Rs. 2-8-0 per bag. There is a difference of only a few annas, hardly sufficient to induce curers to resort to the yards and submit to the regulations in force there. There are other yards where the difference is still less. In consequence the operations in the East Coast yards have materially fallen. The bazaar salt on the West Coast ranges from Rs. 4 to Rs. 4-8-0 per bag and as the issue price of salt in the fish-curing yards is Rs. 2-8-0 a bag the margin of difference is only about Rs. 2. To obtain this gain of Rs. 2 the ticket-holders have to subject themselves to inconveniences and restrictions and carry on curing work in the yards under disciplinary rules. They have also to incur charges for transporting fish from the beach to the yard, pay overtime fees for night operations and also invest money on pucca masonry sheds and other incidental charges, e.g., wages of the masalchi, charges for removing old brine, etc. Compared with this a saving of Rs. 2 per bag may be a negligible item from their point of view. Against this there is the advantage of getting a white kind of salt in the yards which they usually prefer but in places where there are no fish-curing yards or when it is inconvenient to resort to such yards large quantities of fish are cured with Bombay salt. They may also get down if they like white salt from Madras or Tuticorin as was done a few years ago when the Tanur ticket-holders went on strike, and be free of all restrictions. There will be a considerable fall in the curing operations in the yard. It is also likely that the whole industry will be monopolized by a few capitalist merchants who have ready money. The poor curers will have either to quit the yards or resign their tickets in favour of these merchants as they have little or no capital and their margin of profit will be comparatively small. The result will be that the actual fishermen will be victimized. The doubling of issue price was proposed at a time when the duty on salt had been doubled. The duty on salt is now Rs. 1-4-0 per maund and if the issue price be not reduced the effect will sooner or later be to nullify in a great measure the grant of the concession by the Government of India to the fish-curing industry. The position is really worse than even this. With the economic working of the yards under the Fisheries Department the receipts have during the last three years exceeded expenditure after debiting all conceivable items of expenditure including pensionary charges. In other words, the Local Government is profited at the expense of the curer though it is to the latter the Government of India granted the concession of duty-free salt. Prior to 1924-25 the Government of India not only remitted the

duty on salt but contributed a moiety of the charges relating to fish-curing yards, the other portion being borne by the Local Government. When Fisheries became a transferred subject the Government of India agreed to forego the duty on salt amounting to Rs. 3,25,000 but declined to contribute their share of the charges towards the upkeep of the yards amounting to about Rs. 68,000 (net expenditure). On this the Madras Government doubled the issue price with a view to recoup not only the contribution made by the Central Government but also the share borne by themselves (Rs. 69,192) and as I have said before have been actually making profits. The position is therefore anomalous. The Government of India contribute over three lakhs to the industry and though it is a Provincial concern the Madras Government are refusing to contribute anything for the promotion of the industry but have been incidentally making small profits. If the issue price of salt is not reduced the curers will be driven to illicit methods of obtaining it cheaply and instances are not wanting to show that when the price of salt increases salt crimes also increase correspondingly. The curer will seek to compensate himself for the loss sustained by the dearth of salt from the manufacture and sale of inferior variety of fish and he will try his utmost to cheapen his production naturally at the sacrifice of quality and hygiene. The demand for cured fish is at a certain price and if that price is enhanced by an increase in the cost of salt either the price of cured fish will have to be raised or the increase in the price of salt will have to be counter-balanced by a reduction in the cost of fish supplied at the yard. In either case the fishermen whether they cure the fish themselves or supply fish for curing to merchants will be eventually hit.

These are the considerations which should, in my opinion, induce the Government to lower the price of the salt.

47. Yes. By means of transport of salt by trawler. The transport of salt by the trawler is cheaper than the cheapest rates for the transport of salt by schooners through a contractor. Expeditious transport by the trawler saves the entire railway transport which on an average amounts to Rs. 38,000 a year. It will reduce by Rs. 10,000 or more the subsidiary transport of salt from ports of call to different fish-curing yards which costs on an average Rs. 20,000 a year. It will prevent the fall in revenue amounting to about Rs. 8,000 by the depletion of stock of salt due to consignments in sailing vessels failing to reach the yards in time and it will altogether eliminate the heavy wastage and loss of salt that always result in transport by schooners. Almost every season one or more schooners have been sunk in salt transport. On the whole if the entire transport be undertaken by the trawler it will result in a saving of about half a lakh of rupees in the transport charges now incurred.

48. Madras Government. The Government of India have stated that there is no justification for transferring the control of the fish-curing yards in the Madras Presidency to the Central Government and have declared that the present arrangement is constitutionally appropriate and administratively effective.

49. The fishermen curers who are 62 per cent of the ticket-holders in the West Coast yards and almost cent per cent in the East Coast yards will benefit appreciably even if they do not obtain the sole or entire profits and have to share it with the middlemen. The market price of cured fish is governed not only by local produce but by outside competition as well. A concession to the local curer of the Presidency is not likely therefore to appreciably affect the market price to the benefit of the consumer.

51. Yes. The quantity of fish salted in the public fish-curing yards in the Presidency during the year 1926-27 was 692,079 maunds. To this should be added a considerable quantity of fish cured privately with bazaar salt for which no statistics are available.

52. There is demand for more. The year 1926-27 was a very poor year. In 1920-21 which was a bumper year the quantity of salted fish removed from the yards was 10 lakhs of maunds.

53. I would suggest that more fish-curing yards be opened in the Presidency to suit requirements of the curing industry. The improvement in fishing methods is bound to result in larger catches which in its turn will enhance the quantity of fish cured and greater number of fish-curing yards will ultimately be necessary to deal with the catches.

54. Please refer to paragraphs 127, 128, 129, 130 and 131 of my Annual Report for 1924-25. In addition, I have proposed that large storage sheds should be constructed in most of the yards on the West Coast to enable at least a year's requirements of salt to be stored. This will avoid the necessity for inter-yard and supplemental transport which are always expensive and in addition often causes inconvenience to the curers and cessation of curing operations when catches are heavy. At present there is no accommodation in some fish-curing yards for the full or even a reasonable quantity of salt required by these yards. Consequently frequent transport of salt has to be done if the yards are not to be starved of salt. The consequent expenditure on transport and the fall in revenue through want of salt on occasions in the yards is appreciable.

55. In no country institutions like the fish-curing yards in India seem to exist. Fish-curing is an ancient and thriving industry in many countries but are conducted under private management. The quality of cured fish differs according to the taste of the consumers and the requirements of the markets. On the whole, however, fish cured in Western countries and in Japan are far cleaner and more hygienic than India-cured fish which latter in consequence is not acceptable to markets in Europe, America, Australia and even Egypt and Palestine.

56, 57 & 58. Sir F. A. Nicholson's early experiments at Tanur and efforts of the department ever since have been to discover the most hygienic methods of curing fish under tropical conditions with a view to their introduction into the trade. The result of years of research and experiment in the technology of fish-curing at Tanur would have remained unused but for the fact that the department gained possession of the yards and has pushed reforms in the fish-curing industry by demonstration, instruction and persuasion. Considerable improvement in the quality of fish cured has already resulted. The process, however, is slow as the fishermen and the consumer are alike conservative and ignorant. The fishermen are too poor to adopt reforms wholesale and the only incentive for the curer to adopt improved methods is the inducement offered by the remission of tax on salt. Further concessions may be necessary if appreciable progress is to be made. The East Coast curer, for instance, often an impecunious fisher-woman, deals in such small quantities of fish that to enforce the purchase of even sanitary glazed pots costing Rs. 3 to Rs. 5 will prove an intolerable financial burden to be recouped only after many years. On the East Coast specially additional inducements in the form of bounties are necessary for the introduction of reforms.

59. The improvements are bound to be gradual and a bounty amounting to some Rs. 15,000 or Rs. 20,000 a year at about Rs. 5 per curer will have to be given for a period of five or ten years so as to enable each curer to repair his curing utensils. This will be the first measure of reforms.

60. By Government.

VI. FISHERIES CANNERY, CHALIYAM.

62. The immediate object of the cannery was to demonstrate the possibility of canning fish in India so as to produce an article which could rival Western products in delicacy of flavour and keeping quality. This was successfully achieved by the cannery. It was also proved that a number of other fishes and also prawns could be advantageously canned. A large number of new recipes were discovered and adopted. The cannery has not, however, worked to a profit as a commercial concern as the time allowed was too brief—vide sub-paragraph (4) under paragraph 17 (6) of my note.

63. One of the original objects of starting the cannery was to teach apprentices to can fish but apart from giving training to a few students sent by the Travancore and Baroda Governments, no outsiders were trained possibly because suitable applicants were not available. Final batch of students from the Fisheries Training Institute annually receive their course of training here.

64. One student from Travancore and the other from Baroda are now employed as experts in the Fisheries Departments under the respective Governments. I am not aware of any canneries either at Baroda or Travancore. There has been, however, exchange of trained hands between the Government cannery and two or three private canneries. The recipes

adopted at Chaliyam have also been widely used in the private canneries—vide page 130, Bulletin No. 10, Annual Report of Sir F. A. Nicholson for 1915-16.

65. Messrs. Wilson & Co., purchased the small Mahé Cannery and with the aid of the experiments and experience of the Chaliyam Cannery developed a commercial concern called the Malabar Cannery. Another Cannery "Nanu Freres" was also started. The two private canneries started on the model of the Chaliyam Cannery had not prospered because the problems involved in the successful prosecution of the industry are complex and varied.

66. Yes. The Malabar Cannery went into liquidation and a third cannery has been developed in its place by a local purchaser.

67. The adult Malabar sardine has harder bones and scales than the true French sardine "Pilchards." If young sardine only a year old be selected and tinned the defect is to a large extent overcome. Still due to inadequate training of labour and want of continuous expert supervision the highest class of sardine comparable with the French delicacy has not so far been produced. But this, however, does not affect the bulk of the trade in canned fish. The products of the Chaliyam Cannery have been tested from time to time by experts and approved as saleable even in England. During the British Empire Exhibition as many tins as could be sent were sold. The peculiar merit of the Chaliyam products is their delicate flavouring with condiments not available anywhere else in the world. The cannery therefore has produced goods which can compete with the bulk of imported tins in quality. In cost, however, the high price of tin, packing oil and machinery have to a great extent prevented production at competitive prices. The difficulties are not insuperable. If the cannery could purchase at the cheapest markets and sell its products by suitable advertisements and agents there is no reason why the price of the Chaliyam goods could not be reduced to that of imported goods.

68. Since the quality of the Chaliyam products has been approved by experts and compared very favourably with similar class of articles produced in Europe and America there should be no difficulty in popularizing Indian canned fish provided we are able to place them in the market at prices comparatively less than those quoted for imported tins. The most important item is cost. If Chaliyam canned goods could be offered at competitive prices they are bound to sell provided the quality is maintained. Inferior oil or bad handling and the like will destroy the most firmly established business. In order that the State may set an example, I have suggested that the cannery may be worked with certain economies—vide paragraph 17 (6) of my note.

69. The figures given below show quantity and value of foreign canned fish imported into India as a whole and into the Madras Presidency for five years ending 1925-26:—

Tinned or canned fish imported into the Madras Presidency.

						OWT.	RS.
1921-22	...	...	...	...	...	64	8,053
1922-23	...	...	...	...	...	308	20,758
1923-24	...	...	...	...	...	656	52,278
1924-25	...	...	...	...	...	1,033	72,674
1925-26	...	...	...	...	...	934	65,784

Tinned or canned fish imported into India.

						OWT.	RS.
1921-22	...	...	...	...	...	10,998	8,49,980
1922-23	...	...	...	...	...	30,982	18,97,303
1923-24	...	...	...	...	...	24,500	13,31,247
1924-25	...	...	...	...	...	42,762	21,37,022
1925-26	...	...	...	...	...	63,303	27,76,216

Owing to the caste system prevailing in India which forbids the eating of food cooked by others and the fact that tinned fish is a novelty in so far as the general population in this country is concerned, canned fish is not generally eaten by Indians; the Europeans and Anglo-Indians are the people who consume the major part of the goods. Yet a fair number of educated classes have acquired the taste for this delicious and most wholesome fish food.

VII. TANUR EXPERIMENTAL STATION.

71. The Tanur Station was instituted for experiments with improved methods of curing, smoking and otherwise preserving fish and with the manufacture of oil, guano and other by-products.

72. Considerable advance has been made in the introduction of improved methods of curing, manufacture of oil, guano and fish meal—vide sub-paragraphs 2, 3 and 6 under paragraph 19 of my note.

73. In curing and preservation of fish there is a great deal to be done. The elimination of the defects such as pink eye, rusting, salt excretion, etc., as well as the adoption of improved method of curing and preservation that are continually being discovered, such as the use of sodium hypochlorite, refrigeration, and the new German method of pressing instead of sun drying, and the like. There is also a good deal to investigate as regards the industrial possibilities of fish oil and its by-products. Beyond the first comparatively simple process of expressing the oil from fish successfully copied by private producers, nothing has been done by them towards refining the oil up to the standard required by the various consuming industries or of converting the scrap (residual fish) to a much more valuable product than guano, viz., fish meal. Refinement is the next step in the oil industry and a most important one, if it is to be established on a sound financial basis. Success has been attained in producing fish meal from all the common fishes of the West Coast and comparatively cheap methods of producing the meal and sterilizing it have been evolved. The elimination of the objectionably high oil content of the meal is under investigation. These are problems that should be tackled by a bio-chemist. For technological work at the Chaliyam Cannery and Tanur particularly, as well as for other chemical investigations relating to fisheries and pisciculture, I have submitted to Government proposals for the appointment of a qualified Fisheries Chemist—vide Section V of my note.

74. (a) A few fish merchants have adopted the improved methods of cure. As the taste of the public has not correspondingly changed the average fish-curer has been reluctant to adopt better methods which are somewhat costly, as better cured fish do not bring him increased profits. State aid was essential for the introduction of improvements ascertained at Tanur into the curing industry. As purveyors of duty-free salt in the fish-curing yards reforms have been pushed and notable improvement in the cleanliness of the products of these yards on the West Coast has been effected. The work in the East Coast yards commenced only three years ago and reforms are even more difficult here than on the West Coast on account of the extreme poverty of the East Coast curers, who are for the most part fisher-women. Some additional bounty is necessary to enable the East Coast curer to acquire improved utensils for curing fish and this is the first step in the introduction of reforms.

74. (b) & (c) Vide sub-paragraph 3 of paragraph 19 of my note.

74. (d) The preparation of fish meal is a further step in the oil and guano industry which was taken up recently at Tanur. The process has not yet been perfected. Consequently no private factory owner on the West Coast has yet been taught.

VIII. INLAND FISHERIES.

75. The remedial measures adopted by the department consist of the following:—

(1) Establishment of hatcheries for the artificial hatching and breeding of such local fish as were subject to depletion (e.g., Hilsa) and non-indigenous fish considered more suitable for improving the existing fishery (e.g., Trout).

(2) The construction of fish farms at suitable centres primarily for the breeding of the chief food fish in natural ponds and, where necessary, by hatching appliances for ultimate distribution in tanks and rivers.

(3) The stocking of tanks and rivers the fishery rights of which belong to Government with suitable quick growing species of food fish carefully selected from natural sources such as anicuts, rivers and the like.

(4) Importation into the country of well-known fresh water food fish of reputation from other parts of the world and their acclimatization with a view ultimately to naturalizing them in the waters of the Presidency.

(5) The conversion of natural breeding places and the formation of sanctuaries for the protection of fish, e.g., the upper reaches of the Bhavani river in the Coimbatore and Malabar districts.

(6) The framing of rules under the Fisheries Act for the prevention of destructive methods of capture in public waters.

(7) Experiments in improving the existing methods of catching fish in inland waters.

Also vide paragraph 8 of my note.

76. The policy of Government is to resume river and tank fisheries and to stock them with fish and thus increase the fish food supply of the people and incidentally secure increased rents.

77. On a rough calculation the inland fisheries when developed are capable of yielding 500,000 tons of food fish whereas the sea fisheries of the Presidency when efficiently exploited up to the 100-fathom line is likely to produce over 10 million tons of fish. The inland fisheries are therefore relatively unimportant and are not worth more than a twentieth of the value of sea fisheries.

78. (a) Pisciculture in India presents unique problems. The subject is complicated owing to a tropical and dry climate, the peculiar habits of fish still largely unknown, the custom of the country, the nature of its rivers, the irrigational use made of them. To render pisciculture successful much patient research and experiment is necessary. Notable success has, however, been achieved in breeding Etroplus, Gourami, Tench and Hilsa. The only rivers over the control of the department are the Cauvery and its tributaries. The upper reaches of the Bhavani and Moyar rivers, tributaries of the Cauvery, were found to be depleted of fish by destructive methods of fishing such as dynamite, poisoning. A section of four miles in the Cauvery below the Hoginkal Falls is a valuable sanctuary for breeding fish. Every year in the hot weather an army of fishermen 400 to 500 strong invaded this section and destroyed fish wholesale by dynamite and poison. The Bhavani and Moyar rivers and the section of the Cauvery below Hoginkal Falls have been closed to all fishing. An Inspector and a body of watchers have been employed to conserve the upper reaches of the Bhavani. In consequence the Collector of Coimbatore has reported that the fish supply in the river below has considerably increased. A hatchery for the artificial hatching and breeding of hilsa was established at Lower Anicut on the Coleroon—vide paragraph 8 (3) of my note. An attempt has also been made to introduce new varieties. Catla catla—one of the largest fresh water carp limited to the waters north of the Kistna has been successfully transported to the Cauvery river. During the last four or five years catla fry collected in the Godavari and Kistna rivers have been annually stocked in the Cauvery. No proof of its having established in the river is forthcoming as the period is too short to judge of the effect of stocking operations. The fish rent from the Cauvery river has also increased due among other causes to the increase of fish.

78. (b) The Fisheries Department has initiated a scheme whereby irrigation tanks and other inland waters are surveyed district by district and those found suitable are arranged in groups, round fish farms and centres where fish-breeding and rearing are carried on and whence each fry of food varieties is distributed in large numbers to reinforce the natural stock in surrounding tanks. As the fish farms are limited only exotic fish are cultivated in the farms besides the fry of such fish. Large numbers of young indigenous carp and mullet obtained from rivers and estuaries are annually distributed to irrigation tanks which for the most part contain only eight months supply of water. Growth experiments in the fish farms have shown that catla fry of three to four inches grew to a length of one and a half to two feet in the course of eight months the average period for which tanks hold water. Likewise mullet fry six inches and less have been known to attain a length of a foot and a half in tanks stocked by this fish. Stocking with exotic and quick growing indigenous fish is the method employed to improve the fisheries of tanks.

78. (c) & (d) *Freshwater lakes and reservoirs.*—These are for the most part dealt in the same way as tanks, but as noted above are never fished completely except in years of draught, on account of the impotence of indigenous fishing methods.

79. No. The only available statistics are fish rents derived by Government and local bodies from public tanks, channels and rivers. The average rent for the five years ending 1913-14 amounted to Rs. 1,68,590.

80. No.

81. Yes. Vide paragraph 8 (3) of my note.

82. One hundred and ninety tanks have been taken over from local boards in fourteen districts.

83. The annual compensation paid to the local boards on account of these tanks is Rs. 21,300.

84. The revenue realized during the past two years are given below :—

							RS.	A.	P.
1925-26	...	...	...	...	...	...	33,447	2	6
1926-27	...	...	...	...	...	...	26,446	15	8

85. The expenditure amounts to Rs. 23,891-11-0 and Rs. 23,982-2-0 respectively as shown below :—

							1925-26.			1926-27.			
							RS.	A.	P.	RS.	A.	P.	
Compensation	...	...	...	...	...	...	21,300	0	0	21,300	0	0	
Stocking of tanks	...	...	...	...	...	...	2,591	11	0	2,682	2	0	
Total	...	...	...	...	...	...	23,891	11	0	23,982	2	0	

The expenditure is justified judged by the revenue realized which is due among other causes to an increase in fish supply. Besides small experiments in the fish farms, large scale experiments on a commercial basis have been conducted to demonstrate to the public the economic possibilities of tank stocking and pond culture. The fishery of the Vellore fort moat is an instance in point. The fort moat is divided into four sections one of which is set apart for raising fish for the market. This section is regularly stocked with various quick growing fish every year and sold in auction to demonstrate to the public the profits to be had in scientific fish-farming. To mention a recent experiment, the section in question was stocked in September last with 450 Catla fingerlings from the Godavari three inches to four inches in length. They have grown now to twelve inches to sixteen inches and there is a demand at present for the stock of Catla in this section for Rs. 700 to Rs. 800. When it is auctioned early next year the fishery is expected to fetch Rs. 1,000. The expenditure incurred on this stocking operation was only Rs. 90 as per details below :—

							RS.	A.	P.
Cost of 450 fish at Re. 1 per 100	...	...	...	...	...	...	4	8	0
Cart-hire from Pippara to Tadapalligudem	...	...	...	...	...	...	1	0	0
Railway freight from Tadapalligudem to Madras and thence to Katpadi	...	...	...	...	...	...	61	0	0
Carriage of consignment from Katpadi to Vellore	...	...	...	...	...	...	2	0	0
Pay of attendant for two days	...	...	...	...	...	...	4	0	0
Travelling allowance of attendant	...	...	...	...	...	...	13	8	0
Pay of Inspector of Fisheries for one day	...	...	...	...	...	...	4	0	0
Total	...	...	...	...	...	...	90	0	0

The income on this single consignment is eight times the expenditure and proves what a profitable industry pond culture could be if pursued scientifically. A similar demonstration to the public was made in a section of the Chingleput fort moat. The fingerling Catla here grew to eighteen inches and were sold with other fish for Rs. 120. The fish were much appreciated by the public and the fishermen and this year the moat will be stocked

heavily for further demonstration of the possibilities of scientific stocking. It will thus be seen that the stocking operations in fresh-water tanks and rivers have much to do with the increase in the fish food supply to the country and consequent increase of revenue.

86 & 86 (a). Vide paragraph 8 (3) of my note.

87. But for the fish farms none of the cultural work done by the department would have been possible. All the early experiments connected with the selection of suitable fish, their conditioning and transport and their rate of growth and best food for them have all been determined in the fish farms by observations and experiment; also in places where valuable exotic fish such as *Etroplus*, Gourami, Tench and Carp are under culture. Much of the knowledge we possess regarding these fish have been acquired in these fish farms. As work of the farms is purely scientific and cultural no direct monetary returns are available. The value of the work should be judged entirely by the knowledge gained and the success attained in breeding and cultivation of different varieties of fish. Judged by this standard the fish farms have justified the expenditure on them. With better qualified staff greater results are sure to accrue.

88. Yes. The fish farms should be equipped with all necessary fittings and apparatus and the research on inland pisciculture should be placed under a fully qualified whole-time officer of the rank of an Assistant Biologist.

89. The only piece of fishery legislation is the Indian Fisheries Act IV of 1897 of the Government of India. In actual working this has been found defective in preventing destruction of fry and immature valuable food fishes or other species requiring protection. A draft Bill to amend this Act has already been published.

90. The fish farms are in charge of Assistant Inspectors or Sub-Assistant Inspectors.

91. Yes. The Assistant Inspectors who are in charge of fish farms were given a course of departmental training in pisciculture.

92. The Fisheries Training Institute at Calicut and the proposed ones at Mangalore, Madras and Vizagapatam should not only train teachers for fishery schools but also recruits for the subordinate executive posts of the department. The Fisheries Training Institute at Calicut, the only institution now available, is ill equipped and staffed at present. The appointment of specialists and experts who will supervise courses in the Fisheries Training Institute in addition to their regular duties will furnish the machinery required for the training of recruits and apprentices in special branches of the fishing industry. The fishermen of Mangalore have already memorialized Government for the latter.

93. Larvicidal fish are reared in the Powder Factory Farm, Perambur, the Ippur Fish Farm and the Praema Fish Farm, Nallamalais. No special or separate expenditure is incurred as the fish could be bred along with other food fishes. One possible exception was the Praema ponds which till last year was exclusively devoted to the rearing of larvicidal fish for the Nallamalai tracts. The expense connected with this farm was Rs. 314-5-0 a year.

94 & 95. Vide paragraph 31 of my note.

96. (1) The Health Department is primarily concerned. They may be consulted as to ways and means by which local boards and municipalities may be induced to avail themselves adequately of the help the Fisheries Department is capable of giving them in larvicidal stocking operations.

(2) Notorious malarious tracts, such as the Agencies and the Wynad, should ultimately receive attention and schemes such as the Praema scheme may prove useful.

(3) In the course of larvicidal operations it was found that fish traps, basket traps and other contrivances were extensively in use in irrigation channels, paddy fields and field drains, throughout the country which destroy large numbers of immature food fish and the small mosquito-destroying species. As the waters standing in paddy fields presumably fall within the definition of private waters under the Indian Fisheries Act IV of 1897 (the only piece

of fishery legislation available) the Madras Government did not see their way to frame rules prohibiting the use of these objectionable methods of fishing. If full benefits from larvicidal fish are to be derived, ways and methods must be found for preventing the wholesale destruction of these fishes.

X. PEARL FISHERIES.

99. The history of these ancient fisheries is well known. All available evidence seems to indicate that from time immemorial the pearl fisheries off the Gulf of Mannar were in the hands of a caste of shore-dwelling people, i.e., fishermen and divers known as 'Paravas.' The Portuguese had control over the pearl banks from 1524 to 1658 and the Dutch from 1658 to 1796 when the sovereignty of the banks passed into the hands of the British. Also vide paragraph 9 (4) of my note.

100. The most important problem requiring research is the irregular periodicity of the Indian fisheries as opposed to annual pearl fisheries in the Red Sea, Persian Gulf, Malaya Archipelago, Australia and New Zealand, West Indies and elsewhere. This has not yet been satisfactorily solved; much less have remedies been suggested or adopted. On the administration side the problems are—

(1) Recruitment of divers and boats.

(2) Securing the services of suitable tugs.

(3) Inducing merchants to attend the fishery.

(4) Health of the camp such as water-supply, sanitation and medical aid and prevention of epidemics.

101. Practically no research has been done for want of staff and facilities. Only in January 1928 Government agreed to initiate a biological station at the Krusadai Island and work on some emergent lines has just begun. This is highly unsatisfactory.

(2) In the administration of pearl fisheries the years 1926-28 without exaggeration are unparalleled in the whole history of pearl fisheries. The highest revenues, the most satisfactory and perfect methods of inspection, estimation, advertisement, planning and equipment of camp, provision of water-supply, safeguard of health and property and the maximum of satisfaction and profits to divers, merchants, public and the State were all secured.

102. Systematic and intensive research, biological and hydrographical, should be carried out at the Krusadai Station by a qualified whole-time staff with a view to discover and remedy the causes for the mysterious disappearance of oysters. A simple form of diving dress used by the Japanese divers may prove invaluable to the local diver. I expect to go into this matter when I visit Japan.

103. Yes. A comparison with Ceylon fisheries will show that the highest amount of economy has been exercised in every direction in the conduct of pearl fisheries. Further experience may enable the department to economize expenditure whenever possible but I cannot conceive of any great reduction in the running charges. As to the possibilities of leasing the pearl fisheries there are objections. The proposal was never approved by Government. The Ceylon fisheries were leased to a company early this century for a few years but the company wound up with heavy loss. The causes that led to the success or failure of pearl fisheries are so numerous, so varied and so uncertain that only the Government are in the best position to control them.

104 & 105. Diving is the approved method. Dredging apart from the discontent it will cause to the large body of divers is objectionable on technical grounds as it will destroy wholesale young oysters on the banks. In consequence, it has never been adopted in India and Ceylon.

106 & 107. Vide answer to Question No. 103.

108 & 109. Recruitment of divers is the labour problem connected with pearl fishery. Diving as a profession is dying out. The sons of divers no longer follow the profession of their fathers as the occupation is despised. There are far less divers available in South India now than ever before.

If the Japanese diving apparatus succeeds, we can have a regular body of divers trained under our permanent employ. The diver taken could remain under water much longer than a few seconds and could systematically fish the banks. A few divers in the place of the thousands now employed will probably then suffice. A sufficient body of Arab divers who are far and out the best divers we have, should be recruited from Persian Gulf. It should be feasible to obtain true Persian Gulf divers in small gangs under men who can give adequate monetary guarantee for the good behaviours of the men supplied by them both for pearl and chank fisheries.

110 & 111. No research has been done by the department—vide answer to Question No. 101. The causes for the irregular periodicity of the Indian pearl fisheries as opposed to the annual pearl fisheries in the Red Sea, Persian Gulf, Malaya Archipelago, Australia and elsewhere have not yet been successfully ascertained; much less have remedies been suggested or adopted. It is not fully known whether the absence of oysters for years is due to the destruction by natural causes such as currents, storms and predaceous animals or to an absence of natural spawning oysters. If the latter, efforts should be made to start a pearl oyster farm or a sanctuary to keep alive a healthy stock of oysters or to artificially breed oysters and stock the beds with oysterlings. If the experiment succeeds, one may be able to determine what effect the spawning of this stock of oysters in confinement or the stocking has in reviving pearl beds and restocking them with oysters during barren years. The proposals will require years of careful study and experiment at a well-equipped station with a qualified whole-time staff. A marine biologist and assistants are indispensable for the work. To begin with, pearl oysters will be obtained from the banks and kept under observation in aquaria to see whether they would survive in surface waters and on ascertaining this, it is proposed to keep oysters on a larger scale in cages suspended from a wooden staging outside Krusadi Island. The experiment is for ascertaining (1) the exact age and rate of growth of the oysters, (2) the period when they breed, (3) the food that they take, (4) the early stages of the oyster, and (5) the congenial surroundings and favourable conditions under which they will thrive and attain maturity. Eventually when such a farm is fully established, it is hoped that it might be possible to replenish the stock of oysters on the pearl banks more often than is the case under natural conditions by means of spat from the thousands of mature oysters in the oyster park.

Recent developments in fishery science have shown the enormous influence of hydrographical condition of the sea on fisheries. They have a direct bearing on the pearl fisheries, and the prosperity of pearl oysters. Accurate observations should be made and recorded of the temperature, tides and salinity and the like of the different strata of sea water and of the condition of wind and weather and correlated to observed biological phenomena. Practically no work has been done in this direction. Experiments on currents with drift bottles will be conducted and other hydrographical observations will also be made and recorded regularly by the station.

Diving is limited to a depth of ten or eleven fathoms and the distribution of the pearl oyster in deeper waters is unknown. It is proposed to investigate deeper banks with dredgers, grabs and other apparatus operated from the trawler to locate, if possible, pearl oyster beds if there be any beyond the ten-fathom line.

XI. CHANK FISHERIES.

112. The chank fisheries of Madras exist along the coasts of the six southern maritime districts on the East Coast—Tinnevely, Ramnad, Tanjore, South Arcot, Chingleput and Nellore.

These fisheries are Crown monopolies exercised by the Hindu kings of the coastal kingdoms from time immemorial and latterly by the Madura Nayaks, the Nawab of the Carnatic, the Portuguese, the Dutch and finally from 1795 by the British. In practice, this prerogative is variously exercised. In Tinnevely the Madras Government work the fisheries directly through an officer of the Fisheries Department, the Superintendent of Pearl and Chank Fisheries. In Ramnad, the chank fisheries alone were granted to the Raja of Ramnad on an annual peshkash of Rs. 14,000. After the establishment of a Technical Department of Fisheries for various administrative

reasons the department took on the Ramnad fisheries for it was found necessary to resume control of the Ramnad fisheries for the proper organization and development of the chank fisheries and accordingly Government took the fishery on lease for a period of fifteen years from 1913-14 for Rs. 60,000. The Ramnad fisheries like the Tinnevely fisheries have been worked departmentally since. On the Coromandel Coast the chank fisheries off the districts of Tanjore, South Arcot, Chingleput and Nellore are leased to contractors.

113. The more important problems connected with the industry are (a) the labour question connected with chank fishery, (b) the reasons for the cessation and disappearance of the chank bangle industry from the south of India and its possible revival, and (c) the advantageous sale of chanks fished to purchasers in Bengal.

114. Yes.

115. The scientific control of chank fisheries and their cultivation to cope with increased exploitation is a feature of chank work to which little attention has been paid in the past. There are grounds for suspecting that intensive fishing is depleting the chank beds. It is therefore necessary to start investigation for the location of suitable growing grounds for the planting of young shells, the starting of new chank beds, and for ascertaining the life habits, growth, etc., of the chanks and to work the grounds systematically, e.g., like a forest so as to secure perhaps fewer chanks but those of large size.

The provision of a suitable diving dress will also render fishing efficacious.

116. The expenditure now incurred is the minimum and no further reduction is either advisable or possible.

117 & 118. The improved methods of catching chanks are by trawling or dredging. But Mr. Hornell had come to the conclusion from the experiments made by him from 1912 to 1915 that neither trawling nor dredging can furnish a desirable or adequate alternative to diving as a means of fishing chanks. The only other mechanical means suggested by Mr. Hornell is the utilization of a submarine boat of cheap and simple construction which would enable men to collect shells from the bottom in sufficient quantities to be commercially profitable. I however, entertain serious doubts as to the practicability and wisdom of this scheme.

119 & 120. Yes. Leasing of chank fisheries was tried from 1801 to 1876 but proved unsatisfactory.

121. To work on lease fisheries which are not the property of Government will be a legitimate function of the department in cases where it is highly necessary that the control of such fisheries should vest with Government.

The lease of the Ramnad chank fisheries from the Raja of Ramnad closes with June 1928. For the progressive improvement of the chank fishery, a renewal of the lease seems necessary.

We depend entirely on the Ramnad district for divers for working the Tuticorin pearl and chank fisheries. The independent working of the Ramnad chank fisheries will cause innumerable difficulties and friction in the adjustment of wages, with the fixing of prices and, worse than all, it will facilitate the illicit removal of Government shells. Further, since the pearl and chank beds are for the most part identical it will be necessary to prohibit chank-fishing when there are pearl oysters on the beds. In such a contingency the interests of Government are likely to clash with those of the Raja besides giving opportunities for the Raja's men to pilfer pearl oysters.

122. No. The Raja could not work the fisheries as advantageously as by leasing them to a technical Department of Fisheries. A comparison of his revenue before and since the lease will show this. His chank fisheries are not taken on lease against his own interest.

123 & 124. Vide answer to Questions Nos. 108 and 109.

125. No.

126. Yes. We have no knowledge of the age of the chank nor a correct idea as to its vertical distribution and migration, nor even whether intensive fishing had led to the depletion of the fishery. The three years' rest in the case of chank beds off Tinnevely and Ramnad owing to the occurrence of pearl fisheries during the chank-fishing season, has shown an

unusual abundance of large chanks on the beds. It seems, therefore, clear that the beds are being fished to their maximum capacity, if not more. Research on the life history, food growth, etc., of the chank has, therefore, become an immediate necessity. The possibilities of breeding, stocking and otherwise protecting and developing the chank fisheries should be investigated. The lines of investigation will be roughly as follows:—

- (a) The fauna and flora of the chank beds will be studied.
- (b) The food of the chank will be determined by dissection and by aquarium experiments.
- (c) The rate of growth of the chank will be determined by marking specimens in aquaria as well as on the banks.
- (d) A study of bathymetrical distribution of chanks according to sizes and seasons up to ten fathoms by divers and beyond by dredging will be made.
- (e) The migration of chanks, young and old, will be ascertained.
- (f) Piscicultural experiments with chank eggs, capsules in the artificial cultivation of the chank and the study of its early stages will also be undertaken.

XII. RESEARCH.

127. The Personal Assistant Dr. D. W. Devanesan, Research Assistants and one or two Inspectors who are Zoology graduates are capable of doing research work at present. Vide Section V of my note.

128 & 129. Fisheries research may be classified into (1) technological research and (2) biological, hydrographical and other scientific research. I have alluded to the technological research done at Tanur and Chaliyam Cannery and to fishing experiments under the trawler and improved methods of fishing. For biological and scientific research, please see Chapter III, Technical and Scientific Investigation in the pamphlet "Aims and Achievements of the Madras Department of Fisheries." Some recent items of research are the following:—

Studies on the development of edible oysters were undertaken at the laboratory attached to the aquarium and subsequently at Ennur and Pulicat. The experiments have revealed the percentage of salinity most favoured by oysters. The research has enabled us to correct certain erroneous ideas that had been entertained in the past regarding the optimum salinity required by the edible oyster, while the oyster in England fattens and breeds when there is a rise in salinity; the Indian oyster seems to flourish only in low salinities. The freshes in rivers far from damaging them, as was supposed before on the analogy of the European oyster, provides the most favourable conditions for spawning and development of the Indian oyster. The research has also thrown considerable light on the characters of the early stages and the period of development of the oyster. Their value lies in the possibility of forecasting favourable and abundant oyster seasons in the backwaters if statistics of salinity are maintained in the oyster farm. The two research assistants attached to the Calicut research stations were engaged on systematic research on sardine and mackerel. A preliminary report has been issued on the oil sardine and another on mackerel is under preparation.

130. Yes.

131. The investigation was undertaken with successful results in the case of fresh-water mullets and other dozen fresh-water fish and two of the most important economic food fish of the West Coast, viz., sardine and mackerel, and the flying fish of the Madras Coast. I have also unpublished manuscripts on the breeding habits of three or four fish partially worked out as time and opportunity offered—vide paragraph 21 of my note.

132. There is at present no adequate equipment or qualified staff for prosecution of systematic research. The available apparatus and laboratories were utilized to the best advantage for conducting the researches so far done. Till recently the West Hill Research Station was the only laboratory, even that ill-equipped with apparatus, books and staff. The only other facilities are: (1) a small room in the Madras Aquarium for chemical work where I have been conducting experiments in preservation of fish by sodium hypochlorite and the analysis of samples of sea water collected by the trawler in her research cruises; (2) since January the Krusadai station has been

equipped with a few wall cases and apparatus for the proposed research on pearl and chank; (3) the fish farms afford facilities for experiments in inland pisciculture; (4) the hatchery at Lower Anicut now transferred to Bezvada has a battery of hatching jars for treating hilsa eggs.

Besides the two graduates in zoology, one a local M.A., there is no whole-time officer to conduct systematic research. The two graduates have neither the qualifications nor the capacity to conduct research independently. The Director has had continuously to supervise every detail and even write out reports for them. Being burdened with other administrative work the research work turned out is extremely meagre and desultory and calls for considerable reorganization and reform. In view of the fact that there has been no definite policy in regard to research except perhaps on technological lines at Tanur and Chaliyam the Government called for a ten-year programme of research. This was submitted to Government and was approved by them in 1926.

133. There has been a marked absence of sardine shoals during the last four years. The mackerel were available in fair quantities. The season that has just closed was a bumper year for mackerel and record catches of the fish were made. As to places where they disappeared, vide paragraph 25 of Annual Report for 1923-24, paragraph 17 of the Annual Report for 1924-25, paragraph 11 of the Annual Report for 1925-26. If more detailed information is required it could be called for from the fish-curing yards.

134. Yes.

135 & 136. Vide answer to Question No. 133. The phenomena, however, is a normal one. Similar disappearances of sardine and mackerel shoal for years have been known in the past. Such fluctuations are common to all shoaling fish throughout the world.

137 & 138. Some preliminary observations were made on the oil sardines relating to their age, food, spawning and seasonal migration and occasional widespread mortality. These investigations were resumed in 1921-22. The information gathered relates to but single season in 1908 and 1922 and hence are wholly inadequate for basing any weighty conclusions. The results arrived at are also admittedly tentative and require observations to be continued for a series of years before anything like sound inferences could be drawn. Certain lines of investigations on mackerel have been carried on till now and the results are awaiting publication. Though substantial progress has been made as in the case of sardine the bulk of the work still remains to be done in locating breeding grounds, collecting and studying eggs, early stages and in tracing the shoals where they live in the inshore waters.

139. Besides sardine and mackerel there are many kinds of food fishes which yield valuable fisheries; practically nothing is known regarding them.—vide the list of fish statistics sheets enclosed*. Even the species have not been determined. The department will have to take these up according to their relative importance as time and opportunity offers. Also vide paragraphs 21 to 27 of my note.

140. No.

141. My recommendations are embodied in section V of my note.

142. There has been no definite policy and programme of research.

143. Yes. Please refer to paragraph 7 (2) of my note.

144 & 145. The essential problem in the development of deep sea fishing is the determination of the type of net or other method suited to Indian conditions. We are yet to test the suitability of seine net, the trawl, the full-sized modern drift net, the American purse net, the long line and all available methods of exploitation. The question of the 100-fathom line is one which concerns trawling primarily and possibly the Danish seine net. There is no such limit known for drift netting or long lining. The Ratnagiri boats of the Bombay coast have been known to go beyond the 100-fathom line fishing on the small-sized drift nets and hooks. The question whether we should exceed the 100-fathom line will only arise after we have tested all known methods of fishing and decided on those best adopted for Indian conditions.

146. Certainly. This has been one of the fundamental aims of the department from its inception.

147. The research staff and equipment necessary for the purpose is detailed fully in section V of my note.

149. Vide paragraph 7 (2) of my note.

150 & 151. Vide answer to Questions Nos. 27 and 28.

152. Vide answer to Question No. 149.

153. (a). Please see reply to Question No. 149.

(b) She has just completed eight weeks of dredgings with a view to discover pearl oysters within a depth beyond ten fathoms. The work is incomplete and is expected to be continued next year.

(c) The trawler has not so far done any research work connected with chank fisheries. This will be done when the research on chanks proposed at Krusadai is conducted.

154. Vide paragraph 93 of the ten-year programme.

155. The urgency of the line of research depends on the importance of the fisheries concerned. The most urgent lines are, perhaps, exploration of deep sea fishing grounds, sardine, mackerel and pearl fishery research. It must, however, be clearly understood that no specific research is feasible exclusively by itself; a great deal of general research on fauna, plankton, currents, salinity, etc., are required for the elucidation of problems connected with the above items of research. The trawler should continuously make observations and collect samples for analysis and study while engaged in deep sea fishing or in sardine, mackerel or any other fishery research.

(a) Research on Inland Fisheries.

156. Paragraph 8 (3) of my note gives an account of the research work done on inland fisheries.

157. No. If any of these are to be dropped, it should be only for want of funds. The development of inland fisheries is an integral part of the Fisheries Department especially as ice is costly and sea fish cannot reach the interior districts except at high cost. The bulk of the population are far removed from the sea and the reach of fresh sea fish. The most important fresh food fishes are under investigation and I cannot think of any other line of research of greater importance.

158. Beyond the Assistant Inspectors and Sub-Assistant Inspectors in charge of the farms there is no one at present in the Inland section engaged in research work.

159. I would propose a headquarter laboratory and a qualified Assistant Biologist to engage on research on fresh-water fisheries—vide section V of my note, paragraph under Fishery Biologist.

(b) Technological Research.

160. Both are equally important. Under existing conditions of the industry in India technological research assumes greater importance than in advanced countries where initiative, capital and enterprise are available from the public. While it is unnecessary for instance in England for its Department of Fisheries to undertake fishing experiments or the manufacture of cured fish, oil, guano and the like, every branch of the industry from capture to marketing had to be investigated and pioneered in countries where the industry was backward and are required to be developed. I refer to the working of the Fisheries Department in Japan and Ireland and more recently in Canada, South Africa and Australia. In all countries biological research is of supreme importance and devolves almost entirely on a State department of Fisheries.

161. There has been a concentration on administrative and revenue earning sections of the department to the utter neglect of the research side; barring four Research Assistants there is practically no research staff.

162. Please see section V of my note.

163. Vide answer to Question No. 14.

164. Vide answer to Question No. 16.

165. The fishermen have no method at present of keeping fish fresh for any length of time. Their cruising distance and duration of voyage are therefore short. Larger boats with equipment of preservation of fish fresh

alive in live cars or wells or by preservatives such as ice, etc., will be necessary when larger catches further afield are contemplated. In Bengal fishermen employ large bamboo cages in which they keep live fish. The provision of special carriers or boats for delivering catches at shore will also be necessary when fishing on a large scale. At Tellicherry and Calicut there are such boats which are called Kol Odams, but being only canoes they are not very serviceable. The captured fish are now thrown at the bottom of the boat without any attempt to shelter it from the sun or keep it from taint. Beheading, gutting and cleaning of fish from blood, little addition of salt or ice will all contribute towards more hygienic and better quality of fish for the market.

166 (a). No research on oil content has been done. An estimation, however, of the quantity of oil in sardines in various years is made at Tanur. This analysis shows that sardines vary enormously in their oil contents from about 4 to 5 per cent to 16 per cent.

(b) In the manufacture of oil, boiling and pressing have been introduced in the place of the old method of rotting. Refinement of oil consists of—

- (1) Clarification (removal of stearine).
- (2) Filtration.
- (3) Dehydration (removal of water).
- (4) Neutralization (removal of high acidity).
- (5) Deodorization (removal of odour).
- (6) Decolourization (removal of colour).

The complete refinement of fish oil has not yet been accomplished.

The skimmed sardine oil has been sold as a substitute for cod liver oil, but an analysis made by Professor Drummond and Professor Hjort of Kristiania shows that the oil has no vitamin A. The former suggests method of preparation as possibly causing this defect. The latter, however, states that vitamin A is naturally absent in the oil and there is the possibility of vitamin D being present. Further report on the oil from Hjort is expected.

(c) The chief problem engaging the attention of the station with regard to the manufacture of fish-meal is the unduly high percentage of fat in the meal. Fish-meal from "podimeen" has a low oil content, viz., 4 per cent and was sold at 4 annas a pound; but sardine fish-meal which has a greater percentage of oil could be sold only for one anna six pies a pound. New methods for the reduction of the oil content are under trial. The failure of the sardine season has necessarily handicapped experiments and research.

(d) Good fish guano has been manufactured and the process has been taught to manufacturers on the coast.

(e) Hygienic methods of curing fish were the first that were tried in Tanur Station. These have now been introduced in the fish-curing yards. The defects from which cured fish suffer are (1) "Pink eye" a type of mold, (2) "Rusting" a red discolouration after long storage due to a chemical change in the fat of the fish and (3) in the case of semi-dried prawns, a special product of the station, the formation after a time of a white excrescence. During the last three years the Tanur Station has been specially investigating these problems. Harmless ingredients (turmeric, mustard, etc.), in imperceptible proportions of about 1 in 20 of salt have been noted as excellent preventives. More recently pickling mackerel in brine in closed barrels free from light and air has prevented pink eye and rusting completely for months on and though an absolute remedy has not yet been discovered, the fish were subsequently dried for sale as salt fish according to demand and fetched excellent prices. The occurrence of salt excrescence was found to be connected with the length of time for which the prawns are cooked. By limiting the cooking to an absolute minimum the defect was found not to appear for a considerable time. Another remarkable preservative, sodium hypochlorite which is absolutely innocuous and turns into common salt on application to fish, still remains to be tried. Only a few preliminary experiments have so far been done with it.

(f) The possibility of canning sardines and other local fish in a variety of ways has been proved and canned goods of good quality have been placed on the market. There are, however, many problems incidental to canning

in the tropics which require to be investigated. Some of the recent researches at the Cannery were—

(1) A comprehensive range of samples, from the packs of 1919-20 which was the oldest stock available and of subsequent years up to 1923-24 was scrutinized and tested. The oldest stock were found to stand all the known tests. The contents had a good taste except a faint smell of tin. This showed that the Chaliyam tins stored under tropical conditions can remain sound for at least five years. Select tins were examined chemically for dissolved tin by the Chemical Examiner to Government and his report showed that the amount of tin dissolved increased, as was expected with the age of the tin and that in the oldest tin analysed, the percentage of dissolved tin was not more than 0.02 per cent, a perfectly safe and harmless trace. In the history of the trade no thoroughly authenticated case of tin poisoning resulting from canned foods is available. This is because the dissolved tin has been shown by various investigators to be so firmly absorbed in an insoluble form in the solid parts of the food as not to act poisonously. It is known that the minimum quantity of dissolved tin that may prove harmful is two grains to the pound, i.e., 0.035 per cent which is 75 per cent above the quantity (0.02 per cent) found in our oldest stock of tins. The process of detinning in tin fish was found to be 14.7 times as rapid in India (tropics) as in America (temperate zone). Judging from the rate of solution of tin in India, canned sardines would appear to be safe up to a maximum period of seven years in India, after which time they are apt to contain a sufficiently high percentage of dissolved tin, which may prove injurious to health.

(2) The problem of preventing rust in tin stored at a minimum of cost has been solved.

(3) An important defect in Malabar sardine, viz., hard bones, has been traced to the age of the fish; if young fish are canned the defect is greatly reduced.

(g) No chemical except salt is employed in commercial curing in the Presidency. In the early experiments by the department at Ennur and Tanur, Sir F. A. Nicholson experimented with a large number of preservatives such as boric acid and the like. Recently in 1923, sodium benzoate was tried and proved useful. But at no time were these re-agents employed in actually curing fish for the market. Since the publication of the report by the British Department Committee on preservatives and colouring matter further experiments have been made and the employment of chemical re-agents as preservatives has been discarded. There is, however, one chemical re-agent, electrolytic sodium hypochlorite, which is absolutely innocuous, while highly antiseptic in property as it is converted into common salt when it re-acts on organic matter. A few experiments by Sir F. A. Nicholson at Ennur were successful. A small modern plan for the manufacture of this chemical has been purchased and experiments are now in progress. Sodium hypochlorite can keep fish from taint more or less in a fresh condition for some 48 hours even in the tropics, which will enable fresh fish being landed in a fresh condition and transported to the interior markets much farther than those within a radius of 20 miles. If all that is expected of this chemical is realized, the benefit that this method would confer on the fresh fish trade of this Presidency will be incalculable.

Some initial experiments in refrigeration conducted by the department in 1912-13 with ice and subsequently with a small ammonia brine freezing plant, according to the Henderson method in 1915-16 at the Chaliyam Cannery, proved that the method could be adopted with success technically. Further experiment in that direction was stopped after the machine became unserviceable and Government have since been unable to provide funds for restarting the experiment.

(c) Aquarium.

167. Yes. Properly equipped aquaria are absolutely essential for conducting research in marine biological stations and invariably form an integral part of such institutions wherever they have been established. The casual analysis of the problems surrounding the living organism in its environments calls for exact knowledge of not only the studies, etc., of the animal concerned but of the environing factors such as heat, pressure, salinity, nature of food, etc., and the influence of each of these on the living animal could only be experimentally studied in aquarium. The well-known marine biological stations at Plymouth, Port Erin, Hill Port, Naples,

Heligoland, Morocco to mention only a few out of nearly hundred biological stations in Europe have public aquaria attached to them. This is because no study of living animals is possible without a properly equipped aquarium.

168. Yes. An aquarium will disclose the wonders of colour and form characteristic of the fauna and flora of the tropical Indian seas and will reveal a new world of life of never-failing interest and pleasure to the general public both young and old alike.

169. Yes. The aquarium may be advantageously enlarged and the research side of the aquarium should be developed. The laboratory should be enlarged and fully equipped.

170. Yes. For the present one at Rameswaram and another at Vizagapatam should be established.

XIII. TRANSPORT.

171 & 172. The trade organization is so poor that there are no facilities for collection or speedy landing of fish and for its transport to interior markets except at a few important railway stations.

The development of motor bus traffic has to a large extent removed one of the difficulties.

The railways may be approached for concessional rates for cured fish, guano and other fish products. At present only fresh fish is booked at half parcel rates. Again the difficulties in securing steamer freights for fish and fish products is even greater than in the case of railways. Shipping firms have vested interests and flatly refuse to ship fish oil or fish manure except what they themselves purchase and transport. This has crippled trade in these commodities to the detriment of the small scale manufacturer and factory owners.

XIV. SOCIO-ECONOMIC WORK.

(a) Co-operation.

173. Vide paragraph 15 of my note.

174. As explained, the two difficulties are (1) want of close supervision which the officers of the Fisheries Department alone seem capable of exercising; either the Fisheries Department should be so strengthened as to enable close supervision of the fishermen societies as proposed by the Committee on Co-operation or a staff of special Inspectors allotted to these societies should be made to work under the Fisheries Department; (2) the second difficulty is the need for funds. Credit societies do not seem to help the fishermen from experience so far gathered. The only method is for Government to advance special loans as they have done in the case of two societies. If this is done close supervision by the Fisheries Department is necessary to see that these societies work.

175. Considerable benefit has accrued—vide paragraph 15 of my note.

176. Vide answer to Question No. 174.

177 (a) & (b) & 178. In 1923-24 two joint purchase and sale societies of fish-curers and one wholesale society at Mangalore for fish oil and guano manufacture were organized. The societies for the joint purchase and sale of fish have not been working satisfactorily. But last year one of those societies, the Thalavi Fish-curers Society, revived and did good work when the Sub-Inspector of the yard began to interest himself in the working of the society. Another society, the Cannanore Women Curers' Society, made a joint purchase and sale of rice during a time of distress in 1925. Two societies for joint fishing were started in 1927 with the aid of loans advanced by Government. Already within a year they have paid back 30 per cent of the loan granted to them, due to constant supervision exercised by the officers of the Fisheries Department.

179. I consider that societies of these two types are the best for fishermen and more societies should be formed.

180. Yes. Advances, bounties and subsidies are essential for the promotion of co-operative effort among fishermen—vide answer to Question No. 174. Even in the most advanced Western countries financial assistance is given to fisheries. To cite a few examples—

In 1889 in Norway to assist fishermen to purchase boats and gear a loan fund was formed, Government contributing Kr. 200,000 which was subsequently increased to Kr. 3,950,000 (about Rs. 29,62,500).

In 1919 a Government Fisheries Bank was established for granting loans to fishermen's associations or co-operative institutions for the purpose of treating fish and selling fishery products. The funds of the bank amount to 5 millions Kroner (about Rs. 37,50,000) with a reserve fund of Kr. 750,000 (about Rs. 5,62,500).

In Denmark financial assistance to fishermen is given in two ways: (1) Direct loans Kr. 300,000 (about Rs. 2,25,000); (2) loans through the agency of co-operative associations Kr. 200,000 (about Rs. 1,50,000) are given.

In Canada, by an Act of 1882, a provision of \$ 150,000 for the distribution among any fishermen and the owners of fishing boats for the development of the sea fisheries and in the encouragement of boat-building. In 1924 the total of the bounties amounted to \$ 159,826 which is equal to about Rs. 4,39,384.

181. Yes, though a few societies have also been at suitable centres organized on the East Coast for taking on lease fresh-water fisheries hitherto auctioned to highest bidders, usually middlemen, who work the fishery through fishermen on scanty wages and pocket the profits.

182. Yes. The whole of the socio-economic activities on the East Coast now under the control of the Labour Department may be transferred to the Fisheries Department as this department has better staff and machinery for such work. There has been also numerous complaints from East Coast fishermen that their welfare is not attended to by the Fisheries Department.

(b) Education.

183. Vide paragraphs 10 (5) and 11 of my note.

184. Vide paragraph 11 of my note.

185. Vide sub-paragraph (3) under paragraph 14 of my note. The arrangement hitherto followed seems to be the most efficient and economical. Any other arrangement if it should meet all requirements is bound to be needlessly costly and is bound to duplicate staff and work of the Fisheries Department.

186. Thirty day schools and four night schools.

187. So great is the appreciation of the special educational work of the department that there is a constant demand for more fisheries schools from almost all fishing villages of consequence. Lack of funds alone prevents compliance with these demands and a more rapid progress in this essential method of elevating the condition of the fishing people. The indirect benefits of education have exceeded expectation. Thrift, co-operation, progressive ideas, realization of their rights and privileges and desire to elevate and educate themselves have produced an upheaval among at least the young generation of fishermen on the West Coast and one sees on all sides the formation of societies for the promotion of education, temperance, thrift and self-help. This is not the case on the East Coast.

188. Yes.

189. Yes. The East Coast fishermen have urged for fishery schools to be opened on the East Coast by the Fisheries Department. In 1921 the Fisheries Department had no staff on the East Coast and Mr. Hornell has therefore arranged with the Labour Department for the conduct of socio-economic work among East Coast fishermen. Further the Labour Department has a limited staff and very little work appears to have been done among fishermen. The fishermen are not a depressed class actually coming under the care of the Labour Department. The Labour officers have neither the technical knowledge nor facilities to serve the peculiar needs of the fishing community. The Labour Department have to train their teachers

at the Fisheries Training Institute and so far not a single teacher has been sent by them. Since the transfer of the East Coast fish-curing yards, the Fisheries Department has acquired a greater staff than the Labour Department in fishing villages of the coast. For units of purpose and policy I have suggested that the socio-economic work among fishermen may be transferred to the Fisheries Department. The matter is under the consideration of Government.

190. (a) I have at great pains revised and brought up to date the curriculum and studies at the Fisheries Training Institute and elementary schools—vide paragraph 14 of the note.

(b) The Government recently have been sanctioning only as few teachers as possible. The rule says: "that there should be at least one regular teacher for every 40 pupils on the rolls and that it is very desirable that there should be a teacher for every 30 pupils. According to existing orders, if the management employs one teacher for every 20 pupils in standard I, there is no objection to this course provided that the work and progress seen at the inspection justifies the employment of the additional staff;" and still additional teachers are not sanctioned if the excess over the prescribed number of pupils is small. This prevents the school from admitting as many pupils as seek admission and also militates against the efficiency. A more liberal policy, I recommend, should be pursued in sanctioning staff.

The Headmaster of the Fisheries Training Institute has been on the scale of Rs. 75—150 for the last eight years and is naturally very disheartened. The scale in similar institutions elsewhere is Rs. 75—250 and the same scale if granted will enable the department to retain the Headmaster's services. He has been specially instructed in courses given by the Fisheries Training Institute and it is not easy or convenient to replace him at short notice. The conduct and abilities of the present Headmaster are extremely satisfactory and I recommend that every effort should be made to retain him.

For the proper technological instruction both to advanced students or apprentices in special branches of the industry and for training recruits in the department the courses of studies will have to be supervised, amended and revised by the expert staff of the department. These will also form the Board of Examiners.

(c) The Fisheries Training Institute at Calicut is the only institution existing now; it is far from well-equipped. If it is to be well provided with apparatus and fittings for instruction in various branches of the industry an additional capital investment of at least Rs. 9,000 is required. I have submitted a scheme to Government for the investment of annual instalments as follows:—

	1928-29.	RS.
A demonstration cannery, curing and oil and guano plant and construction of shed for same	...	3,000
Extension of the present scout's room for stores and net ...	...	2,000
Construction of a museum hall with fittings and library ...	...	2,000
	1929-30.	
Construction of a small stone built tank for students to study pond life	...	2,000
Total ...	...	9,000

Some important courses of studies in the new curriculum have not yet been started for want of equipment. If education for the fisherfolk of the East and West Coast is to be conducted efficiently three more training institutions for teachers, apprentices and recruits will be required, one at Mangalore for Kanarese students, one at Madras for Tamil students, and one at Vizagapatam for Andhra students. Proposals for the fisheries training institutes at Mangalore and Vizagapatam, have already been submitted to Government and a site for the Madras Fisheries Training Institute has been proposed.

(d) Vide answers to (b) and (c) above.

191. Yes. Waiting on the fisher community to sufficiently develop their industry and demand for training would not lead to any result in reasonable time. The method adopted is to enlighten the fisherfolk by elementary technical training so that they themselves realize the need for more advanced training. Last year the fishermen of South Kanara memorialized the Minister for a separate Fisheries Training Institute at Mangalore not merely for training teachers for elementary schools but to impart technical instruction in special branches of the industry to youths and adults actually engaged in fishing and possessing special aptitude for such training. This is a direct result and a natural development of the working of the Fisheries elementary schools in the district.

I have proposed the establishment of a technological school at a capital cost of about Rs. 4,000 and a recurring cost of Rs. 9,338 which will provide not merely training for pupil-teachers for elementary schools in South Kanara but training in special branches of the industry to fisher-youths and adults engaged in fishing. To be properly equipped, however, a final investment of at least Rs. 15,000 will be required for apparatus and fittings. The fishermen are willing to meet half the cost of technological courses and I have suggested that the other half should be met by the award of six scholarships to apprentices.

192. As I have already explained the Fisheries Training Institutes at Mangalore, Calicut, Madras and Vizagapatam, if fully equipped, will function not only as training institutes for teachers but for imparting advanced technological instruction to apprentices in the trade and to the recruits in the department. The courses will be supervised and revised continuously by the experts of the department.

XV. ZOOLOGICAL SPECIMEN SUPPLY.

193. The nature of biological studies is such that students must have a practical and intimate knowledge of local animals and plants. There has been no institution for the supply of Indian specimens. Previous to the initiation of the supply section, colleges throughout India were compelled to base their practical zoological teaching either upon text-books, illustrations or on few foreign specimens obtained from European biological stations. Biological teaching, therefore, was purely of a theoretical nature and was abstract and unreal.

194. The numerous fishing operations conducted or controlled by the department particularly in chank and pearl oyster diving and the periodical dredging of pearl and chank beds, result incidentally in the collection of numerous specimens of animals and plants of considerable value to students of natural science. This department, therefore, could undertake the supply work much more readily than any other department.

195. Vide sub-paragraphs 3 and 4 under paragraph 32 of my note.

XVI. STAFF.

196. The experts of other departments cannot exactly solve the needs of this department owing to the peculiarity of the work and its volume. An attempt to carry out part of the research connected with a red discolouration at the Guindy Institute had to be stopped as the Director complained that he has neither the staff nor facilities for technological research on purely fishery questions. A similar attempt to analyse tin fish was very kindly done by the Government Analyst; but it was clear that continuous research on more detailed lines could not very well be undertaken by him. The Government Ophthalmic Hospital was approached for experiments with fish oil. They carried out the tests as far as they were able to do, but it led to no useful result and the test had finally to be made through the Imperial Institute at a heavy cost. While moot questions could be referred to the Imperial Institute the department must possess the requisite laboratories and staff for systematic research. The Government have very kindly approved of my proposal for the appointment of a Bio-Chemist as one of the experts of the department. So long as I continue as Director, I expect it will be possible for me to carry on the cultural and statistical work of the department in

addition to my duties with a qualified subordinate staff. Should, however, work develop a wholtime pisciculturist, statistician and economist may prove necessary.

197. In the present social, political and industrial development of India administrative duties form an essential part of a Fisheries Department. The experiments and researches of a decade at Tanur would have remained a closed book but for the administration of the fish-curing yards by the Fisheries Department. An unappreciative market will never pay the fish-curer for improved method and stimulus on the part of Government is the only medium through which improvement in the industry could be effected and public taste educated. Another instance is the use of clean white salt for fish-curing; before the intervention of the Fisheries Department dark Bombay salt being the cheaper commodity was in extensive use in West Coast fish-curing yards. Even at a loss to the Salt Department then administering the yards Sir F. A. Nicholson advocated the supply of clean Tuticorin salt. Fish cured by this salt has in its turn educated the consumer that fish cured with dirty Bombay salt is no longer attractive and the West Coast curer will not now take Bombay salt even at a cheaper price. Administration of the industry by the State was therefore directly responsible for this measure of reform.

Research is also directly helped by administration—

(1) But for fish-curing yards that intimate touch with the industry at all important points of the coast and the staff needed for making observations, collecting data and statistics regarding fish and fisheries and 108 important fishing villages of the coast without additional cost and duplication of the staff would have been denied to the department.

(2) Likewise opportunities for observation and experiment in chank and pearl fisheries would have been denied to a very large measure if the department did not administer these fisheries.

(3) The stocking and fishing of numerous rivers, tanks, lakes and reservoirs affords opportunity for studies which would otherwise not become available without considerable extra expenditure and duplication of staff.

(4) Much of the research being directly connected with economic questions, many experiments have to be tested by its effects on the trade and industry and the most suitable conditions for conducting experiments or observations will be denied to the department if it did not control the trade and the industry. For instance, cultural operations with particular fish if it is to yield results should be accompanied by co-ordinated restrictions in fishing and exploitation in waters operated on and by close observation of results for definite period. All these latter which are purely administrative measures could not very well be co-ordinated to research if the same department did not control the administrative side of fisheries. Instances like these could be produced for almost every economic research conducted by the department. The most convenient, economical and efficient method of combining research and administration is to vest both in the one department of Fisheries as far as possible.

198 & 199. Administrative officers cannot very well be entrusted with research work except to the extent of collecting statistics or making observations or enforcing rules and regulations connected with experiments. For the future development of the department, I consider that the time has come for the separation of the administrative side from the purely research side and the appointment of wholtime experts for conducting research. In Captain Cribb and in the Fisheries Chemist recently sanctioned we have two experts for the department. We will need others. Almost immediately a fisheries biologist and staff are required. The appointment of a gazetted Personal Assistant to the Director of Fisheries will relieve him of much of the clerical, account and administrative details and will enable him to devote his time to the more legitimate duties of his office and to the conduct of piscicultural and statistical work. There is no other expert officer burdened with administrative duties.

200 & 201. A larger administrative staff with definite territorial jurisdiction is needed,

202. No more than the absolute minimum of administrative staff exist. No retrenchment, therefore, is possible.

203. No—vide section V of my note.

204. No. The Assistant Director (Inland) and the Superintendent, Pearl and Chank Fisheries, should be granted the usual provincial grade. The Sub-Inspectors of Fisheries for the most part were Salt Department Sub-Inspectors before the transfer of the yards to this department. While the cadre in the Salt and Excise Departments rises up to Rs. 90 the scale in the Fisheries Department is limited to Rs. 80. Further the chances of promotion to Inspectors are far less in the Fisheries Department as the number of Inspectors is strictly limited. The staff of Sub-Inspectors therefore as a body are discontented, and memorialized Government. It has greatly hampered the introduction of reforms in fish-curing yards. I recommend that their grade of pay may be suitably improved.

The headmaster and staff of the Fisheries Training Institute should be given at least the pay of similar posts in the Education Department if not somewhat more attractive pay as special technical qualifications are required and there are no further prospects for the men.

The research staff to the "Lady Goschen" should be given adequate allowances to compensate the continuous work at sea.

205. The training of experts is at present out of the question as there is no institution in the whole of India that provides courses in the higher branches of fishery science. If such existed, we could obtain men with a sound grounding in fishery science, who after training and experience in the department, would be capable of taking the position of experts. At present experts with foreign training will almost certainly have to be selected. Several of these experts could be enlisted only on short-term contract as the Assistant Director (Marine). The immediate assistants under them will be Honours Graduate in chemistry or biology who, if they show sufficient aptitude, should be deputed to foreign universities for special courses in the subjects in which they deal. Their Indian experience combined with foreign academical training should fit them for the post of experts subsequently.

XVII. FINANCE.

Question numbers.	Expenditure in 1926-27 (latest available).	Receipts.	Average for five years.	
			Expenditure.	Receipts.
	RS.	RS.	RS.	RS.
206 ..	7,76,224	8,07,016	5,83,366	5,68,610
207 ..	30,502	31	28,740	7
208 ..	65,671	129	37,963	146
209 ..	1,08,227	1,06,255	93,887	1,10,705
210 ..	It is not sufficient.			
211 ..	43,487	21,341	46,006	39,381
212 ..	46,264	457	43,249	375
213 ..	3,20,306	3,26,562	3,49,079	3,62,257
214 ..	27,387	6,543	28,609	22,075
215 ..	16,001	14,798	17,397	17,305
216 ..	6,923	9,360	6,693	9,058
217 ..	5,622	3,989	4,903	4,054
218 ..	1,07,158	2,90,691	50,328	1,06,351
219 ..	22,383	41,854	37,336	70,324
220 ..	No separate expenditure is incurred on co-operation. This work is done by the staff sanctioned for the fish-curing yards and fishery schools.			

Oral Evidence.

In reply to the Chairman, Dr. Sundara Raj, stated as follows: I am the Director of Fisheries. I joined the Fisheries Department at the request of Sir F. A. Nicholson in 1915. I was then an M.A. of the Madras University. I was Assistant Professor of Zoology in the Madras Christian College, and afterwards assistant to Dr. Henderson in the Museum. In 1921 I went to Liverpool—the only University in the United Kingdom which teaches fisheries. I was a research student of the fisheries there and, in view of my past work, they admitted me as a research fellow of the University. Thus I had the unique privilege of having a room and apparatus furnished for me. I produced a thesis at the end of two years and obtained a Doctorate in Fisheries (Oceanography) within the period of three years prescribed. I have travelled all over Europe. Germany has a comparatively small fishing industry, but her equipment for research in fisheries is admittedly very thorough. She is the leader in the matter of scientific research in fisheries.

Mr. R. S. Nayudu: Have you gone to America?—No. I propose to do so as soon as I can get leave.

Are conditions in America and Europe the same?—There is a wide difference of opinion between experts in America and Europe. Americans believe in pisciculture as an unfailing remedy. They have attempted the artificial propagation of nearly all economically important sea and fresh-water fish in special hatcheries and claim success in augmenting catches. In Europe there are very few hatcheries for sea fish. Europe believes in pisciculture only so far as it concerns inland fisheries and marine shell fisheries.

Is it a fact that America has succeeded in the matter of preservation of raw fish and in sending it thousands of miles away?—This is one of the recent advances in the transport and distribution of fresh fish in America. Refrigeration even by the most recent method of dry ice or solid CO₂ has been tried in America.

The Chairman: You have given in paragraph 2 of your note eight items as the aims of the department. Are these the aims of every Fisheries Department in all countries?—Yes.

What do you mean by developing the marine fisheries?—Developing every aspect of it, viz., boats, nets, methods of capture, and thereby increasing the capture of fish and making it available to the masses as cheap fish food and also thereby providing cheap manures to the agriculturist. I agree that the fish caught by our fishermen with their primitive boats and ill-equipped nets and tackle is not sufficient for the province and that a richer harvest can be reaped out of the sea. With augmented catches there should be an abundant quantity of fish for supply to the people and even export to other countries. There should be one or more research vessels for the department properly equipped on up-to-date lines, for experimenting with various methods of fishing with a view to determining the most suitable modern method of deep sea fishing and then to demonstrate such method or methods to the trade. The department has secured a trawler which can go much farther than catamarans or canoes and investigate possibilities. Through her researches it should be possible to determine what kinds of fish and what quantities of it can be had in different localities at different seasons, which fishing banks are rich and what type of nets or other tackle should be employed on the different banks and for different fish. A prolonged investigation by the trawler is needed; until this preliminary work is concluded and facts have been ascertained, practical instruction to fishermen will not be possible. The location of extensive fishing banks and even the effective capture of fishes by modern methods in deeper water constitute but one part of the programme for the development of marine fisheries. The landing of the catches in sound condition, their preservation, rapid transport and marketing are all equally necessary and require continuous experimentation before successful practice can be determined and advocated to the fishermen.

So, unless you do something of this kind yourself, and show the people that it is a profitable concern and will increase the national wealth, do you think people will take to it?—No. Under present conditions in India. I am of opinion that it is the duty of the State, to experiment with and demonstrate improved methods to the fishermen.

Do you think that the supply of marine food has increased appreciably during the last twenty years?—I doubt, if there has been an increase. We have no statistical machinery for ascertaining the landings of fish, since 1924, I have tried to utilize the fish-curing yard staff for this purpose. The figures for the West Coast for the year 1925-26 have been fairly accurately gathered and published in a supplement to that year's annual report. I have still no reliable data for the East Coast.

So, we cannot say that we have succeeded in the first aim?—No.

Now referring to the third clause, so far as leaflets and bulletins are concerned I presume they are more useful to the department and a few educated men who take interest in fisheries, than to the public as they are too scientific for them?—There are no advanced sections among the fishing population who can make use of them.

Mr. R. S. Nayudu: How many exhibitions have you held up till now?—Several agricultural exhibitions have been held and all of them included fisheries exhibits. We had a stall in the "All-India Industrial and Khaddar Exhibition" held in Madras recently. We have taken part in the agricultural exhibitions at Bellary, Salem, Coimbatore and others on the East Coast.

You had none in Madura and Ramnad which are important fishing centres?—Very likely not.

So those fishermen have no idea of the up-to-date methods?—No.

The Chairman: Coming to the fourth aim, according to you, regarding the results of scientific investigation, can you claim any definite results from such investigation?—Yes; (1) in pisciculture, we have successfully introduced, cultivated and stocked exotic varieties of food-fish; (2) in fishing deep permanent water tanks, we have introduced new methods which are being copied by the public; (3) in the manufacture of fishery products, the improved methods ascertained at Tanur are being gradually adopted in public fish-curing yards and by the hundreds of private oil and guano factories.

As regards your fifth aim, Sir F. Nicholson was appointed as Honorary Director of a Bureau which was supposed to be part of the Agricultural Department?—A bureau is a department of experts for the transaction of public business of a scientific nature. The name was probably adopted from America, where a similar institution is called the United States Bureau of Fisheries. The Madras department was never a part of the Department of Agriculture. Small as this department is, it has been widely consulted by various fisheries institutions of the world and the fund of information collected has been used by the public and by the Government in administering the fisheries of the province.

Barring yourself, there are no experts in your departments?—No. I can claim expert knowledge in pisciculture only.

So, except in the directions mentioned by you, most of the aims of the department cannot be said to have been realized?—No. The staff at present has got enough administrative work. The few that are well educated are capable of some research work but they have no time to do it. We want experts and funds.

Is fish food cheaper than other kinds of non-vegetarian food?—It is.

Do you think the economic position of the people would be bettered by the supply of cheap and wholesome fish food?—I think so; particularly for a rice-eating people nitrogenous food as fish or meat is a necessary and a highly desirable item of dietary. The majority of people will eat meat or fish if they can get it. Almost invariably meat is dearer than fish.

Do you think that when famine occurs, fish food supply would form an important element in reducing the rigours of famine?—Sea fisheries could be an effective insurance against famine much more than irrigation and famine relief works. Irrigation canals cannot function when rain fails and famine-relief works are not preventive but palliative measures; but the harvest of the sea is always with us. Incidentally, inedible fish as well as edible fish when in excess of requirements could be converted into valuable manure to enrich the impoverished soil.

Are the present methods of catching fish ineffective and have you, during the last twenty years, endeavoured to improve them?—Yes, but we have not been able to succeed on account of the conservatism of the fisherfolk

and their poverty. The failure is partly due to the fact that experts have not been in charge of this work. The attempt to introduce the Ratnagiri boats on the West Coast failed for these reasons. An attempt was made to introduce at Madras the Malabar type of canoe which was considered to be better but the East Coast fishermen did not take to it. Two trawling grounds were discovered by Mr. Hornell and Captain Cribb; but the depth of these banks being 30 or 40 fathoms and their distance from the coast more than 7 or 8 miles, they have not been fished by the local fishermen.

What is the depth up to which the local fishermen fish?—In places like Cocanada and Masulipatam as well as in Palk Bay and the Gulf of Mannar boats venture out to greater depths but the limiting factor is not depth as the appliances used are drift and seine nets or long lines which are plied at the surface or in mid-water. The fisherman is more afraid of losing sight of land.

Do not you think that the smallness of the boats is a hindrance for them to go further out to sea?—Yes. Small canoes and catamarans cannot carry supplies of food and water nor do they afford shelter for sleep and rest. There is also no room in them for accommodating large fishing nets and working them.

Do they salt fish in boats?—They don't. The department made attempts in the early days in this direction, but it led to no definite results.

Through whose fault?—It is very difficult for me to judge at this distance of time. I do not know what happened. There was the conservatism, ignorance and the extreme poverty of the fishermen on the one side and on the other, we had no real experts to carry on this kind of work. We have to rely on actual professional fishermen who have been brought up to the trade from their youth and who are acquainted with the various modern methods of fishing for the introduction of such reforms. There are no facilities for salting on catamarans and canoes. The boats must be bigger.

What does a catamaran or a canoe cost?—A catamaran costs about Rs. 150 and a canoe between Rs. 250 and Rs. 300. The minimum cost of a sailing boat providing for salting fish without any refrigerating arrangements will be about Rs. 800. Inshore fishing smacks vary greatly in size. There are small ones which range from 18 feet upwards. Some of them are equipped with a motor and may cost from £27 to £100. They are partially or wholly docked and have cabins for shelter.

IV. DEEP SEA FISHING.

The Chairman: I suppose you have got seven boats altogether—this is a subject on which there has been much controversy—and the biggest is the "Lady Goschen." That is the only trawler?—Yes.

What could the "Lady Nicholson" do?—It is an inspection schooner and is not intended for trawling at all. The "Sutherland" is now a motor boat. Originally she was built to specifications and drawings of fishing boats obtained in England. No fishing experiments, however, appear to have been made with this boat. The "Margaritta" was an old steam launch belonging to the Port Department which was transferred to Fisheries with the pearl and chank fisheries. She made a cruise on the Malabar coast and in the Laccadive seas. Being very old she had to be condemned and scrapped when the "Lady Nicholson" was built. The "Leve-rett" is a small motor boat. She was built as a rapid carrier for collecting sardines for the cannery and fish for Tanur from boats at sea and swiftly carrying them to the shore. This again does not appear to have been used for this purpose. She now works at Tuticorin in connection with the pearl and chank fisheries and tows boats regularly to sea and back. The "Sea Scout" was purchased in England in 1923 for experiments with the Danish seine net. Though the naval experts approved and passed the boat she proved unsuitable in design and equipment for conducting the experiments. Her engines could never work the seine net winches and she was altogether too light and unstable for seine net operations though an excellent sea-going launch. She has been of great assistance in the conduct of pearl fisheries at Tuticorin. Two motor boats "Pearl" and "Sutherland" have had to be condemned for chank fishery work and the "Sea Scout" has taken their place. Now, the "Pearl" is the oldest motor boat the department has. It is an open boat of small size and her engine is very old. She cannot be any longer employed actively in chank fishery

operations. The last vessel to be purchased is the trawler "Lady Goschen." She is an Admiralty trawler of the Castle type built in Canada in 1919. Her gross tonnage is about 300 tons and her registered tonnage 180 tons. My predecessors in office hesitated purchasing a trawler for the department on account of the very high initial and running cost involved although they had recognized that a vessel of that type was indispensable for research and inspection. With the transfer of the fish-curing yards in 1924 an excellent opportunity arose for the acquisition of this long-desired research vessel. Ways of working the fish-curing yards as economically as possible were scrutinized both with a view to reduce annual loss incurred by the Salt Department in working these yards and with a view to reduce the issue price of salt to curers which had been doubled recently to minimise the loss to Government. The main item of expenditure in the fish-curing yards' budget was Rs. 1,99,000 (budget figure for 1924-25) for the purchase and transport of salt to the West Coast yards. The West Coast yards consume the largest quantity of salt and in the absence of salt factories all the salt has to be transported to the West Coast from Tuticorin and Kayalpatnam which are the nearest factories and also from Madras and other East Coast factories by rail occasionally when sea transport fails. The sea transport had been till then done by contractors at about Rs. 12½ per ton of salt. The delay, inconvenience and loss of salt in sea transport by contractors had been considerable. I found that if transport were done by means of a trawler towing vessels laden with salt, an economy of about half a lakh of rupees in the annual expenditure on fish-curing yards could be effected. Accordingly the trawler was purchased in 1926. The salt transport will occupy at the most four months. For the rest of the year the trawler will be available for fishing experiments, survey of fishing banks and all other fishery research. Even the trips to the West Coast with salt could be combined with hydrographical, meteorological and plankton research. In fact for such research the trawler will have to make these long-shore journeys whether she tows salt schooners or not. Madras, therefore, is in the fortunate position of having found a solution for the financial outlay required for deep sea fishery research. The Bombay, Bengal and even the Ceylon Governments, in view of the heavy expenditure involved, curtailed their deep sea investigations with trawlers to extremely limited periods of a few months. With the economies that will accrue by combining research with salt transport, the capital and running costs of the trawler will be more than paid for otherwise and research and experiments for a prolonged series of years is ensured without the necessity of measuring the success of such pioneer enterprises by financial returns. The trawler has not yet been equipped with cabins, laboratories and apparatus needed for fishery research.

Did not the Bombay trawler do commercial fishing?—If you turn to page 3 of the report of Mr. Hefford you will see his views on this question. He was compelled to engage in commercial fishing from the start by the Government of Bombay and he considered it a mistake. Faced with a heavy expenditure the Government desired to catch and sell fish and wanted to kill two birds in one shot. The problem is by no means so simple as this. Laborious experimentation and research for a long period of years by a competent whole-time officer and a properly equipped deep sea fishing vessel are indispensable for success in such an enterprise.

Was it part of your object also when this boat was purchased?—Our objects with regard to fishing experiments were (1) to find fishing banks in deep water beyond the range of catamarans and canoes, (2) to determine the quality and quantity of fish available on these banks throughout the year, and (3) to determine the best methods of catching these fish by trawl nets, seine nets, purse nets, long line, etc. Such an investigation is essential before commercial fishing could be thought of. The other objects are efficient and economic transport of salt and scientific research.

Is there any marine biologist on it?—No. One Inspector with some biological training has been posted to the trawler. The technological operations, i.e., survey of banks and capture of fish and the like are controlled by the Master, the Assistant Director (Marine). The biological side is at present attended to by the Inspector. He is a low-paid officer on Rs. 150 with eleven years' service in the department. He has hardly the qualifications necessary for the researches contemplated at sea. He has, however, been provided with a set of instructions for recording meteorological and

hydrographical data and for obtaining sea-water samples. As he is not a trained man his work in this direction cannot be relied on. He maintains registers for the record of experiments made by the trawler such as the date and time of fishing, the quantity of fish caught, the depths of the sea, the nature of the sea bottom, the kinds of fish caught, their maturity and other biological data. Here his work is more or less reliable.

Did he take the fish as they were caught or did he specialize on any particular kind of fish?—He was asked simply to analyze catches, i.e., roughly classify them into various kinds. The trawler has not the equipment at present nor is the Inspector sufficiently qualified for undertaking specialized research on any particular kind of fish, i.e., where they migrate, where they breed, and how they grow, etc.

The Chairman: Now about this trawler. It arrived in Madras on 26th May 1926?—Yes.

I find from your evidence that serious work could not be begun till November? Am I right?—Yes.

Then I also find that from March to May this year it was otherwise engaged?—Yes.

So that any experiments in deep sea fishing could have taken place only from November to March, i.e., for about four or five months?—Yes.

During the time when it was engaged in this work of catching fish, what was done with the fish that was caught?—Some were sold and some were salted.

Tuticorin does not afford a very good market for fish?—No.

How far do they go in the sea for fishing?—They go up to the limits of the continental shelf, i.e., the 100-fathom line. The distance of this contour from the coast varies. At Cape Comorin it is fully 30 or 40 miles out. In Madras, for instance, it is only some 17 miles away.

Do they fish at nights or day-time?—Night is considered the best time for trawling. Whenever they approach land, they land and sell the fish; on other occasions they salt their catch. Exploration and not commercial fishing being our immediate object, the trawler did not make special efforts to land fish every time or to fish exclusively in areas where an abundance of fish were noted. She did not also confine herself to places close to the shore. In Bengal they seem to have kept themselves as far as possible within 20 miles of the coast, in order to land fish quickly and fresh for the market with a view to obtain good prices. As I have said this is unnecessary in the case of Madras as little or no expense is being incurred on fishing experiments to demand recoupment even to the detriment of research. And secondly such a policy will defeat the aims of research as it did in Bombay and Bengal.

Why was not the policy of marketing fish to the best advantage adopted?—Because exploration and experiment are more important in pioneer work of this kind than financial returns. Repeated journeys to the shore will occupy the time of the trawler to the detriment of experiments and any limitations of the distance to the port within which she should work will also necessarily curtail her survey. For these reasons such limitations should be avoided.

What I should like to ask you is—could not the catches be sent to the shore from time to time on board small boats while the trawler continues its research on the banks?—There is only one boat which is a life boat on board the trawler. Therefore boats for constant transport of fish are not available at sea. A special carrier will have to be commissioned for this work. The few motor boats belonging to this department are engaged in pearl and chank fishery operations and could not be detailed for this work. There have been difficulties in landing officers from the trawler even on such days when she actually called at Tuticorin owing to the absence of motor boats on chank and pearl work.

Could you not have some launches?—Yes.

Supposing one or two launches are supplied, could you not simultaneously carry on this work and don't you think that is more profitable?—Not in Tuticorin, perhaps!

In places where there is a good catch?—Yes; this is a matter for experiment.

Once you introduce refrigeration, you could have a store on the shore?—Yes.

Would you find it difficult to find purchasers?—Even 5 maunds of fresh fish could not be sold in a place like Tuticorin. If motor lorries or railway facilities exist and a cold store is established, it must be possible to carry the fish to markets in the interior.

Has any action been taken by the Government in this direction?—No. They do not want to touch the question of marketing at all.

Is it because that it would be interfering with private competition if they did so?—No. There is no private enterprise in this field at all for the Government to compete with. They only said so because they felt that it will be attempting too much at a time.

Do you know that in Guntur and Godavari districts merchants have been purchasing sea-fish and marketing it at Sumalkot and Cocanada and other places?—Yes; but my latest information is that the Uppada merchant has stopped doing this.

Has any attempt been made for icing the fish?—Several people applied to me for advice. One man, at any rate, in South Kanara has adopted my suggestions and has built an ice factory for refrigerating fish and for transport to Coorg and Mysore.

Do you think that refrigeration is a cheap or economic method of preservation? Don't you think the cost will be prohibitive?—Icing is undoubtedly more costly in India than in the West and will necessarily add to the final cost of fish. Still there seems to be a fair market for iced fish in large towns. Here again we have no experimental data to decide the question. I suggested experiments some years ago, about 1924, in fish refrigeration, but Government postponed the scheme.

Do you expect the people of this country to take this up without expecting the Government to take some action in the matter?—Only one man to my knowledge has started refrigeration at my instance. For regular experiments, a Government station should engage in this work.

In connection with the trawler did you not speak of an inspector doing research work? Was it not possible for you to find a better qualified man than he?—No.

I do not mean any disparagement to him. What I mean to say is you have to consider whether the present man is sufficiently qualified for the post?—As I have said he is the only man we have, but he is not fully qualified for the researches that the trawler is expected to make.

You certainly prefer a better qualified man then?—Yes, certainly.

You do not consider that the work that is done actually by this officer is just what you want. You want something more?—As I have pointed out, the officer has no qualification for hydrographical and meteorological work nor any experience in advanced fishery research. He is only a subordinate officer and does his work to the best of his ability.

For how many months has the trawler been transporting salt and doing other duties respectively?—As I have stated before, the trawler does not engage exclusively in salt transport at any time. Such long-shore trips should be combined with hydrographical and plankton research. In other words, the trawler will be continuously engaged in research work while she will tow salt schooners whenever necessary. Besides the trawler cannot continuously engage in trawling alone. The result of the trawler's fishing and survey work have to be studied before further work could be advantageously planned. The collections made have to be identified, classified, and grouped. The depths and journeys made, the nature of sea bottom observed, the currents noted, the rocks met with, have all to be plotted on charts. In other words, there are necessary intervals between scientific cruises which could be utilised for other work such as salt transport. The long-shore trips carrying salt will therefore fit in between trawling and scientific cruises and even during the journeys to the West Coast fish-curing yards and back the trawler will engage in hydrographical and plankton work. This latter are essential for the successful solution of fishery problems and have to be collected and studied at regular intervals along with surveying and fishing of banks.

What period you require for the carrying of salt alone?—I have calculated that the trawler will have to make 15 trips to the West Coast and each trip will occupy on an average six days. Roughly four months should suffice for transporting the whole of the salt required by the yards and even these four months will not be exclusively devoted to salt transport. The trawler could and will carry on scientific research simultaneously.

What are the stations on the West Coast to which salt should be carried?—The salt should be delivered at the fish-curing yards all along the Malabar and South Kanara coasts. For calculation purposes, I have taken Calicut as the centre.

You have no salt factories on the West Coast? The nearest for Malabar is Tuticorin?—Yes. We have no salt factories there.

Is it impossible to carry the salt in one or two trips? For many reasons it is impossible. There are no storage sheds on the West Coast large enough to accommodate all the salt. Even if additional accommodation is provided, it is not possible to carry all the salt in one or two trips.

Mr. Tampoe: How much salt could the trawler carry for each trip?—She could carry easily what three schooners carry or roughly 25,000 maunds.

How many days will each trip take you?—Sometimes two days and sometimes six days depending on the distance of the yard from Tuticorin.

Could not salt be carried throughout the year?—No. Weather conditions will be unfavourable.

Was really any effort made to carry the salt by railway? Was any concession given by the railway?—Yes. We are compelled to rush salt to the West Coast as great delays occur in the present method of transporting salt by sailing schooners. The railway also gives us concession rates. The concession rate on the railway is, however, much higher than the contractor's rate by sea. Also railway stations are at a distance from yards especially the yards south of Tirur and north of Mangalore. Therefore additional charges are always incurred in conveying salt from the railway stations to the yards.

Supposing some depot is constructed, where is the difficulty?—A depot no doubt will help us to store a large quantity of salt, but will not alter the financial position. Railway transport is more costly than sea transport and the railway does not serve all the yards. There are yards about 50 miles away from the nearest railway station.

I suppose you have been using this trawler for making research in connexion with pearl fisheries? For how long have you employed her on this work?—The trawler has been used for only one month on pearl fishery research.

Khan Bahadur Abdul Razack Sahib Bahadur: What is the capacity of the present trawler?—I suppose you mean the tonnage capacity. That is about 200 tons besides its capacity for carrying coal and water.

Is any provision made in the trawler for refrigeration?—No.

Do you consider that is necessary?—Yes.

Do you think there is any necessity for central cold storage in centres like Madras, that is, at the base of operation of this trawler?—Yes. Cold storage facilities will be of great assistance; they are indispensable in the development of an efficient deep sea fishery. Tons of fish that will be captured could then be stored without risk of spoilage in cold storages and distributed to the markets according to demand. Cold storages thus provide for an even distribution of fish and will enable the fishing companies to obtain satisfactory prices.

What type of cold storage would you propose?—At present cold storages could be established in connection with ice factories. There are small cold chambers in Madras and in Calicut but larger accommodation will be required when deep sea fishing develops.

Mr. Tampoe: If you want to do trawling or research work, I understand that a certain amount of interval is necessary for working and that salt transport was a necessary and indispensable occupation to engage in

during the interval. Is this so?—Yes. Though the main work of the trawler is research, research cannot be done continuously. There must be necessary intervals. Also research of this nature is likely to occupy several years. I therefore consider that it is an advantage financially and otherwise to engage the trawler in salt transport and other work provided such work does not interfere with her main duties.

The Chairman: What are the qualification of Captain Cribb?—Captain Cribb is an experienced North Sea fisherman. He has, of course, had no academic education. As a Master Fisherman, he understands everything connected with fishing. He is the most competent officer to introduce reforms in fishing boats and gear. For biological and scientific work a thoroughly qualified biologist is needed.

Mr. Tampoe: With regard to fish trawling what is your average catch for a night?—I have not worked it out. It depends upon several conditions.

Will it be a ton of fish?—The trawler has caught a ton of fish within about four hours at times.

What do you think would be the effect on the prices of fish if all on a sudden a ton of fish is put on the market?—There will be a slump in the market. The transport facility and trade organization necessary for the speedy distribution of that quantity of fish does not at present exist.

So that marketing is a big problem?—Yes and a very important one for the development of sea fisheries.

Do the fishermen going in ordinary boats salt the fish?—As a rule they do not.

If they do not, they become poorer. In spite of it they have never taken to salting?—The fishing boats are only catamarans and canoes with no accommodation for salting or storage of fish. If large quantities of fish are caught, the boats return all the quicker to port and land the fish where salting is undertaken by the fisherfolk or by professional curers. This is the system in vogue at present.

So there is no appreciative market?—No.

If there is no market you cannot blame him?—No.

Do you know whether there is fishing at Narasapur?—I do not know Narasapur.

The Chairman: Is it a fact that fish-curing yards brought in large profits some years ago?—I do not think this was ever the case. The yards may have been self-supporting. I cannot see how they could produce large profits. The system of accounts kept in those early days were defective in many ways and did not bring out the actual financial condition of the yards. There is, however, ample evidence that Government lost heavily on the score of the yards in more recent years. The manner in which the issue price was fixed in those days is not known.

(*Mr. Tampoe* interrupting said that it was fixed on the basis of prime cost.)

Dr. Sundara Raj (continuing): The present issue price of Rs. 1-4-0 a maund was fixed in order to make the fish-curing yards self-supporting. In 1923 when the issue price of salt was only 10 annas the expenditure on fish-curing yards was double the receipts from the sale of salt. The Government, therefore, doubled the sale price of salt so as to cover the entire expenditure involved. The original rate of 10 annas and the present rate of Rs. 1-4-0 were intended to include cost of purchase and transport of salt as well as the expenditure on buildings and staff employed for the distribution of duty free salt.

How is the cost arrived at by the Salt Department?—I do not know. There is the labour involved in working the pans, there is the land rent and there are factory officers to be paid. All these, I have no doubt, will count in estimating the cost.

Is there any basis as to whether this 3-anna rate is correct?—I cannot say. By public tender at Tuticorin I have been able to purchase salt sometimes at 6 pies but this is waste powdery salt for which I am told there is no market. The loss to imperial revenue on the score of the grant of duty free salt to fish-curing yards in the Madras Presidency roughly amount Rs. 3½ lakhs.

Mr. Tampoe: The manufactured price of salt is different from the issue price. Supposing the vendor supplies you salt, may I know at what rate you purchase from the vendor?—I have been able to buy salt at Tuticorin from 6 pies to 12 pies a maund. At present we pay As. 1-3 per maund owing to the dearth of salt at Tuticorin. Before trawler transport commenced, the average cost of transport alone was 12 annas per maund. After the trawler undertook the transport, we have been able to reduce the transport charges considerably. On a rough estimate the purchase and transport of salt together amount only to about 10 annas per maund. If the establishment charges were added, the cost will amount roughly to As. 10-9 per maund. There are, therefore, grounds for reducing the issue price of salt but the reduction is not feasible unless the trawler undertakes salt transport. The enhanced issue price of salt has caused hardship to the trade.

You are not affording any facilities on the East Coast to fishermen to take to this industry?—No. The present rate of issue price brings the cost of salt in the yards very near that of the duty-paid salt in the bazaar on the East Coast. Therefore no real advantage is offered to curers to come to the East Coast yards.

How does Bombay salt compare with East Coast salt and is it cheap?—The Bombay salt is dark in colour and has an admixture of 7 or 10 per cent dirt. Even though that salt is a little cheaper than Madras salt, the West Coast curers prefer the white Madras salt and are prepared to pay a higher price. They have been accustomed to cleaner salt for some years now and they consider that fish cured with dirty salt will not fetch good prices.

The Chairman: You want this Committee to recommend a reduction in salt duty to 12 annas per maund?—Yes. I believe there are sound reasons, financial and otherwise, for such reduction.

Why have not Government started more fish-curing yards on the East Coast?—The fishermen on the East Coast are decidedly poorer than on the West Coast. A single yard on the West Coast consumes annually nearly the whole of the salt supplied to all the East Coast yards in a year. Many yards on the East Coast have been closed for want of transaction. The matter, however, is worthy of further investigation.

Messrs. VENKATARATNAM and SATYARAJU.

Oral Evidence.

To the Chairman: (Mr. Satyaraju) We are fishermen by caste. There are ten or fifteen villages where our castemen are living near the mouth of the river Godavari. Vadlarevu, Bandamur lanka, Rameswaram, Katrevu-padu lanka, Rabbanpalli, are some of those villages near the sea shore. Only fishermen live in these villages and there will be 4,000 fishermen in all these villages. Vadlarevu is my own village. There are four hundred fishermen's houses and two thousand fishermen living in that locality. There are about fifty boats in the village. For every eight houses there may be one boat. Poverty is the cause for there not being more number of boats. There will be work for all in the months of July, August and September each year.

Mr. Venkataratnam: From December to March we get big fish. In August and September only small fishes are available.

Mr. Satyaraju: In each boat four people go about with nets. We use drift nets. Its length is generally a mile. We go only two miles from the shore. The depth there will be 10 to 20 fathoms. We set about at 3 p.m. We return at 7 a.m. the next morning and there will be two catches in the interval. We sell the fish on the sea shore, where the purchasers will be waiting, by auction. The whole lot will be put into auction at one stretch. Ordinarily the value may range from Rs. 3 to Rs. 15. We sail along the sea shore even fifty miles. We go along the coast to Antharvasi and even Bandar and even as far as Nizampatnam. We take meals in the boat and prepare the same there. We go on selling fish along the coastal villages. People have not the equipment to catch fish but there is plenty of fish in the sea. People are poor not because they cannot make their living but because they have very poor equipments. For generations we have been using the same kind of nets and the same kind of boats.

Mr. Venkataratnam: We do not know of the existence of a department like that of the Fisheries Department. If this department can help the poor fisherfolk they will be only too grateful for it. The department can establish a place where they can lend boats and nets and demonstrate new methods of catching fish. If they only do this, it will be a source of livelihood for very many. We do not have fish-curing yards in our side. Naupada, Penuguduru, Managanapudi, are some of the fishing villages along the coast. Though the Government have not helped us we know curing fish with salt; we cut it, put salt in it and dry it.

Mr. Satyaraju: As soon as the fish reaches the shore we cut open the fishes, fill them with salt and dry them in the sun. We purchase salt from the bazaar. We purchase it at 12 annas per maund. We will gladly purchase salt from the Government if they will give it at quarter anna per pound. For four months in a year we will have work. Our earnings are not enough to keep us on for the whole year. Even if there is sufficient catch people live only hand to mouth. Sora (shark) and Magalu (Poli-ninus) are some of the varieties we usually get. They are salted, dried and exported to Bezwada. Salted fish is sold locally also at low prices. There is also a considerable local sale. Merchants purchase from us and sell in the neighbouring villages. From the middle of July till the middle of September prawns are caught. If the Godavari river is in floods very large quantities are available. They are dried in the sun. They are sold by the baskets. Merchants take it from us to Cocanada wherefrom they ship the same to distant places. Each basket is sold from Rs. 2 to Rs. 3. If Godavari is in floods each may get Rs. 4 to Rs. 10. Our caste people as well as people of other communities purchase the fishes. Government can help us in the following ways:—(1) Establishing fish-curing yards, (2) supply of salt at cheaper rate, (3) facilities for increasing the size of our boats, (4) developing the quality of our nets and (5) financial help.

Mr. Venkataratnam: If new nets and new boats are given we can repay the loan by instalments.

Mr. Satyaraju: We were very rich people formerly. We were doing our own shipping business. For the last fifty years we have not been doing that business.

Mr. Venkataratnam: It is said that our ancestors were so rich that they measured money by handfuls and baskets and paid them in return for the purchase of cloths and other like things. With the death of the shipping business all that passed away.

Mr. Satyaraju: All that money was got by trade and not by fishing. The number of boats is diminishing to-day. The headmaster of our school is a Brahman. The second master is a man of our own caste. Carpentry and such things every one of us knows. It is only education that we want. I have no objection to your including carpentry and such things in the school.

To Mr. R. S. Nayudu: (Mr. Satyaraju) Each boat costs 300 to 350 rupees. Each boat will serve for ten years. Four people who go in the boat cook the food in the boat itself. Each boat may weigh one or two tons. If one has Rs. 100, the other Rs. 200 he will borrow for purchasing a boat. We pay interest at 18 per cent and sometimes 24 per cent. People are generally able to clear their debts. If co-operative societies will lend us we can build better boats.

Mr. Venkataratnam: A co-operative society was started in our place with a capital of Rs. 6,000. The organization failed for want of educated men to manage the business. Further, the periods were not long enough for the repayment of loans.

To Mr. Manikka Nayakar: (Mr. Satyaraju) When there are large catches we sell at low rates. If there is rain and if there are large catches we throw them in the mouth of the river without knowing their manurial value. Because the smell of the putrified fish is intolerable we cannot keep it. If we bury them in the soil and convert it into manure nobody will purchase the same. I have no objection to introduce a small machine on the lines of the Tanur Experimental Station to manufacture manure. Our fishes are sold at places 15 to 16 miles distant. They are carried on kavadis to distant places. People who live by fishing are living hand to mouth. There is a local fund school in our village and about 150 children attend the school. It is a day school intended solely for the fisherfolk.

Mr. Venkataratnam: They need not be taught anything in the art of fishing. They can themselves teach others. They only want good boats and good nets. There are people who will be in water for four or five days together. We do not know what takes place in other places with regard to fishing methods. We are perfectly willing to learn new methods of catching and preserving fish. The cost of coolie is a considerably big item and if that can be brought down by taking large quantities, the catches will fetch a better price.

Mr. Satyaraju: The fisherfolk own their own houses which are of mud walls and thatched roofs. They are very small in size. They own no lands except house-sites. When they have no work they do agricultural labour. When we are engaged in agricultural labour we won't get catches in the sea. One work will not interfere with the other. Government don't give lands to us. They are reserved for the depressed classes and ex-service men. If we are taught new professions which are more paying than this we have no objection to follow them. The shipping trade is not foreign to us. The two reasons for the loss of our shipping business are the extinction of old ports and the poverty of the people.

(The witness withdrew.)

Dr. B. S. MALLAYYA, M.L.C.

Oral Evidence.

The Chairman: I suppose the reason why the Government requested you to give evidence was that you took some interest in fish-curing yards?—Yes; and the insanitary condition of pearl fisheries, and also the supply of salt.

Will you give us your views on the matter—I saw some fish-curing yards on the West Coast, at Mangalore, in 1912, and they were very filthy and foul-smelling. I am told they have since made some improvements, but they are haphazard. The fish-curing yards were of the most primitive type; the smell inside was very bad and the fish was allowed to rot.

I am afraid some of the fish-curing yards must emit a certain amount of smell?—It need not necessarily be so. For instance, in the case of tanneries, a certain healthy condition is possible. The fish-curing yards were under the control of the Salt Department then, but I was told they were afterwards taken over by the Fisheries Department. I am told some improvements have been effected; they are replacing those briny ponds and the dirty floors by cement structure, by basins and the like. But I do not know whether they have made arrangements for the removal of the entrails of the fish and other things outside the area immediately. On no account they must be allowed to rot there and decompose. I think the District Health Officer will be a better person than a specialist in fish-curing to supervise the sanitation of these areas. He must be held responsible for their sanitary condition.

You advocate the removal of these ponds and the construction of regular yards in their place, so as to leave no room for fishermen to resort to the old insanitary measures?—Yes. I have got something to say about the women employed there. As it is, the fish-curing yards are in the hands of rich persons and middlemen and they are employing other men, not the fishermen by profession, but men of other communities.

Would it make any difference so far as the insanitary condition is concerned, so long as the object is to increase the fish food supply?—It is immaterial. Government might as well put up manufactories and run them. But you must encourage this particular community called Mogairs on the West Coast and see that they get employment. They must be taught the new methods. It will be to the good of that community as well as to trade if individuals of that community alone are employed in that trade.

What about women?—Women do not now frequent these fish-curing yards. If they are encouraged to do this work, labour will be cheaper and also you will provide work for these women who are at present idling away at home, or are tempted to take away these fish to their own homes and do the work there which will mean insanitation in the whole village. To prevent this, women must be encouraged to go and work in these yards. As a rule when epidemics start, these are the people that suffer. As regards pearl fisheries, the one which I had occasion to witness was in 1907 at Salavathurai. A lot of people congregated there and the sanitary condition was very bad. Invariably there is a shortage of drinking water and secondly the sanitary arrangements for removal of night-soil and other bad things are very inadequate in the camps. They suffer from frequent visitations of cholera. One thing that struck me was, where was the necessity for all these people to come together, and why should not Government take these oysters? You can have cold storage wagons and you will get better prices.

Dr. Sundara Raj: That will be interference with private enterprise?—If the Government is out to realize money, why should it give it to the merchants.

Dr. Sundara Raj: If it was a regular thing, it would be easier. But it is periodical and there is the difficulty of bringing in machinery. The local purchase is very limited. It is the merchants that purchase them and they come from long distances, from Northern India.

Mr. R. S. Nayudu: You will be quite satisfied if proper arrangements are made at the place where the pearl fisheries are carried on?—The people want also to try their luck. I knew of a man who paid Rs. 10 and realized Rs. 300. It must be spread over and not confined to one particular town. It is not desirable to keep these things in one place, but must be distributed over a large area. As regards the local markets for fish, the whole industry is in a very primitive condition. No scientific work is done as they do in Japan or Java. They have got better methods of catching fish. There is plenty of fish and you do not catch more. Again there are no facilities for people living inland. If the Government can devise rapid distribution by cold storage, it will be a great help to the public. It is a very valuable food and is in great demand. Under the present conditions, the inland people have to depend on cured fish or salt fish. If the Government make arrangements to distribute it into the interior it will be a great help to the public. The Government will get the benefit in the long run. I advocate spending larger sums on the department. The department must concentrate on improved methods of catching fish, and some of our fishermen should be sent to Western countries to study the improved methods of catching fish. There are special boxes and if fish is put into them it won't smell, and you can distribute them in motor-cars.

The Chairman: They say that fish sometimes become insipid if conveyed under ice?—If it is there for a long time it would get more or less hardened. I understand that fish is sent to Ootacamund under ice and that there is no complaint. The Fisheries Department might do another useful thing. There is what is called the larvicidal fish and if this kind of fish is bred in the Coom, etc., canals, it would eliminate the mosquito nuisance and consequently malaria. Six years back there was a Commission in Madras to consider measures for dealing with malaria and at the instance of that Commission this kind of fish was bred in many of the canals. Malaria became a thing of the past and there were very few deaths from it. But those operations were discontinued and malaria has again become our worst enemy. I was told that the department has a small fish-breeding station at Perambur.

Mr. Tampoe: Has the Corporation asked the Fisheries Department to renew that campaign?—I have been hammering at them, but they say that the Government should do something.

Mr. R. S. Nayudu: Is it not the work of the Public Health Department?—It may be so. I am told that in Chingleput and Vellore this campaign was conducted and there is considerable improvement in the health of those places. If it can be done in those places, why should it not be done in Madras? I should like to know whether the fisheries expert will not be able to breed them in our Coom.

Dr. Sundara Raj: They do not thrive in brackish water.

Dr. B. S. Mallayya (the witness): There are other varieties which thrive in brackish water. The Fisheries Department can do much anti-malarial work which is a useful public health work.

Dr. Sundara Raj: The Fisheries Department can only rear fish; it cannot ask the Public Health Department to take them?—It will be good if they all co-operate for the public good. Now they are going in for quinine and more quinine by growing cinchona extensively, instead of attacking the germs which are the cause of malaria at their very inception.

Mr. R. S. Nayudu: The Public Health Department ought to be sufficiently educated to go in for these things?—The municipalities.

The Public Health Department has to convince the municipalities as to the utility of this kind of work?—It has been done in Ceylon, Madras, etc. The chairmen of our municipalities are not probably enthusiastic enough to take lessons from these things.

Perhaps the Health Department has not sufficiently put the idea into the head of the chairman?—I know something about Madura. I was Health Officer of the Madura Municipality. What harm is there in putting a few fish in the many tanks there.

We have no malaria there now?—If you want to be completely free from malaria the existing side-drains should be completely filled up.

The Chairman: Do not foreign fish such as trout, salmon, etc., thrive in this country?—There are other varieties in countries which have the same temperate climate as in India.

What is the economic value of the fish?—Let it grow there and whenever you want it, you can take it by hygienic methods instead of allowing the men to wade into it with their nets.

Mr. Manikka Nayakar: What Dr. Mallayya said is a paradox to me. His main point is that the Fisheries Department must exist for the fishermen first and for all the rest next and that their profession must not be taken from them and that provision must be made for them. He complains that the crudest methods of fishing are in vogue even after the innovations made by the Fisheries Department. These two form a paradox to me. As far as I know, any profession or trade is at least three-quarters engineering in Europe. You will find that the total number of people in trades are 75 per cent engineering men. Without engineering no trade can be made efficient. In all these improved methods you find that more and more a particular method is improved, more and more the engineering profession is called in. With the increased efficiency of the Fisheries Department more and more fishermen are thrown out of employment. In the fish-curing yards only about 6 per cent are fishermen as intellectuals have to be in charge of them. Why do you think that you cannot get engineers among the fishermen? Teach them everything. This department was formed with the primary object of improving the status of the fisherfolk. There are two millions of these men living in vicarious conditions. They are now going to other professions. They are honest and have a high sense of duty. They are in great demand in the warehouses in Bombay.

With the introduction of improved methods in the fish-curing yards, the fishermen are driven out of their profession and they are seeking employment in other directions?—But they have the sea-faring instinct. It is they who fought the battles of Japan. To-morrow when India gets swaraj, when we have a navy of our own, their services would be very valuable.

What you want is a general improvement in their economic condition?—Yes.

Mr. Tampoe: Have you had occasion to see the dry fish sold in the bazaars of Madras?—I have seen it in the market in Maunadi. It is too dry. It has not the inviting appearance of the fish coming from inland. I cannot say that they are not made under hygienic conditions. Smoking varieties are good, I am told. The smoked fish looks clean whereas the other one is repulsive at sight. I am told it comes from Thondi. Much can be done to improve it.

(The witness withdrew.)

The Committee then adjourned till 11 a.m. on Tuesday, the 10th July 1928.

Tuesday, July 10th, 1928.

MADRAS.

PRESENT :

M.R.Ry. Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, Kt. (Chairman).

Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, M.L.C.

M.R.Ry. S. ARPUDASWAMI UDAYAR Avargal, M.L.C.

„ **R. S. NAYUDU Avargal.**

„ **P. V. MANIKKA NAYAKAR Avargal, B.E.**

Mr. A. McG. C. TAMPOE, I.C.S., M.L.C. (Secretary).

Dr. B. SUNDARA RAJ (Director of Fisheries) was also present.

Diwan Bahadur R. N. AROGYASWAMI MUDALIYAR, M.L.C.

Oral Evidence.

The Chairman: You were Minister of Public Health and Fisheries?—Yes.

Have you prepared any written answers?—I would suggest, if I may, that you may take up the questionnaire block by block, and I shall answer as many questions as possible. Taking up the first section, aims of the department. In general terms, the aims of the department may be said to be threefold, to conserve and develop the inland fisheries, and to similarly conserve and develop the marine fisheries, and to look after the interests of the fisherfolk. I think the first two items include research work. Within the limits possible I think these aims have been achieved. There are certain limitations which I shall refer to; the organization of the department itself was defective and wrong; it had not the right personnel. For instance, in the matter of research absolutely nothing was possible. There were no research officers worth speaking. We started some years ago with men who were not fishery experts, who had no previous fishery training. They were picked up from office managers and head clerks and people of that type, and some of them were holding appointments as Assistant Director of Fisheries. I am not blaming anybody for it. But that is how things stand at present. You do want one or two people of the non-technical kind to look after the by-activities of the department, but for the main operations of the department you ought to recruit the technical men. The Director is very severely handicapped, because he has nobody to depend on for technical work.

Have you succeeded in introducing new methods with the material at hand?—It is a very large question, firstly how far new methods were applicable, and then what new methods should be advocated that would meet the requirements of the people. For instance, there is the deep sea fisheries, but who is to do it? The fishermen are not in a position to do it. Even if they are willing they want finance. We want capitalists to undertake it. I do not think even co-operative societies would solve the problem. First, capital is required then staff and then market for sale. There are so many other connected problems which have to be thought out and solved before you talk of the introduction of new methods.

Until these accessories are provided you don't think anything like the development of the fisheries could be achieved?—Not along these lines. I suppose it is one of the functions of your Committee to report on what ought to be done so as to develop the fisheries further.

Do you consider that the fish food supply of this country has in any way been advanced by the work of this department during the last twenty years?—Certainly I think so. In the matter of inland fishery, something within the limits possible has been done. Sea fishery is a very big problem, and I do not think the department has even touched the fringe of it. As for fish food supply, there is a very great scope for the development of fish food, particularly sea fishes, because the stock of inland fish food is very limited and it is only available in certain seasons whereas sea fish is available at all seasons of the year. Fish food is certainly cheaper than other non-vegetarian foods, certainly cheaper than meat; and if more of it is available the price of it would also go down. Improved methods must be adopted and improved methods would mean capital and bringing in of experts. To some extent it may work disadvantage to the fisherfolk. But you must safeguard the interests of the fisherfolk and see that they are not driven out of existence by the capitalists coming in. It is very likely that the capitalists will be able to absorb the small fisher population and give them wages equivalent to what they are able to earn by fishing.

To induce these capitalists, is it not necessary that Government should first demonstrate on the profitable nature of this business?—I think they are working in the direction. The other problem that we have to tackle are the preservation of fish, and transport facilities. We have to devise means of preserving fish before we think of sending them to other places. I understand that within a certain limit it has been successful. I do not know exactly what has been achieved. I think the Director is severely handicapped in that matter. The problem of preservation of fish is one of research and not for the Director to deal. He has got enough of administrative work and has no time to spare for research work. I shall later on emphasize the necessity for research work. You ought to be able to demonstrate that you can transport fish without ruining it. That ought to be done by the Government.

The Chairman: Have you any idea as to how fish is carried in other countries?—Refrigeration is one of the methods. But it is not easy in our climate. Fish that is caught in Norway and Sweden need very little refrigeration.

Suppose we ask the railways to construct one or two carriages to be used for the transport of fish from Madras?—That must be in course of time when the need develops. It is a technical matter in which I do not like to get beyond my depths. Something of the sort ought to be done. There is one thing I wanted to suggest in this connexion. If you went into the big markets in the Western countries you have always got a cold-storage room where after the articles are sold in the day they are kept in. For instance, beef, pork, etc., are exposed during the day and taken into the cold-storage chambers during the night. What is not sold is preserved inside safely. Sometimes you get a large surplus of fish which fishermen cannot get off their hands and these are preserved inside. If you can find room where these people can keep their perishable goods, it will be excellent.

Mr. Manikka Nayakar: The maintenance of such a room in this climate is costly?—But it is worth while to have it.

Mr. Tampoe: There is a place like that in Colombo?—There may be a room like that in the Moore Market for storing these. I think the Government must come to the help of the people in this direction. I think the Government going in for large-scale business, you need not have such rooms. If you are not have not been tapped at all. The fishermen are quite happy with their catamarans and old nets.

Khan Bahadur Abdul Razack Sahib Bahadur: Should the Government do all these things?—Certainly. You cannot have business without our expert sort of commercial concern. It is a rotten arrangement—the Government as a start must pay its way. Otherwise Government would not give a pie. I think that system is absolutely rotten and that the Fisheries Department must consider itself like an Education Department in its own way. You have got to do the pioneering work.

Mr. Tampoe: That point of view has been accepted?—I am very happy to hear that. I was fighting and fighting for it.

Dr. Sundara Raj: The Royal Commission has recommended it.

Mr. R. S. Naguda: Fisheries is an industry which ought to be nationalized?—It is a very big term. I do not know what you say.

I mean that any improvement that ought to be done should not be left in the hands of the capitalists, but should be done by the Government itself and worked as a sort of relief work?—I am not an advanced socialist of that type. I do not believe in nationalization of industries or railways. It would not be right to expect the State to do everything. The State ought to do the pioneering work and then the capitalists or anybody else may take it.

Food supply is the concern of the Government and if it is left in the hands of the capitalists, they will surely exploit the people?—Government does not take it as part of its duty to supply people with food at ordinary times. We ought to devise a system by which it would be possible to do without the middlemen. The capitalists are not middlemen. They have their own place in society. In these matters the Government ought to do the pioneering. I do not agree that the Government should do more than that.

If you leave it in the hands of the capitalists, they might corner the whole stock?—It is not possible to corner the marine industry.

As things stand now, the whole thing is in the hands of the capitalists. The Government simply does something to show that they have an interest?—It is to some extent so on account of the pecuniary condition of the fisherfolk, but I think part of the problem can be solved by means of co-operative societies. I would not agree to a broad proposition that we should not borrow from the capitalists altogether. I will refer to this question later on.

Don't you think it advisable to see that the Government takes it as its policy to keep this industry completely in its hands and develop it to such an extent as to solve the food problem once for all?—It would not be possible at all. Whatever you do, you ought to make the living of the fisherfolk easier and see that they are not driven out of their profession.

The Chairman: While you deprecate these people being handed over entirely to the capitalists, you are for doing something to prevent their exploitation by the capitalists. You do not like the idea of nationalization?—Yes.

Mr. Arputaswami Udayar: As regards the inland fisheries, you said that it is not possible to increase the fish supply?—I said that it is possible.

It is still more possible to increase the fish supply by developing marine fisheries?—Obviously.

The fishermen should not lose their occupation?—Certainly.

Don't you think these might result in the fisherfolk losing their occupation?—I do not think that will happen. In any case the people are already there and any capitalist that goes in, must engage these people. Nobody else will go in for fishing.

Suppose for the preservation of oysters it is ordered that there should be no fishing on a particular seaboard. Would it not interfere with the occupation of the fisherfolk?—I think there is a place for pearl fisheries. The Fisheries Department by notification prevents people from catching fish on particular banks. We will deal with it later.

Under the existing law you cannot prevent sea-fishing. I agree that just like our agriculturists, these people also are conservatives and do not appreciate any innovation. As in agriculture, these people will probably use the improved nets and other things if their usefulness is demonstrated to them.

Therefore you advocate provision being made for a number of demonstrations?—The details are for the department to work out. But certainly the Government ought to carry on the experiments and demonstrate the superiority of the improved materials, etc.

Has the question of the supply of fish by improved methods been fully investigated, viz., whether the supply is adequate, etc.? I think even in the sea, certain kinds of fish appear at certain seasons and we do not know

whether the supply is inexhaustible and can be increased?—The supply is inexhaustible. I think I will refer to the question later on. But this is again a matter for investigation and study. We know very little about the habits and habitat of fishes, why they come and go. All those matters have been urged by the Director on the Government for a long time. All these things ought to be investigated. With that object the trawler was bought. I cannot speak about refrigerator and other things. I am not an expert. But I saw some months ago a statement about the possibility of increasing the transport of fish to inland places by the use of some kind of condensed gas CO₂. I have been advocating research work in this direction. I think that Dr. Sundara Raj is already working in this direction but for want of assistance he has not done enough. These ought to be investigated. There is a great demand for fish food in some months of the year; you cannot get even inland fish. Nothing else than a variety of small fish which no human being would take is available. We want to collect a lot of information about fish grounds and things like that. That is one of the objects with which the trawler was bought. That work has yet to be done.

SECTION IV

I do not think I will be able to give any statistical information. We have got a trawler by name "Lady Goschen" and two boats at Tuticorin. I do not think the boats at Tuticorin are useful for fishing at all.

The Chairman: Is any retrenchment on these vessels possible?—I think it is the other way about. The trawler has not got enough establishment.

Is it possible to dispense with some of these vessels altogether?—Some are dispensing with themselves. I think one has been condemned already.

Do you need all of them?—We need one at Tuticorin for patrolling purposes.

Did you receive any report during your time about research work done by this trawler?—It did not do very much. It has an unfortunate history. It took a long time to get it repaired. Before my resignation I think I saw three or four reports about its working. It did not do any research work. It only trawled and caught fish so as to see what fish exists and where it exists. Captain Cribb was able to locate the position of certain banks which they did not know before.

What about the use of this vessel for the transport of salt?—I hope you have seen the file on it.

Don't you consider that the transport of salt is legitimate?—I would not put it that way at all. I think I will have to trace its history from the very beginning. I would not give a direct reply to that question. I will put it in my own way. The first point is that the fishermen on the West Coast are entitled to salt duty-free and at the cheapest possible rate. In fact, I should think that independently of the law, they ought to have the salt free of all charges. If that is not possible, the present practice . . .

What do you mean by 'absolutely free'?—I will explain myself. The salt monopoly is more or less a recent matter. The monopoly was begun in about 1850. Before that, the fishermen were using earth salt for fish-curing purposes and they did not pay anything for it. Even after the salt monopoly was established and there were salt pans on the West Coast, the taking of earth salt for fish-curing purposes was not stopped. Then, of course, the Salt Department complained that earth salt was being manufactured illicitly and that it was likely to affect salt revenue. On this the Government increased its establishment there and throttled this business altogether. The next stage and the worst stage was reached when the Government abolished all the salt pans on the West Coast. I do not know when this was done. For their own convenience the Government of India abolished the salt pans and that is why they have to go to Tuticorin now.

Mr. Arpudaswami Udayar: The salt pans on the West Coast were not as remunerative as those on the East Coast?—I do not know that. When the fishermen were deprived of the opportunity of using earth salt they were not able to get salt locally. If you use black salt it can easily get out of the fish-curing yards and it cannot be recognized. Nobody sells white salt in the bazaar. Local merchants get it from the Bombay Presidency.

Will you advocate the establishment of fish-curing yards on the East Coast?—We have got several; but I think there is demand for more.

So far as I know, there is no fish-curing yard in East Godavari, West Godavari and Kistna?—But there are a good number of fish-curing yards on the East Coast. I certainly admit there is room for more. Even on the West Coast there is demand for more. But there is the trouble of meeting the expenditure. There is a constant trouble for finance even under the present conditions.

Mr. Arpudaswami Udayar: Would you advocate the establishment of more fish-curing yards?—There is room for more and we get requisition from people constantly. But the present system is certainly not popular with the people. They are grouching and are forced to come in. They no doubt ask for more. Some of them are ignorant of the conditions. As people are now grouching they may grouse everywhere. If we can reduce the issue price of salt one of the results will be to increase the production of salt fish. I have no doubt about it. I suppose it will benefit the consumer and the middleman. I suppose it will benefit the curer also. At present the curer is rather at a disadvantage sometimes. He has to come in and pay any price that you charge. He has no other go; otherwise the fish will be spoiled. If you reduce the issue price possibly it will result in cheapening the price of salt fish. It will increase inland and export trade. You may compete more favourably in Ceylon markets. In most inland villages there is no decent salted fish available. You get only dirty stuff.

Can fish-curing yards be cheapened?—Some time ago I went into the question. I think you cannot really reduce the establishment. I think the present establishment is not sufficient. The difficulty no doubt exists in many departments. It is a matter of internal arrangement and even there there is the dead wall of finance. The net cost of the organization is very small. The present arrangements do not provide even for promotion. It is all rotten. In fact I think we are incurring less expenditure than the Government of India was incurring. I do not think these yards require any improvements. Improvements are being done gradually. I do not force improvements on these people. Fish-curers come in gradually and accept putting up sanitary sheds. But there is one thing. The cesses levied from the fish-curer should pass through the Fisheries Department. I do not think there is any objection to that.

Mr. R. S. Nayudu: Do you agree that there are very few fish-curing yards south of Madras?—I do not exactly remember.

You are for more fish-curing yards?—It will depend upon the demand. There is the difficulty of transporting salt. They live in places which are inaccessible. You cannot even get a handy to many of these places and you will have to cross rivers and vast expanses of sandy areas. The cost of transport will be much and it is very likely that the issue price will go up.

Mr. Arpudaswami Udayar: Apart from the use of trawler for cheapening the issue price can you suggest any other method?—Try salt pans on the West Coast.

Mr. Tampoe: Have you any idea as to the cost of the salt in proportion to the cost of the finished product?—I remember that it is something insignificant. There was some multiplication, some addition and some subtraction and some jugglery. On the whole my idea is that it would not matter if you increase or decrease the cost.

Will you be surprised that it is only 14 per cent?—The point is that whatever it is I will advocate it. I consider the present price is iniquitous. Any reduction will be welcome.

The Chairman: How far do the canneries serve the purpose?—You must have seen the history of the whole case. It was started of course in pre-war days. Sir Frederick Nicholson was a very humble and estimable person and he worked the whole thing. Of course he was an amateur. The whole thing was under amateur management and he did very good work. Several of his ventures have been wonderfully successful and have been taken up by private people. In this particular case also with the poor equipment available and with his own limited knowledge he did very well. During the

whole of the War the fish cannery was earning large profits. Government never said anything so long as profits were given. After the war was over the import of outside stuff started coming in. Our stuff was suffering from very many difficulties. The manufacture was going on on a very large scale. We could not sell. Our buyers were the War Department. After the war their tastes changed. So they would not buy this. We had not established a ready market in the country already. The result was that the huge number of tins that were manufactured were lying idle and could not be sold and we had to write off a good many of these tins because they were getting spoiled. Some of them were made bad as what happens in the early stages of every enterprise. The tins were not properly closed so that air was going in and coming out and so owing to defective manufacture, excessive manufacture and owing to the fact that we had not already established a market these things remained unsold and we had to write off a lot. So the question came up for consideration whether the cannery should be kept up or not and for the time they passed orders to suspend operations of manufacture. I think it was in 1924. Since then it has remained in that stage. In the meantime Sir Frederick Nicholson went away and Dr. Sundara Raj came in and we had the Director going into the whole question and he sent some reports. Sir Frederick was also asked to report and I daresay you have seen his note. In that note he recommended many things. He said that he believed that there was no reason why the cannery should not be a successful venture here with certain improvements he suggested. One of the improvements suggested was that the size of the tins should be small. He suggested improvements in packing. It was on account of the loose packing that the stuff got powdered. The defect in manufacture led to blows and the spoiling of tins. All this was put against the concern. These are not recurring items of expenditure. These were avoidable. Dr. Sundara Raj showed another defect, namely, the thickness of the tins. Further, most of the tins were manufactured without tin openers. You had to get a hammer and open it. These are defects which could be cured. Another thing that Dr. Sundara Raj pointed out was that under the present stores rules you have to purchase them from particular stores. Local purchase is not permitted and permitted only under certain conditions. On account of the stores rules the cost of the tins themselves came to much more than what was necessary. If the Director had the local option he could reduce the cost of tin plates considerably. If even these improvements were carried out you could manufacture the tins at competitive prices with the articles imported from the west. One thing ought to be obvious I think. The objection raised on financial grounds would not stand if these improvements were carried out and secondly the proposal to commercialising the thing is a bad arrangement. How is the money spent on pioneering to be put? Why should it be put permanently on the capital cost and condemned for ever? It is most unfair.

The Chairman : It is Sir Charles's fad.

The witness : It is an absurd arrangement. You cannot expect it to pay from the very beginning and until it establishes itself. There is another aspect of the matter which I think I would press even if it is out of the competence of this Committee. Why should you not tax the imports heavily, at least to the extent necessary? If you are to start the canning industry you can never do it without the tariff wall to protect you. It is an article of consumption of the well-to-do classes and I do not see why you should not do it. I am putting that suggestion to you more as a general proposition. It applies to every other industry of the department. Any industry in this country has to face fierce competition from rich firms in the west that are able to destroy anything you start here by under-selling if necessary. To say that fish-canning industry cannot be started here is absurd. That is not a thing which any self-governing country would do. If America wanted to start a fish-canning industry in that country surely it will put a protective tariff against England, Norway and other countries. I do not see why we should not do it here. I mention it here as a proposition which is of fairly wide application. We are asked to start industries and want that they must produce profit. I have not known any pioneer industry producing profit and successfully standing competition. It is only possible to grow up behind a protective tariff wall. England has all the advantages in respect of the

iron industry as ores, coal and climate and yet America succeeded because of the tariff. I put this forward as a proposition for general application. You cannot start a new venture without having the power of levying a protective tariff. A cannery was started at Mahé and it collapsed. This country is a grave of new industries started. The shipping industry has gone to the devil. It is absurd to put forward the two propositions that it should be treated as a commercial venture and that it should not have a protective tariff. It is impossible to start any new industry in the present state of things.

The Chairman : Let us return to 1924. What happened then?—Further production was stopped and there was only one man to clean up the plants and keep the things tidy. The other man is looking after some other work. Sir Frederick then recommended that the cannery should be restarted and manufacture should be begun again. It was settled and agreed that Sir Frederick was to take up all these industries. Since he came back his eye-sight was failing and he was not willing to take them up. Then of course the whole thing changed and the angle of vision also changed. The old attitude came up that no more manufacture should be continued. I struggled and struggled and did not succeed. Even in the last budget I fought for a small amount. After all it was a demand for Rs. 3,000.

The Chairman : Previous to the closing of practical work there was loss in the working?—The statement of loss and other things were all made up. The total loss for the last ten years comes to Rs. 3,000. Is that a loss, is that a tremendous loss that the Government cannot stand and should go to the extent of closing the whole thing? Up to date it was earning large profits. The net loss for the whole period was Rs. 3,000.

The Chairman : The account was on a peculiar basis?—Every rotten building that was put up and demolished was added to the capital. I wonder how any business can be expected to continue under such conditions. It was an experimental building. The whole thing was pell mell without any kind of plan or arrangement, stores on one side, examination room the other side, packing room somewhere. There was no order or arrangement. Apparently he developed things from very small beginnings. Then he added block after block. The whole of this experimental arrangement was added to the capital cost.

So that you don't think that it really suffered any loss worth mentioning?—Unless you consider Rs. 3,000 such a terrible loss that ought to stagger a Government, there was no loss.

Even that you say is due to the wonderful accounting?—Rs. 3,000 is the loss for the past ten years.

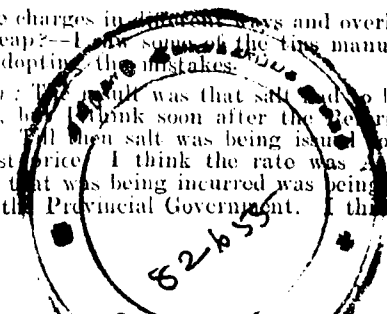
Now you think that it is an experiment worth considering?—Certainly.

You think that it will be of sufficient educative value?—There are also several connected problems to be solved. Sir Frederick says that our sardines were too bony. That is a problem that could be solved by experts by the addition of some acids. There ought to be no trouble on that account. The cost of softening must be trifling. Then with regard to packing we don't classify. The whole thing is put into one. You have no right to compare this with the western stuff because it is not manufactured in the same way. I think about twenty lakhs of these tins are imported every year for the whole of India and five-eighths of it comes to this Presidency. Further it will be a training centre.

Have you come across any enterprise started by the men trained?—The cannery at Mahé collapsed, I think. It was started by Messrs. Wilson & Co. It was impossible to establish factories by the men trained when we Government were not able to establish it.

Government have charges in different ways and overhead charges. Private people will do it cheap?—I saw some of the tins manufactured at Mahé and they were merely adopting the mistakes.

To the Chairman : The result was that salt had to be imported. I do not know in what year, but I think soon after the 1920s—fisheries became a transferred subject. Till then salt was being issued to fishermen in the fish-curing yards at cost price. I think the rate was Rs. 10 per maund then. All the expenditure that was being incurred was being shared by the Government of India and the Provincial Government. I think they were incurring



every year excess expenditure of nearly 1.6 lakhs of rupees. The Government of India were bearing about 90 per cent and the Provincial Governments 10 per cent. I am speaking from memory. When "Fisheries" became a transferred subject, the Government of India said they did not see any reason why they should incur such a large expenditure for the maintenance of fish-curing yards, and seeing that salt was supplied free of duty they said they would not bear any portion of expenditure and they passed orders that fish-curing yards should be self-supporting. That could not be done without increasing the issue price of salt from As. 10 to Rs. 1-4-0. I have advocated that the present issue price of salt ought to be reduced to As. 13 or possibly less. It can only be done if you use the trawler for that purpose, because by the methods adopted for transport of salt by schooners the cost became very high. By using the trawler Dr. Sundara Raj expected to be able to save something like Rs. 70,000 on the salt transport alone, and thereby that amount could be utilized for the people in the way of reduction in the price of salt. The Government have no right to fix the price of salt at Rs. 1-4-0 seeing that a large number of fishermen who were using the salt at a much lower price were deprived of that right.

They deprived all the people of that right?—I said that the amount of loss which the Government would be undergoing by supplying salt at a lower price to a particular section of people would be very small and that in the interests of these poor fishermen they must be prepared to shell out some money.

But there are limitations even to that?—We are not going to spend some millions.

How does it make any difference on principle?—The principle is that these people enjoyed certain right and if you take off that right it seriously affects their position. Of course you cannot take my statement as universally applicable. In this particular case you are helping an industry and Government must give some concession. I think the salt that is used for textile purposes is absolutely free of duty. Now by your artificial increase in the price of salt you are indirectly forcing them to get their salt from Tuticorin. They also abolished the salt pans on the West Coast.

From the fact they thought fit to close salt pans, it is clear that consumption of salt in India is not met from salt manufactured in India alone?—Yes, I saw the figures only recently. The figures are quite tangible.

Supposing you ask the Government to open some salt pans on the West Coast it will be met by the argument that they never made any profit at all?—That argument they apply to everything. Then as regards the equipment of trawler I wish to say something. It should be made absolutely useful. After catching the fish, the fishes would be spoiled before the trawler comes back to the shore if we had no refrigerating plant. There must also be accommodation for crew and other things. So I say the trawler should be better equipped by providing refrigerating plant, holes for fish and also cabin accommodation for officers. As for persons being trained under the present officer who is in charge of the trawler, he has not got enough staff. As regards investigations and possibilities of development of marine fisheries, there remains a very great deal more to be done. Ordinarily these fishermen do not go beyond one mile in the sea for fishing. Probably in the West Coast they go beyond one mile. Here they go hardly one mile and put their nets. I have not measured the length of their ropes. Certainly these ropes will not be more than a mile from the shore.

To Mr. R. S. Nayudu : For the present I think that part of the trawler's duty is transport of salt. Unless and until you have cheaper means of conveyance of salt I certainly advocate that the trawler should be used for transport of salt. By using the trawler for transport of salt we will be able to give salt to fishermen at As. 13.

So the benefit that you derive from using the trawler is not very commensurate with the expenditure incurred upon its maintenance?—I do not think you will have to look at it from that standpoint. The expenditure is necessary; that expenditure is quite consistent with the benefit that we derive.

On the East Coast south of Madras up to Tuticorin there is very little or no activity of the Fisheries Department. Is it true?—I think it is true. I think they should extend the area of their operations to the East Coast. We have already submitted proposals to the Government but they pleaded as usual that their present state of finances would not permit them to take up such activities.

You know that on the East Coast there is a good deal of market for fish?—I should think so. It is capable of large development.

At present the supply is not at all sufficient for the demand. You are aware of that?—I should think so.

To Mr. Arpudawami Udayar : The trawler was used for fishing as well as for carrying salt. It towed salt schooners from Tuticorin to other places on the West Coast. There are one or two schooners at Calicut. We take those schooners to other ports and on the way back the trawler does fishing work. In that way it does both the duties, without interference to its legitimate work. If the present trawler is properly equipped it will be able to do the work which it is intended to do. The cost of equipping it fully would come to about Rs. 40,000.

To Mr. Tampoe : The total quantity of salt used in the fish-curing yards on the West Coast is two lakhs and odd maunds. I do not know exactly the exact quantity of salt that the trawler can carry per trip, but I suppose that eight trips will be sufficient for the purpose of supplying salt to the fish-curing yards. For about 24 days it has to be engaged in the transport of salt. With regard to the various boats at the disposal of the Fisheries Department, I have seen the Sea Scout when the sea was not very rough. But I cannot say exactly whether such boats will be useful for this particular kind of work.

V. FISH-CURING YARDS.

To the Chairman : The remedy that I suggested that the present trawler should be used for carrying salt and that the saving effected thereby should go to the benefit of fishermen in the way of reducing the issue price of salt is not a permanent remedy. I suggested once that salt pans should be opened on the West Coast. I do not see any reason why they should not be started on the West Coast. It is said that on the West Coast there is heavy rainfall and therefore it would not be suitable for opening salt pans there. After the end of August there is very little rain in many of these places. I do not think that argument will stand. As regards the argument that the salt manufactured on the East Coast is of a better quality and that manufactured on the West Coast is of an inferior variety and that it would not pay us, I think we can get over that difficulty. Personally I cannot see any obvious difficulty in manufacturing as good a salt on the West Coast as on the East Coast.

Mr. Tampoe (interrupting) : It depends upon the bran and the atmosphere in which the salt is manufactured.

Mr. Arogyaswami Mudaliar (continuing) : Conditions outside the rainy season are almost the same. I do not see much difference between the climate of Madras and that of Calicut. I have served in those parts. I believe they have got salt pans in North Kanara. Personally I think you can very well create salt pans in those parts.

As I said Sir Frederick Nicholson recommended that the cannery should deal not only with canning fish but should also manufacture fish meal and fish powder. He said that this was being done in Japan and so he advocated that it should be part of our operation at the Fish Cannery at Chaliyam.

Do you agree with those recommendations?—Most emphatically. What else is the department for? We have got the Tanur station where demonstration work is carried on and fish manures and bone meal and such things are manufactured.

Is it possible to combine these two stations?—I have not thought about it. We ought to have some sort of central institute where we could train students and also carry on research work. A sort of workshop should be attached to the education institutions. Madras commands certain obvious

advantages, and I should recommend the location of such an institute in Madras, independent of the Tanur and Chaliyam institutes. For manufacture purposes, Calicut would be a better place.

Would you remove Chaliyam Cannery to Calicut?—No. We cannot go in for additional expenditure. My idea of a training institute is very different. I would not interfere with Chaliyam Cannery. It must continue to do its work.

Mr. R. S. Nayudu : With the greater development of the goods Chaliyam Cannery would have been a successful concern?—Mere development would have been of no use; there are other difficulties.

The existence of a factory and the manufacture of goods were not known to the public so well as it ought to?—I do not think that was the real difficulty. Advertisement might have been on better lines. But what mattered was the selling price as also the quality of these things.

If they advertised a little more than there would have been greater sale?—We never suffered from want of advertisement. We had special selling agents going about canvassing orders.

Do you know that in Madura the price of prawns went up? If there is sufficient advertisement there will be a very large market?—We have no difficulty about prawns; we cannot get enough to sell.

Mr. Manikka Nayakar : Are you in favour of leasing out the Chaliyam business?—I won't do it. It must be a training centre; that is its primary object. Our cannery has been very well advertised. It has been damned like anything.

Mr. Arpudawami Udayar : As regards question No. 69, I think our customers are chiefly inhabitants of Burma and Malay States?—I won't put it that way. We have customers here. Arni was good enough to buy the whole lot; they never bothered about quality. There are differences between local sardines and the imported ones. Ours is not a carefully selected thing; it is a regular mix up. You have got the old sardines and the new ones put together. Our sardine is very bony because we have not succeeded in softening the bone.

Do you think that any firms here, like the Spencer & Co., could be prevailed upon to take our fish?—I am not quite sure of it. They are out here for assisting their own home industries. They are not here to help you. I believe our people approached the Spencer & Co., and they said they would not look at them. They might give some diplomatic reasons but at the back of it there will be other reasons. You cannot expect any help from European firms. We have got a right to claim that the imported stuff ought to be taxed. The Government of India has got the power. If the Government honestly thinks that the industry should be developed it ought to levy a protective tariff.

Mr. Manikka Nayakar : Instead of putting a tax on the huge European trade for the sake of one cannery or two and in anticipation of bringing into existence thousands of them, would it not be more advantageous to support them by a system of bounties?—The difference is this. You consider the people that pay. Bounty means increased taxation here. Very rightly they may say "We have no money."

The Chairman : Just give us your experience of Tanur?—Tanur is little better than Chaliyam. It was also started as an experiment. You don't expect very much from such ill-equipped places. It has done something very valuable considering the small size of the place and the limited scope of the operations.

In what direction?—It has established a fish guano industry on the West Coast. Sir Frederick Nicholson deserves credit for the fish guano and the oil industry. The initial work was done by him at the Tanur station. Oil extraction is part of the work, but the oil is of very inferior sort. We could have solved the difficulty if we had a research man. You would remember the time when our Medical Department recommended this sardine oil for cod liver oil. They found later that some vitamin was absent. This I believe was due to the defect in the process of manufacture. It is a point for the research man.

Besides this question of oil, what else was done?—Various kinds of fish meal, smoke fish and various modes of treatment of fish. They are exporting a certain amount of fish bone. If they could manufacture on a big scale, there would be a good sale. As I said, Tanur station is a very small one for research purposes. I should advocate a big institute in Madras where you can carry out research work, keeping a small assistant, if necessary, at Tanur. We have got a man there who is a chemistry graduate, but by no means the chemist suitable for industry purposes. He must be a bio-chemist.

So, these are the four activities of the department?—They are doing a number of little things, fish meal, curing fish, etc. As for fish meal, there are a number of chemical problems to be solved.

Can you tell us why the institute was started at Tanur?—It was possibly one of the biggest fishing villages on the West Coast.

Are there any complaints and troubles about this institution from other departments?—Other departments did not bother about this.

No suggestion to close this up?—Thank God; they never thought of it.

Mr. Arpudawami Udayar : As regards Tanur, I do not think the important thing is to get only refined oil?—If you had a real chemist, he could do many things. This research man must also be a teacher. That is why I was thinking of an institute where you can train men; it should be a place from which you can recruit men for your Fisheries Department.

I want to know whether you can get refined oil with present staff?—Absolutely impossible. The employment of an expert will tend to the acceleration of those processes which ultimately result in this oil and other things. Only experts can tackle some of those problems that are at present unsolved and lead the way to other industries.

You advocate that apprentices should be trained by them so that in course of time they might take up and continue the work left by them?—I will call for students for training just as they do in the Agricultural College. It will be the recruiting ground for future managers of industries. It is not worth transferring the Tanur Experimental Station to Calicut at present in its present condition.

I think I might state my opinion about the inland fisheries briefly. We have not very much in the way of inland fisheries. Our area of operation is itself very limited. I think we are doing something in connexion with rivers in Tanjore, the Nilgiris, Chingleput and Nellore. They are not actually doing very much in the way of fish-stocking. They have not got adequate establishment. They have a few breeding stations and at certain seasons they transfer the little fish. These inland fisheries are capable of further development. If we can stock the tanks that do not get dry in summer with these fishes, that would be excellent. But there again the trouble is that we look at it from a commercial point of view. In spite of its being treated as a commercial business, the inland fisheries would leave a margin. We do not take into account the lease amount. It comes to the Government. The amount is settled with the local boards. The balance left after meeting these payments is shown as profit.

Are these licensing fees a proper item of receipts?—The only thing to be said for it is that it has gone on for a very long time. I really think that we have no right to put any check on the catch of fish in inland waters. The Government no doubt have got a right to auction the lease of a tank built by them, but most of these are old works. Nobody made the rivers and streams. In no country in the world are there anything like fishery leases. They are generally considered to be open to the public. The law itself is very uncertain about it. I think we are trying to make it certain (laughter). Apart from the question of the law, I should prefer to abolish the whole fees; but the difficulty is this. If you do not have an establishment to supervise, it is very likely that the food supply will go down. People will be reckless and waters will be depleted and nobody will look after them. They will fish up even the sponge. In that way it would not be an advantage to the country. But weighing the advantages and disadvantages, I really think, looking at what obtains in countries which are called civilized, there is very little legal justification for the present procedure. The present procedure seems to have grown up gradually. It would not stand very close scrutiny. It was obvious that originally there were

no such levies. People were fishing freely. Recently there was an attempt to bring in legislation to make all fish as Government property. That did not succeed and somehow, in a sort of backdoor fashion, the habit seems to have grown up gradually. It is not universal. My answer to the question of the leasing system is that I feel that on the whole it is not altogether justified; and, considering that the amount of revenue realized from this source is only about two or three lakhs, it would not matter very much if the Government gave up this thing altogether. I do not know if it will be possible. There are difficulties.

Mr. Arpudaswami Udayar: You are for improving the inland fisheries, not so much for revenue purposes as for fish food purposes?—Yes.

What would be the cost of establishment that would be required for stocking, for improving and increasing the fish in rivers and in tanks?—I could not give the figure offhand. I believe for all the districts it would not come to very much. The establishment is a low paid one, the maximum being about Rs. 40 to Rs. 50 per month. They select the tanks which do not get dried up in summer and such tanks are very few in number.

It will be a ten months' crop?—There are various kinds of fishes stocked by the department such as the gourami, etc.

Can we grow them in Pattukkottai?—We ought to be able to grow whales in the Mettur reservoir.

Don't you think that the abandoning of the present lease system will interfere seriously with the revenue?—The local boards would grumble, but the amount in each case would be negligible.

Mr. Tampoe: Do you think stocking would be of much practical use without very strict preservation?—I think stocking would be useless without preservation.

Do you not think that the cost of the preventive staff would be expensive?—I think it is a question that can be given the same answer as that given to the question about preventive staff for excise. You can always show a threatening figure that will run to crores. If you want prohibition you want an establishment the cost of which would run up to crores and, if you want to prevent poaching of fish you require an establishment costing crores. If the village establishment—of course there are now separate compartments, reserved and unreserved—can be got to do this thing, it would be excellent. With their co-operation and with a small staff this can be done effectively and easily. Of course there is difficulty in preventing poaching in big areas. Fish can be stolen from them from any point. But I do not think that the thing can be done with the help of the village establishment. The cost of the preventive establishment which a lessee would engage would depend upon the size of the tank and the place where the lessee lives. If it is a question of preventing poaching, you will have to consider whether you can punish poaching. Some of our law officers said that we cannot punish, while others said that we can.

Mr. Manikka Nayakar: As regards marine fisheries, does the department respect existing rights?—It recognizes them.

In some of the Government Orders which enumerated the tanks to be brought under the control of the Fisheries Department, those rights were not recognized?—I am not aware of that.

My memory is fresh because I had to deal with one such case?—The existing rights have been recognized.

This question of irrigation and fisheries in some instances clash in the matter of manuring, cattle-grazing and duck-grazing. Duck-grazing necessarily interferes with fish development and the moss taken for manuring purposes takes away the small eggs of fish. The use of moss for manuring purposes is an established right in very many cases. Without that the irrigation will be a costly affair. Do you propose to recognize such rights in inland fisheries?—If such rights exist I simply recognize them.

Mr. R. S. Nayudu: Or you can purchase those rights?—There is no need. Further, they cannot be purchased. Agricultural facilities should not be purchased. Agriculture is primary and fisheries is only secondary.

Mr. Manikka Nayakar: Even if they offer to sell it must not be bought?—A civil suit would establish it.

The powerful party (the Government) should go to the court and not the ryot?—Unless the ryots prove their right, how can the Fisheries Department admit it? The Government have recognized every individual right. In Chingleput, Veceranam and other places they have recognized it.

Definite proposals with regard to the investigation of prescriptive rights must form the subject matter of the Committee?—It is for the ryot to put forward his claim and for the Director of Fisheries to recognize it.

My point is, whether agricultural considerations should not be given the primary importance and fisheries secondary?—I do not know to what particular consideration you are referring.

Grazing, manure taken from the bed of the lake, etc.?—I think that if such rights exist they must be recognized.

The Chairman: How does this question of ryots' right interfere with the activities of the department in inland fisheries?—Apart from the question raised by Mr. Manikka Nayakar, there is of course the complaint that the fisheries men open sluices and let water out. It is not possible everywhere. It is the outlook of the villagers to safeguard their sluices.

Mr. Manikka Nayakar: To avoid this trouble, do you propose leaving the Fisheries Department with the Agricultural Department or the Agricultural Department with the Fisheries Department?—It is not such a big matter. The places where we have got these difficulties are very limited. We have these difficulties on the anicuts and on great rivers but nowhere else.

IX. KINDS OF FISH.

The Chairman: Would you like to say anything at all?—Dr. Sundara Raj is the man for it.

X. PEARL FISHERIES.

To the Chairman: The important problem connected with this industry so far as my experience goes is about the occurrence of pearl oysters. At present we are fishing pearls from about 10 fathoms, but we know nothing as to where it comes from. It disappears from the banks. It must be somewhere else. As a layman, I think we can argue that the pearl oyster exists somewhere. It must exist in deep waters. The Directors of the Fisheries Department have been urging that we should investigate this problem which is part of your scientific research. Our proposed research station on the Krusadai island has not been sanctioned. That question was brought up again and again but for some reason or other the proposal fell through. Commercially pearl oyster industry is an industry which would bring the Government very good money. So the first problem is the problem of research as to the movement of pearl oysters, where it exists, whether it exists in deep waters or on the surface or on the banks and so on. In other countries such as South America and elsewhere they go very deep for fishing pearl oysters. So, obviously we must find out, instead of the pearl oysters coming on to the bank, as to where the pearl oysters exist. I do not know whether the developed oysters remain in deep waters or not. We have to examine that aspect of the matter. Therefore I would suggest to the Director of Fisheries that he should get hold of some mechanical plants for working the pearl oysters. I saw in the "Scientific American" complete plants for diving into the sea. It is a sort of bell-like thing and a man gets into it and dives deep into the sea and when he has reached the place where the pearl oysters exist he gongs that bell and the man on the surface pulls the man off from the bottom of the sea. It is very difficult to get divers and we are not getting enough of labour. We have been fishing only on the banks. Never have we been able to fish completely. So the first thing that we have to find out is where these oysters go, whether they go in deeper waters or not. So considering the difficulties of getting labour not only we want some machinery for fishing pearl oysters, but we must also have a man for doing research work because he only will be able to study the habits and habitat of the pearl oysters, and their life history, and how long they take to mature and so on. I think if all these things were done, pearl industry would be one of the most profitable industries for the Government.

We cannot afford to lease this pearl fishing business.

To Mr. Arpudaswami Udayar : Although we set apart a seaport here and a seaport there for pearl fishing, we will not be interfering with the rights of fisherfolk. There is plenty of fishing going on the pearl banks. The fishermen take to two kinds of fishing, i.e., with nets which is done close to the shore and the other with fishing boats by which they go a little far off and by angling they catch fish. A pearl oyster is about 4 inches in size and it is almost round in shape; whether they migrate or not I do not know. I went into the whole question when I was at Tuticorin. In Eastern seas and other places pearl oyster occurs in greater depths than it occurs here. My objection for leasing this pearl business is not based on the fact that if we lease it these oysters might be destroyed. At present what is done is that these pearl oysters are brought to the shore banks and from there they are auctioned. The capitalists cannot bid when the thing is lying on the shore?

XI. CHANK FISHERIES.

To the Chairman : What applies to pearl fisheries is almost applicable to chank fisheries. As for leasing out this business I do not see any reason why we should not do so so long as we are at an advantage. If we are not incurring any loss I do not see any reason why we should not lease. It is a matter between the proprietor and the Government. I do not think there is any harm in leasing the business provided the Government are able to come to some terms with the Raja of Ramnad.

XII. RESEARCH.

With regard to the question as to whether sardines and mackerels have disappeared from the West Coast, from what the Director has been writing, I think he has not enough of information. He wants more information to deal with the problem. We have got some sketchy information about these two kinds of fishes. When I went to Calicut in 1922, Mr. Ramaswami Nayudu told me that he had been studying the habits and habitat of these fishes. Now some more information should be available. But what we have got is nothing when compared to what remains to be done. We have no research establishment. We have got a paid man at Tanur. We should have at least two men to begin with. I would ask you to study the papers on the question. Not long ago Dr. Sundara Raj gave you a list of problems awaiting research. I would ask for a research chemist and another research biologist.

Is there one like fisheries biologist who would go into the question of the sea fisheries?—I think both are the same.

You will be content with a marine biologist and chemist?—My idea is something like this. I have always been thinking of starting an institution in Madras or Calicut. This would be a teaching institute and would also be a research institute. The research people would do research work and would also do some teaching work. It is on the analogy of the Agricultural College. It is one of the crying requirements of the Fisheries Department. Even our minor administrative officers have learnt fisheries after joining the department. I want this institute as a training ground for your future establishment and as a training ground for people who would like to take special branches of the fisheries industries like fish-canning, fish oil, etc. Research will be attached to this institute. It may be that small factories may be attached to this as a sort of place where the students may go to readily see the processes just as we have workshops attached to the engineering colleges.

Don't you think that there is some difference between this and the Engineering College? There the demand for men is so very large. But here after all if you train half a dozen men one year, you don't require men for another fifteen years?—You must have at least two specialists who must train the future recruits.

Can they not work in the aquarium?—Anywhere, but train men at the same time. You need not commit yourself to anything big. As the demand arises the institution may develop. The big man should be at the institute. The minor research people should be one on the trawler, one at Chaliyam, one at Tanur and so on.

Financial difficulties might arise?—Where there is a will there is a way.

The two men must have special pay?—You must pay and get them.

Do you expect to get men on less than Rs. 2,000?—I think we can.

Mr. R. S. Nayudu : What about the men working in the department? Will you send them for training?—I think it is a problematical business. I could not think of a suitable man. The kind of men you want are not the kind of men we have here. Unless it was Mr. Moses, I do not know of anybody.

Mr. Arpudaswami Udayar : Such men might be sent?—My initial objection would be this. It will mean shelving the business.

In addition to your scheme?—Specialists will train our men on temporary contracts.

The trawler men must also be brought?—In addition to Captain Cribb, you can have local men whose business will be to collect material and data for the research men. He need not do research work.

You think an Indian is enough?—Yes.

The Chairman : Do you think men are available in India?—Do you mean to say that bio-chemists do not exist outside the Fisheries Department in India?

I do not know if there are men who have done research work in fish oil, etc?—When you advertise I would make it possible for a man in India, if one is available, to be appointed. I am referring to the recent advertisement in the press about the special staff for the College of Engineering. They have so framed the conditions that it will be impossible for any Indian to apply.

Engineering is fairly well advanced. It is said that our engineers can compare very well to those of the Cooper's Hill College. I am not referring to that?—Put any condition in it. But I want to stipulate that an Indian in India if one is available must be appointed. You must not so put your conditions that it must be obvious to anybody that you are deliberately shutting up an Indian.

Can you think of any Indian?—No. There are lots of young men who have done much in bio-chemistry. Prescribe the best qualifications; but don't say that you must come from some University.

One who has done some work in fish?—Certainly it must be one of your most important conditions.

Both of them are to work at Madras?—I would not be definite about it. I should like to have it examined. But there are advantages in having them at Madras.

How many on the trawler?—I suppose you must have five. I attach a good deal of importance to the starting of a training institute because we have no recruiting ground for the establishment. Where are you to get men from? You pick out clerks and they have to look after the fisheries. It is an absurd arrangement. These people become Assistant Directors of fisheries and many of them know nothing of fisheries. My idea is to have a school or a college where year after year you turn out certain number of men who are fit to hold places in the Fisheries Department.

A college is useful where a large number of men are wanted. How will you employ them?—That is the look out of the public. Where is the work for the hundreds of lawyers that you are turning out. We leave it to the laws of supply and demand.

When you start an institution on the lines of a school or college you would naturally expect it to continue for some years, is it not?—Yes.

Even your Veterinary College was thought of being closed because there was no employment for them. For the Fisheries Department I do not think you require twenty men for thirty years?—I would not say that. Taking the total fisheries executive establishment you can arrive at some figure for annual recruitment. There may be four or five. You can find room for these. Where will you pick them up now?

If it is only four or five, will it meet your requirements?—To the extent that it would meet your requirements you may train people. I do not think of anything on the lines of the Presidency College.

Supposing thirty graduates apply?—Take them; you do the same thing in the Law College.

It becomes an institution or a college?—This is an undeveloped business. It is not only for the training of your establishment that this institution is required. You are not training anybody in the trade or industries. This will form the training ground. They may start ventures of their own. What other place is there in India where you can get such a training. There is no place in India. Consider the value of learning fishery. Take little England. The annual earning of a single fisherman employed in the fishing trade is somewhere about £70 per annum. The annual value of fisheries in England is somewhere about eight million pounds. You have not got statistics here for this as for many other things. I think this is a thing which is capable of very large improvement. This is the Presidency in India which has got the largest coast line. You have got the bulk of the coast line in this Presidency and I think there is every promise of developing our own fisheries very largely.

Mr. Arpudaswami Udayar : Has the Captain been able to do anything?—Trawler has not done anything in the way of research.

Cannot your difficulty of trained men be solved by giving scholarships for learning abroad?—I have two objections. First of all, it would not meet our immediate requirements. Secondly, the research men are wanted at once. As we are to have these men at once you may make use of them to train our future people. I do not know how scholarship system would compare financially. But where will you employ these people. Is it to employ or to afford facilities to train series of people. You cannot employ them. A man returning from England won't accept Rs. 40.

You want specialists who have undergone training in America or England?—I suggest that if there are people available now we should have them immediately.

Have you anything to say about inland fisheries?—In the matter of inland fisheries a good deal of research has to be done. The proper kind of fishes that can live in the tanks and ponds must be decided. The department had done some work. Nothing that they have done need be dropped.

Is the present staff enough?—It all depends upon your future policy. We put up a scheme for Ganjam and that was thrown down.

Will you be content with the present staff or employ more staff and ask for more money?—At present it is not a matter of very great urgency. We can wait for a few years. In the meantime the present research work can be carried on and we may be on firmer ground when we propose taking new districts. To some extent each district will present its own special problems, climatic conditions, water conditions, etc. It is a question mixed up with so many other things. I should like to proceed cautiously in the matter of the expansion of inland fisheries.

Am I right in thinking that you don't propose further extension just now?—At present very little is being done and I do not see why you should not expand slowly.

What have you to say about the aquarium?—One of the reasons why I want the technological institute to be located here is the presence of the aquarium. In New York the research centre is as much a show centre. We can show a good many things if we have accommodation. In any case we should have an aquarium if not in Vizagapatam at least in Rameswaram to study the marine biological phenomena and for seeking marine specimens. Our experts have always been advocating that place. It was proved that it would be a paying proposition. I thought the Finance Department would approve of it but they did not. Even when it is good financial venture money was not forthcoming.

Mr. Arpudaswami Udayar : Do you think the aquarium is good even for the purpose of show?—It is a very small place. For its size it is very good. It is more than self-supporting; otherwise it would have gone.

The Chairman : What about transport?—You cannot decide the question without exploring the markets. We should have more definite information about market. A sort of enquiry should be made. There are two aspects of the question—motor transport and railway transport. The motor transport will reach places twenty or thirty miles from the shore fresh without being spoiled. In the matter of railways some sort of cold storage should be introduced. In Ootacamund a good deal of fish every day is being destroyed by the health inspector.

The Chairman : How does it come there—in tin boxes or wooden boxes?—In dealwood boxes.

They also put in some ice there?—Yes.

Mr. Arpudaswami Udayar : What about communications?—Some of the fishing villages are inaccessible. The poor people have not got even enough water to drink. There must be inter-communications, connecting the fishing villages with the nearest road. Many people are not able to live there on account of lack of drinking water. It is one of your duties to go into the conditions of the fishermen.

XIV. SOCIO-ECONOMIC WORK.

The Chairman : Have you anything to say on the question of co-operation?—Something has been done. We have started a certain number of co-operative societies, but the majority of them are mere loan societies, and the borrowed amount has got to be returned within five years. This does not really help the people. You must advance loans on long terms payable in twenty years. As for education, the Fisheries Department has done something. But they have not got special text-books. There are no lessons on subjects interesting to the fisher boys.

Do you mean to say that the curriculum must be different from the ordinary schools?—No; they ought to be written in a way that would interest the fisher boys. The present elementary education does not prevent fishermen from joining the ordinary school. They have been wanting to have special text-books for a long time, but nothing has been done. One general remark I should like to make about co-operation and education. When I was in office, there was this struggle as to which department should look after this education, the Fisheries or the Education Department? I do not think it is a very important point. If the Fisheries Department is to be expanded personally, I should not object to co-operation and education being transferred to the Minister in charge of this subject. But this I should insist on, viz., the Fisheries Department should be allowed to inspect the institutions and see if the work is being conducted satisfactorily and the interests of the fisherfolk are looked after.

XV. ZOOLOGICAL SPECIMEN SUPPLY.

The Chairman : Have you anything to say on this?—The Fisheries Department are supplying zoological specimens gratis to schools, colleges, etc.

XVII. FINANCE.

The Chairman : Would you give us some idea of your experience in this matter?—The difficulties I think are fundamental. I do not know how you are going to overcome them. There are constitutional difficulties and I hold very strong opinions. I certainly object to the present system that enables the Finance Member almost to override the Minister. Of course, the Finance Member would say "He merely advises us." In practice it comes to that. Any Minister will see that. Take the case of the fish cannery at Chaliyam. The thing has been in operation, and I put up a demand for Rs. 3,000 for carrying on the work for a year. Finance says "No." It raises objection and says "Plenty of tinned fish is coming from outside; yours is not good enough." I gave him the details. I said "I can reduce the production cost; I can improve the quality; I can get a sale" and answered all his objections. But still he objects. The constitution lays down that the Governor is the arbiter. But even the Governor—I refer to the position of the Governor and the position of the Finance Member—really cannot overrule the Minister in a matter of this sort. Supposing I put up a demand for Rs. 3,000 for Chaliyam. I think the Governor has got no business to overrule it; he is bound to accept it if he is to carry out the spirit of the constitution; because it is distinctly laid down—not in the Government of India Act—it is the intention of the framers of the Act, the Joint Committee Report, the Montford Report and later on the Muddiman Report refer to the same thing; these original documents lay down that except where the consequences of acquiescence in the Minister's advice would be serious, the Governor should not overrule a Minister. The Governor himself cannot overrule a Minister. As for Finance, it is distinctly laid down

that Finance is an advisory body, it is not an overriding authority; whereas at present if Finance is anything at all, it is an overriding authority, because Finance ranges over the whole domain of administration. They have got all details of schemes. I as Minister put them up and Finance discusses them from the administrative standpoint which is entirely beyond their scope. I would ask you to deal with the question and come to some sort of conclusion as to the recommendation to be made, and as to the relationship that should subsist between the Minister in charge and Finance.

The Chairman: It is a vital constitutional position. The Simon Commission will be called upon to decide it. I understand your throwing some side hints. We cannot make it an issue here?—Take the question of the fish cannery or the question of the issue price of salt. Can you discuss the question the whole year and not come to any conclusion? The Minister sends some recommendation, the Finance Member writes something, and nothing is done.

Khan Bahadur Abdul Razack Sahib Bahadur: The same thing happens to other departments also?—Unless you settle the question of financial relationship, the whole question of the development of this department will be a farce.

Mr. Arpudaswami Udayar: You are in favour of making a general recommendation like this, that money spent on this department is money well spent?—I shall be glad if you can recommend like that. But the point is the Fisheries Department does not get any money. Look at the budgets.

Mr. Tampoe: To what extent is the Finance Committee responsible for this?—By Finance Member I mean the Finance Committee. The present Finance Committee is a truncated body.

For the existence of which the Legislative Council alone is responsible. How far is the starvation of the Fisheries Department caused by the Finance Committee rather than by the Finance Member? The majority of the members of the Finance Committee are elected by members of the Legislative Council and are our own countrymen?—It is not a question of majority and minority; the Finance Committee is merely an advisory body.

The Chairman: It is something more than other advisory bodies?—The Finance Committee is a truncated body.

Mr. Tampoe: It does not affect the question of relative principle. I am not discussing the value of their decision. I simply say the majority there are our own people?—Is it not a fact that the Finance Committee is purely an advisory body? I believe so.

Khan Bahadur Abdul Razack Sahib Bahadur: It is quite so; the decision will be come to in the Cabinet?—One thing I may say. I was dealing with the relationship between the Finance Member and the Minister. I was not talking about the Finance Committee.

Mr. Tampoe: You can press your scheme even if the Finance Committee does not give its approval?

The Chairman: Before they reach the Cabinet, some of the schemes are turned out?—I am talking of schemes which were discussed in the Cabinet. I do not know what happened to them in the Finance Committee.

(The witness withdrew.)

The Committee then adjourned till 11 a.m. on Wednesday, the 11th July 1928.

Wednesday, July 11th, 1928.

MADRAS.

PRESENT:

M.R.Ry. Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, Kt. (*Chairman*).

Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, M.L.C.

M.R.Ry. S. ARPUDASWAMI UDAYAR Avargal, M.L.C.

.. R. S. NAYUDU Avargal.

Mr. A. McG. C. TAMPOE, I.C.S.

Dr. B. SUNDARA RAJ was also present.

Mr. C. GOPALA MENON, M.L.C.

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

1 to 6. I can attempt to answer these only in a general way. The department was organized to conduct research work in its different aspects so as to augment the sea and inland fisheries. Various ways, means and devices were on the anvil during the time Sir Frederick Nicholson was in charge. After his retirement, the same enthusiasm does not appear to have been continued, with the result that the achievements are hardly tangible. The department should be manned by officers of good training in the line of their work to ensure an expert knowledge. The vast field for research work, a success of which will materially add to the economic welfare, is a factor to be reckoned with.

II. FISH FOOD SUPPLY.

8. The supply is seasonal and uncertain as in the case of paddy and other cereals. The crop cannot be depended upon. Sometimes this may be a bumper one, at others, a failure. Take the case of sardines, for instance. They have migrated from the coast since the last few years and no attempt has been made by the department to induce them to return to the coastal waters.

9. Yes. If the catch is plentiful in the places where fishing is carried on.

10. Yes, very much.

11. Yes.

12. Certainly.

III. IMPROVED METHODS OF FISHING.

13. No. They are very poor specimens of primitive days and not effective to cope with increased demand.

14. I can't find anything to speak of.

15 & 16. Reasons are not far to seek. Want of organized attempt. This is remediable. The poor fishermen are unable to adopt any new appliances owing to their financial conditions and are still clinging to their old-fashioned equipments of netting. It must be pointed out to the credit of

the fishermen that with their present equipment they are going out far into the sea, but owing to their simply constructed open crafts without live-well and no provision made to keep the catch fresh for a longer time, they are unable to stay longer time far out in the sea. Oftentimes these simple boats are lost in the sea with all the equipments owing to stormy weather. There are no means of mechanically handling any bigger or improved types of nets. Some improvement in this direction may be effected by supplying better types of boats with live-well and mechanically fitted nets.

V. FISH-CURING YARDS.

43. There was an idea, which was real, that the fish cured under the management of the Salt Department continued to be on the primitive method and that there was no improvement in its quality, there having been no expert knowledge for the officers concerned. There was also the complaint that the rules controlling the management, severe as they are as compared with the neighbouring Bombay Presidency, were being worked harshly. It was then considered that the transfer to a department of officers with expert knowledge would materially conduce to the improvement of the stuff produced and, with better supervision under full-timed officers, the irregularities would cease. Therefore, these fish-curing yards were transferred to the Fisheries Department.

44. The results, however, have not fully justified the expectations. It is not unusual to hear a fish-curer talking on the desirability of reviving the old order. The administrative rigidity had no appreciable change and the expenses the curers had to undergo, under the guise of introducing improved methods of curing, are complained of as unbearable while the change in the general turn-out of the cured products has not been much to speak of.

45. So long as the curers are in their present impecunious state, no improvement is possible at their expense.

The curing sheds for the improved system and the plants required for the same will have to be put up at State expense, the cost being reimbursed in long terms by means of a small cess on each maund of salt sold.

The restrictions with regard to weighing of fish into the yard should be regulated to avoid delay in salting and consequential putrefaction. At present, apart from this unavoidable delay in handling the fish before it reaches the yard, there is the scramble at the weighing place. Ways and means to have the fish salted before it gets stale must be found and that is the initial stage for the production of a better stuff. The methods said to be existing, I am told, in the Bombay fish-curing yards afford better facilities and are well worth trial.

46. Further enhancement of the issue price of salt is out of the question. On the contrary, the existing rates should be materially reduced and the rate should include the factory cost price and transport charges and other incidental expenses.

47. For an efficient supply causing no anxiety for a depletion of stock during the season of heavy catches, the local storage system which was in existence years ago should be revived. Cheaper salt can be made available for the West Coast which is the centre of the fish-curing industry. Storage of salt, wherever there are fish-curing yards, should be improved by keeping a good supply during the period of plentiful catch.

48. It is immaterial as to which Government issues the salt. The nearest one would be preferable, in that it may reduce the delay in supply, usual to official red-tapism.

49. If the issue price is reduced, there will, of course, be an all-round benefit. But we are more concerned with the actual fishermen and the consuming public. The fish-curing yards were originally started for the good of the actual fishermen. Owing to their poverty and the consequent incapacity to run their own curing sheds in yards, the industry in about 90 per cent cases fell into the hands of the curer who is also the middleman in most cases. If the sale price of salt is reduced and additional facilities offered as the one suggested under Question No. 45, the fishermen may find

means to get in and take the place of the curer. The consumer will have his share of the benefit by way of a reduction in the sale price of the product in the market.

50. Scraping of salt earth (a supply of which is abundant at one's very doors on the West Coast and also in certain parts of the East Coast), and the manufacture of earth salt therefrom, were penalized with the enactment of the Local Government's Salt Act of 1882. The worst sufferer by this was the fisherfolk. Before this Act came into force, the fishermen used to salt their fish with earth salt and the produce, though far below the average in point of quality, was finding a ready sale which went a great way to ameliorate their condition. On representations being made to Government in England, the establishment of fish-curing yards for the supply of salt—duty free—was sanctioned and the present institutions owe their existence to that benevolence. But owing to undue restrictions imposed by the Salt Department that controlled them, the poor fishermen found no means to get in and the fish-curer had his own way. Every endeavour to eliminate this element to help the person to whom this was intended should be made. To achieve this, the only possible method is to render facilities even at a financial sacrifice.

51. It is difficult to give the quantity of fish salted. Probably administration reports will reveal the fact. Anyhow the fish salted is very considerable during the season. Mackerel, as far as I know, heads the list.

52. The supply during certain years falls far below the demand and if the curing can be done well enough to last a year or two more than the usual, it will be a boon to the consumer. The bulk of the cured fish of inferior variety, the catch of which fortunately is usually the biggest, is consumed by the poor classes including the labourers, plantation coolies in Ceylon, Federated Malay States, etc., etc. Their demand is very heavy and will stand any abnormal supply.

53. To meet such demand the catches have to be increased. How? The deep sea fishing is not possible with the present appliances in hand with the fishermen. The surface fishing is conducted with nets and lines of old. The introduction of the Western methods by trawlers, etc., is the only means of improving deep sea fishing. The only thing that can be thought of is to improve and increase the existing arrangements with financial aid on well-supervised co-operative methods.

54. This question should not have arisen. The only way of cheapening is to reduce the establishment running the show.

55 & 56. Not that I am aware of. If local conditions are suitable, a trial to copy the system may be made.

57 to 60. Hygienic conditions in curing are not at present entirely satisfactory. Hardly any fish comes into the yard for curing without its having reached some stage of putrefaction. This is in some cases beyond the control of the fisherman or the curer, but can be very much minimized. The Yard Officer has the power to reject stale fish for curing.

As regards the method of curing, any improvement on a scientific basis may not be possible all at once. Fresh fish, properly cut and well cleansed in sea water to be taken for curing to the yard and without undue manipulation at the hands of the officer in charge, to be passed for salting. The tubs, boats, etc., used for the purpose should be likewise well cleaned. After the usual period of retaining the stuff in salt is over, the drying should be conducted on clean mats. This will ensure a tolerably good product. The suggestion is not new to the naked eye in a fish-curing yard. There are the fish, the tubs, boats and mats, etc., etc. The details in their upkeep such as cleaning, brushing, etc., are neglected.

In the above suggestion there is hardly any cost and Question No. 60 does not arise. But if improvement on any costly method is to be contemplated, who is to bear it? The Government or the poor fishermen. That has to be decided.

IX. KINDS OF FISH.

97. The most important is oil sardines. Beyond its excellent food value, its importance in oil extractions, guano preparations, etc., cannot be excelled by any other species of the West Coast. Mackerel is the next. But it cannot compete with sardines in any of the points mentioned.

98. Yes. The department would do well if it can go into the reasons for disappearance of shoals of the above fishes during their season time. The department should do well to investigate as to what food would induce these shoals to remain in shallow waters.

XII. RESEARCH.

133 to 138. Sardine has been very poor on the West Coast since the last few years. Mackerel, however, made its appearance last season and the catches were good. Both sardines and mackerel appear at stated season—October to March. They are to be plentiful in December and January. Sardine particularly has disappeared handicapping the oil and guano business. The stray shoals that appear were quite insufficient to meet even the domestic demand. No investigation or research appears to have been made to ascertain the causes. They are capable of investigation.

139. No other kind of fish require investigation in this line. With the advent of sardine and mackerel, all varieties of big fish that prey upon these will follow in abundance.

146. Yes. The most important point is determining suitable craft and gear and also finding out new fishing grounds.

163. So far as one can see, nothing has yet been done in this direction. The old type of boats, nets and other fishing tackles are still in use. The method of fishing is also the same.

165. This question need be gone into only after appliances for deep sea fishing beyond the present limits are provided.

XIV. SOCIO-ECONOMIC WORK.

173. The co-operative work thus far conducted is very limited and almost confined to afford credit facilities. The thrift side had but a nominal attention.

174. The modification or development should be in the way of conducting societies for purchase and sale. This will free the fishermen from the clutches of the middleman and it is only then that they can be considered to have been solved.

175. Nothing to speak of up to now. Their association will do no harm at any rate.

177 & 178. Absolutely nothing and it is in this line that the combined attention of the two departments and non-official workers is needed.

XVII. FINANCE.

220. Nothing is done by the department so far as my enquiries go.

Oral Evidence.

The Chairman: You are a Member of the Madras Legislative Council?—
I am a Member of the Legislative Council elected by the South Indian Chamber of Commerce. I have been in the Council for the last two terms. I have sent my written evidence. My native place is Calicut, but I have been in business for a long time in Madras. In my business career I had something to do with canned foodstuff. For a long time I was Director of the Malabar Canneries and I was in touch with the business. I had, therefore, opportunities of witnessing what was going on at Chaliyam. Of course, it was in competition with our business. I do not mean that they undersold or did anything like that. Our firm was not dealing with canned fish at Chaliyam. We were dealing with Mahe and other places. We closed our firm in 1925. I am connected with Wilson & Co. The cannery at Mahe was a limited company floated by Mr. Wilson. I was one of its first directors until the time of its winding up. We took it from the younger Joselin in 1917. The Joselins were running it for about 50 years. They are two Frenchmen settled down there. They were making a living in that canning business. There is no doubt about it. We purchased it in 1917. We conducted the business till 1925. We dropped the business as the manager became too old and retired. He was a Scotchman and he came to us from Colombo. He knew all about this business at Home and he worked in some places in Colombo and then when we took over this business he and his wife were employed by us. They were paid about Rs. 300 to Rs. 400 inclusive of commission. We had no mind to go on with the business without him and we advertised for sale. We got very good dividends until 1923. In the last two years there were some reverses on account of the high prices of tin. The prices went up to Rs. 90 during war time and immediately after the armistice it came down to Rs. 15 or so. We had a good stock and so lost much. It is not on account of the want of demand that we closed our firm.

How did your produce compare with the foreign stuff?—We sold all our supplies to the local store merchants in Bundar Street and so on. We were supplying to some of the railway restaurants. The M. & S. M. Co-operative Stores at Rayapuram, etc., used to purchase our produce. I have not seen the stuff produced in Chaliyam in the local market and therefore I have not compared it with ours. Of course, if you want to find that out, you can go to one of the Moore Market shops and ask for the produce of the Government cannery. I did not hear any complaint about the quality of the canned fish. It is worth while reviving the cannery at Chaliyam. There is a demand for canned foodstuff and there is no competition. I am sure the Government cannery tinned stuff will obtain good sale. We can get men to take up agencies for sale of this produce just as we have agents for the sale of the products of the Ink Factory, the Soap Factory, etc. There is a large demand for Washwell Soap. There is no reason why canned fish should not be brought into the market. There is a good demand for it.

You said something about curing. Do you consider the present methods of curing sufficiently developed?—When I used to pay visits to Mahe I have seen things at Tellicherry. Curing is going on there and the only point is whether you can reduce the expenses in any way and allow the actual fishermen to come into the business.

So far as the present system goes, do you advocate further building of those yards in the other places?—From the administration reports I find you have got 107 curing yards all over the Presidency. The question is one with regard to the kind of fish that is available and the quantity that can be got which would justify the increase of fish-curing yards. If fish is available I would advocate the extension of fish-curing yards, because there is a demand for it not only locally but from places like Burma, Federated Malay States, etc., also. Even the fish of the manure variety is in demand in the plantations in Colombo and Federated Malay States. In fact, we have been shipping our stuff to Burma and Federated Malay States.

Is there anything else to which you would like to draw our attention?—I wish to refer to the fish oil industry. I understand that there are a number of private concerns on the West Coast which manufacture this oil and that about 500 licences have been granted for working these concerns.

Therefore it would be well for Government to divert their attention to the inspection of these concerns and see whether they are doing it on up-to-date methods and help them in that way instead of our manufacturing the oil ourselves and trying to compete with them. Probably in the matter of advice and so on these concerns get some help from the Government station. I do not know whether these private concerns seek help from Government at all.

Don't you think that the guano and the oil prepared in Tanur is superior to the oil prepared by the private concerns?—May be; but the coffee planters are buying a lot of that stuff in Mahe, etc. The factory-owners go and canvass for orders in advance and they are getting orders. I had no occasion to compare the quality of the oil prepared by the Government with that of the private concerns. We have no material to say now that the Tanur produce is better. If there is sufficient advertisement and canvassing, we might be able to sell more.

Have you anything to suggest with regard to the oil or guano at Tanur?—You can carry on research work there and help these private concerns on the West Coast.

For what is this fish oil used?—The planters are buying it. I do not know the purpose for which they are using it.

Mr. Arpudaswami Udayar: You said that one of the reasons why you had to wind up the Mahe Cannery was the large stock of tins which had gone down in price?—I did not say that. The reasons were different. We did not want to run it on the West Coast when we could not get a good man to manage it.

You spoke about the fall in price of tin?—Just as everything else went down in price, the price of canned tins also went down and therefore there was some loss sustained by the concern. Prior to that we had no loss whatever. In judging the soundness of a concern, you have to take the average of a number of years. We had a very good market for the stuff we produced.

Could you tell us whether there were such ups and downs in the progress of the Chaliyam factory?—You remember the thrust we made in the Council with regard to the loss on tins and we had opportunities of studying the literature on the subject at that time in order to acquaint ourselves with the position. But, I believe to some extent the situation was created as an after-effect of the war. They had purchased raw materials at high prices. What we want in business is to try to find outlet for our manufacture and increase the produce as the demand increases. Sometimes we may have even to reduce the price and sell. It is better to reduce the price and sell off the stuff than to keep it on and sell at a highly reduced price.

We have now normal prices. Is it your opinion that by introducing economy, better management and by improving the quality of the produce, it is possible for us to realize good profit and make it a growing concern?—You will have to manufacture a certain quantity in order to show what the Government concern can do and teach the private concerns so that more and more private concerns may grow up in this line of business. You have to manufacture these stuffs to educate the public.

How is the public to be educated?—When they see the Government cannery working at a profit they will copy it. After we closed our factory at Mahe certain cottage industries were started. Like that, people will come in and take advice from the Government factory. In that way the Government factory can help the public. As I have said in my written evidence, there is yet a great deal to be done in the direction of improving the operations of the department not only in canning and curing methods, but in research work, such as tracing the migrating fish, finding out proper food for retaining the fish, improving the methods of fishing, lengthening period of preservation, efficient methods of oil extraction, finding out suitable fish manure to be used for different crops and different soils. Unless you divert attention to these matters, the fishermen community who form a good part of the population on the West Coast cannot be helped.

Can they be helped by demonstration methods?—Not only by demonstration but by continuing the manufacture in order to educate the private concerns.

If we go on manufacturing canned goods, how can we educate the fisherfolk unless we take some apprentices?—Of course there should be a teaching section also.

You spoke of economy? Could you suggest ways and means?—As regards Tanur there are a number of private factories coming into existence. There is no use diverting attention to that part of the business. But there is research work to be done. I said that an itinerant staff is enough to go and inspect and advise the private factories. That is the sort of economy I advocate.

From the report don't you see that these people have not succeeded in refining their fish oil?—Yes. But they will gradually perfect it. That was the case with the candle business. Research and manufacture may go on at the same time.

You have practical knowledge of the manner in which co-operative societies started for the benefit of the fisherfolk are working. Do you think they have been helpful to the fisherfolk and have they arrested the growing poverty of those people?—With regard to credit side, very little has been done. The co-operative work thus far has resulted in nothing. Thrift side has to be developed to a great extent.

Can you tell me whether the fisherfolk are given to drinking?—I have not been in their midst. I am spending all my time in Madras. You can imagine what the Madras fishermen are doing.

Has anything been done to arrest that evil?—Of course there is the temperance propaganda all over the Presidency. They will be doing some work in that direction.

With regard to the help afforded to these fishermen in the shape of loans, do you think the present system is adequate or whether improvements are possible or desirable?—If you can give them help in the way of improving their boats, nets, etc., it would be excellent.

From enquiries made in Kuppam I understand that the large nets have been pawned and many big nattamais are in the hands of middlemen?—Yes.

Can you suggest some method of affording real relief to these people and also a better kind of education which would fit them for their work?—The only help the Government can give is to supply them with materials and try to recover the cost in easy instalments. Co-operative stores could help them. If you can take them into the fish-curing business that also will be good.

To Mr. Arpudaswami Udayar: Generally the fishermen go five or six miles into the sea. With the present plants they go from three to four miles. I mean they very often try to go from three to four miles. They go in the morning and return late in the evening. I think it is possible for the Government to improve their nets and thus improve their catch of fish. The Fisheries Department can find the means for that. I cannot say that Government can do so by improving their boats. The fishermen probably want better education in handling their boats. I mean to say although the Government may give them motor boats or anything like that they may not know how to use them and they may want pilots. I mean to say there are other questions to be decided before we ask the Government to help them by supplying them with boats. We must see whether they are sufficiently advanced. We have seen what is going on in other parts of the world and it will take time for them to adopt those conditions. It should be our aim to educate these people. The fishing industry has a great future. It has been developed to a far greater extent than it has been developed here. Certainly by increasing the staff it is possible to give fishermen this kind of education.

To Mr. R. S. Nayudu: I think they are finding markets for their fish already. Some of these people could not find sale for their raw fish, only in certain parts of the year. In good season when there is fish-curing the fishermen bring their catches and they send a certain portion to the market

for sale and the other portion to the fish-curers. The reason for their selling at a lower rate to curers might probably be due to their indebtedness to the fish-curers. The difficulty is in finding a large quantity of fish.

(Mr. R. S. Nayudu interrupting : We have got a large quantity of fish but there is no market for it.)

Then it will be stale fish which could be used for other purposes and not for eating purposes. I do not think there is dearth of market for fish. From my experience on the West Coast the sale of fish depends on the condition of the fish. There are certain parts of the year in which you get what is called 'not good fish,' I mean to say not the fish which is eaten by better-class people. That sort of fish you will find left in the market. At certain parts of the year we get a heavy catch of that sort of fish and that is left unsold in the market. I think if Government were to start some co-operative sale society for these fishermen, it will be a better organized way of selling their products. I think there is a great necessity for societies of that kind. As far as I know there is no arrangement made between the railway company and the fishermen to take the fish into the interior. For instance, you take fish from Tanur to Malapuram which is a military centre. I think it is taken by load. There is no transport. I am for improving the transport facilities. As regards the terms on which the railway carry the fish there have been complaints in regard to the fare. No doubt about that. If Government were to come to some terms with the railway authorities and thereby effect a reduction in the railway fare, that will help the transport facilities and thus improve the condition of the fisherfolk and the economic side of the food question. I am for enlarging the scope of the department and for increasing the staff of the department where development is badly needed. I now understand that sardines have disappeared from the West Coast. There was a good catch of mackerel last year, but no sardines. So if the Fisheries Department could help in finding out where these sardines have located themselves it would be a great help to the people. I cannot say that the present staff is not sufficient to enlarge the activities of the department. I am not thoroughly acquainted with the qualifications of the present staff. Instead of your starting a factory on the East Coast like the one at Chaliyam or the one at Tanur, people themselves can do a great deal more.

The factories at Tanur and Chaliyam are far away from the East Coast and the people on the East Coast cannot avail themselves of the advantages of these factories?—Let these factories be strengthened a little more.

So far as their present work is concerned, there is nothing to be discouraged. The work that these factories have turned out is satisfactory. There is no harm I think in having one or two on the East Coast?—If there is a demand for that sort of thing. If the Fisheries Department think that a factory is absolutely necessary on the East Coast, we can have a small one on the East Coast.

There is no factory on the East Coast just as you have in Tanur and Chaliyam. So will it not be better to have one on the East Coast?—The whole question is with regard to the catch of fish before starting any factory. In the West Coast we are finding difficulty of getting good catch of fish. Unless we get over that difficulty there is no use of starting any more factories in any other parts of the Presidency. What I mean to say is you must educate the fisherfolk in latest scientific matters. In order to help them to that extent you may start a small type of factory on the East Coast or the South. I do not think the present staff can in any way be reduced. Nor am I for increasing the staff. If we are going to have some more stations, not of the wider type on the West Coast, but small ones and if there is a necessity for more men, I would certainly like to have more qualified men.

Your opinion is that sufficient money is not spent for widening the scope of the department?—Sufficient help is not rendered by the Government for making this department more useful to the fisherfolk and the people in general in the matter of getting more fish. We want to find out where we can get good supply of fish. Sometimes they get a good catch of fish and in other months you cannot get a sufficient supply. It is a problem we have to solve. In previous years when this factory was first started, there was no difficulty in getting good catches of fish. It went on like

that for several years. But during the last three or four years we are experiencing difficulty and they are experiencing the same difficulty in other parts of the world. One Portuguese traveller told me that sardines had entirely disappeared from their sea coast.

So, you are for improving the staff of research?—I want better type of work to be done.

Now you say that facilities are not available in the department for making good research work?—I cannot say that.

So you say you ought to have more men and better qualified men ought to be engaged in research work?—Yes.

Mr. Tampoe : Apart from this cannery have you had any experience of fishing industry?—I have had opportunities of handling the foodstuffs manufactured in different countries such as England, Norway, etc. I have also had opportunities of coming in contact with the managers of those manufacturing concerns and they have often explained to me how those foodstuffs were manufactured and in what way they are superior and so on so that I might explain in turn to my customers.

You say that your connexion with the cannery lasts for the last eight years. During those eight years did you seek any advice or comparative knowledge from the Government cannery?—We did not. We had men well experienced in the canning industry and we had no necessity to seek advice elsewhere. If we had we certainly would have sought. As a matter of fact, we followed an independent line of business. Our factory was an old one and the men who handed over the factory to us left all their experience and knowledge to our men.

What would be productive cost of a factory like the one you had?—I can't say.

Roughly?—It depends upon the machinery which you wish to install. We went on a very large scale. But the old people, i.e., Frenchmen who first started the factory at Mahe, invested about 20,000 or 30,000 rupees. We afterwards improved the machinery. I do not know exactly what they have done with our machinery? I do not know exactly whether they have been sold. Nor do I know whether they are functioning properly. I did not make any enquiries for the last two years, but I think all the machinery had been disposed of.

I take it that it is the question of want of a proper manager for the factory that compelled you to close the business?—I can't tell you as a business man all the reasons that compelled us to close the factory. On the whole we did not want to retain the factory and therefore we closed it, but this much I can tell you we had no difficulty in finding sale for our product. We did sell our products to various stores men on the China Bazaar Road. During the war our stuff found a very good sale and we did make a good profit.

Mr. Arpudasmami Udayar : Have you not got to pay a duty if you transport your manufactured goods from Mahe?—The factory was situated, I believe, in the British territory.

Mr. Tampoe : How far do you think it would be profitable for the Government to follow this business as a commercial venture or would it be better to confine themselves to research work alone?—Follow it up to the extent to which it affords scope as a commercial venture.

Do you not want a certain amount of manufacturing skill and also a certain amount of skill in selling the manufactured articles in the open market?—You have not the same facilities for finding an easy market for all the stuff that you produce.

Then is it your opinion that the Chaliyam factory should confine itself to research activities to the extent of a commercial beginning?—To the extent to which research work should be carried on and also to enable private men to come into the trade.

You would advise the Government to undertake teaching salesmanship to private people?—Salesmanship is a very difficult art. Really marketing is not a thing which anybody can teach.

Do you think that Government is at a disadvantage when compared with private firms?—I do not think that Government would be at a disadvantage. If you have got private men with the necessary knowledge and experience as to how to deal with customers, then there will be no difficulty.

Are you aware of any commercial concern under Government which has been closed?—As far as I am concerned, Government should not enter into that sort of thing.

With regard to Tanur your suggestion is that we should reduce our commercial activities and restrict ourselves to research?—Your commercial activities have almost reached their maximum, because you have enabled private men to come into the trade and they have begun to manufacture the stuff. The next thing for you to see is whether they are producing the required stuff for the market or for the consuming public.

You have to do a good deal with foreign foodstuff. Do you think it will be worth while to send young men from this country in order to acquire knowledge of foreign methods?—Yes.

Mr. Manikka Nayakar interrupting: My fear is that in foreign countries the manufacturers would not reveal their secrets to you. I went to England to learn so many trades and in every trade they would not let me know the secret. There you must get into touch with the right sort of man. I know of some young men who have gone to foreign countries on Government scholarships. They have all told me that there was no difficulty for them in learning and studying in those factories and that they were allowed to see anything and everything. It all depends upon the man who goes there. I went to Sheffield and my manufacturers showed me all the working of the factory from start to finish.

Dr. Sundara Raj when asked as to what his experience was when he was at Liverpool, said that his experience exactly tallied with that of *Mr. Manikka Nayakar*.

Mr. Manikka Nayakar interrupting: There was no reservation so far as iron trade was concerned because Englishmen were better organized than other people and their success in that trade consisted in their organization. But in other smaller trades they would not reveal their secrets.

Mr. T. K. RAJARAM RAO, Proprietor, The Indian Electric and Engineering Co., Mount Road, Madras.

Memorandum.

I propose to deal with the question of fisheries from a purely commercial point of view and as such I beg to be excused from answering the questionnaire in order, as most of the information required therein is of a purely departmental origin and is not usually available to the lay public. Section II has a direct bearing on the aspect I propose to deal and so I will take up the same.

A cursory visit to any of the fish markets, either in the city itself or in such centres as Ponneri and Eunore, will convince anybody of the great demand there already exists for fish. It is also a fact that the supply of fish even to these coastal towns is very limited. Being cheaper than other non-vegetarian food, it is the stand-by for the poorer class of people and if, as the result of large scale operations, such as now contemplated, the price of fish could be brought down, so as to be within the economic reach of the half-starved people, it will not only be solving one of the greatest economic problems, but also bring out a healthier, robust and strong race into being. The question whether a greater supply would lower the price will not arise, as there are very large potential and latent markets in all the district and taluk centres, where, with proper facilities, fish could be made available: and as such there need be no fear of swamping the market and lowering the general price so low, as to make it a commercial failure. Any quantity of fish could be easily absorbed provided proper facilities are made for transport of fish to the various markets. Next with regard to the catching of fish we have at present some very time-honoured ancient methods which are really very effective for small scale operations: but to tap the ocean of the rich harvest these methods are of no use. So far as the ordinary fishermen are concerned, there has been no improvement in the fishing craft, gear and tackle or fishing ground. He goes on, even as the birds of the air have been since creation began, following one traditional vocation and never trying to improve. To a large extent this apathy for material advancement is due to mental outlook necessitated by the nature of the calling he follows. Partly, the hide-bound caste system is responsible for taking away all ambition to rise above others in the world from a whole community. Further, want of knowledge, enterprise and capital to start things stand not only in their way but in that also of people who wish to give a helping hand to this hard-working community. With regard to the last question under this group, i.e., "Can you suggest any improvement," I have very reluctantly to point out that the present methods of fishing, however effective they may be for small scale operations, are of no use for wholesale work and these methods are bound to disappear. The community must face something, like an industrial revolution, in case large scale operations such as the one now contemplated come into being. I hope the Government will not indulge in weak sentiment but will embark on a bold and progressive policy for the larger good not only of the community itself but also of the whole people of the Presidency.

It is true the members of this community living near large future fishing centres will lose their occupations not being capable to compete with the fishing centres: but this I consider will be a blessing in disguise for the community. So long as they stick to their age-long calling conducted in the same manner as it was done by their ancestors since the time of Adam and Eve, there is no chance for them to survive in the present economic conditions. Very similar has been the fate of hand-weaving. So long as machinery exists, it is not possible to recall the golden days of old. The

earlier this is realized by all, the better. So the community must face a revolution. Secondly, the loss of their ancient calling does not necessarily mean that they will have to beg, as they could with very great advantage be employed in fishing operations: in fact the whole field should be reserved for this community as a recompense for their loss of occupation. Their past calling and wide experience would be of great use to the department itself.

Now coming to the actual necessities for a well-managed fishery on a large scale, I propose to deal with the matter under three different heads:—

- (1) Catching.
- (2) Storage.
- (3) Distribution.

Catching of fish.—If the Government is seriously contemplating the development of the fisheries as a useful and valuable adjunct to its various other duties, it ought not to be satisfied with half-hearted halting measures but must have a definite policy and, as a necessary corollary, must start operations on a large scale. The ultimate aim of the Fisheries Department ought to be, in my opinion, the supply of this wholesome valuable foodstuff to each and every village at a price which would be within the reach of practically everybody. If this, as I assume it to be, is the proposed policy, the whole department will have to be organized towards achieving this laudable object.

To get at this result, we ought to have of necessity, large centres of fishing. I propose that five of these be immediately installed at the following places:—

- (1) Tuticorin.
- (2) Negapatam.
- (3) Madras.
- (4) Cocanada.
- (5) Calicut.

To each one of these centres must be attached one or two trawlers capable of cruising to distances of about 100 miles and more and engaging in deep sea fishing. Unfortunately, the experience of the Madras Fisheries Department seems to be a very sad one with regard to trawlers. The one bought in 1924 was not at all suitable for fishing operations and the second one bought in 1926 had a defective boiler and could not be put to any use. These purchases were made, I understand, through the Indian Stores Purchase Department in London. A greater scandal than this cannot be imagined: and I may be always accompanied by waste of public funds. Maintaining as they do a costly and reputed to be an expert inspection staff, both in England and in India, the general rule is that the stores received are not up to the requirements. It is a wasteful department and the earlier it is abolished the better: but more of this on another occasion. For the present, I would strongly suggest to the Fisheries Department to get permission of the Local or Imperial Government as the case may be, to call for tenders themselves and purchase the materials themselves instead of going to the Stores Purchase Department. They may get the manufacturers to send out their own representatives here to show the proper working of the trawlers to suit our requirements and if found suitable payments could be made.

The five trawlers proposed should have ample capacity to hold at least a few days' catch. Secondly, it will not be possible for the trawler to come out for three or four days at a time. Hence another requirement for the catch. Further what kind of refrigeration chamber would be the full economical, has to be decided. Usually, meat is carried from the most American countries and from Australia to Europe by steamers fitted with special large refrigeration chambers: but the latest and the one specially adapted for fish is the one that was originally proposed by a Dane named Ottensen but now scientifically and very successfully worked out by Professor Plank of Karlsruhe in Germany. This system provides the storing of fish in very cold brine. It is claimed that, by this method, fish does not absorb even a particle of salt and keeps in a fresh state for a long time. As soon as the fish is introduced in the cold brine, they become hard and

small, tiny crystals of ice are formed inside the body of the fish. The tissues do not get spoiled and taste remains perfect. I regret I have not got the details of this process but in case the Committee wish to have the same, I shall get it through my office in Berlin.

Further I am of opinion that it may be very much cheaper and more effective to have the refrigeration of the catch on the trawler itself by solid carbon dioxide. The trawler may be so constructed as to have one solid hold set apart for the storing of fish. Air-tight boxes containing solid carbon dioxide could be placed therein and pipes from these boxes could lead off the cold gas and refrigerate the hold. The details of this type of refrigeration could be gone in through, in consultation with the builders of the trawlers: but I beg to suggest to the Committee that this method of keeping the catch cool, ought to work out very well and at a very small cost when compared to the elaborate chambers and refrigerating machinery needed.

Cold storage at fish centres.—The next question is the furnishing of the five fish centres. These are the bases for the trawlers to operate from; and when the catch arrives there must be enough well-equipped cold storage to receive the full catch. What form this type of storage ought to take is another question. A central cold storage like the one mentioned above is very successfully working in Germany. This system as mentioned above uses very cold brine to preserve the fish, but I think we can with very great advantage use solid carbon dioxide as a refrigerant. I am enclosing a diagram* of such a cold storage house. This, I believe, would work out much cheaper than the brine system both in capital outlay and running costs. I beg to invite the special attention of the Committee to the sketch herewith submitted in order to show them the simplicity of the arrangement and the perfect refrigeration of the fish in such a cold store.

Distribution.—The next subject is the distribution of fish to various markets both on the coast and inland. There is no difficulty with the former as towns near the fish centres could be easily provided by motor lorries; but the question assumes a different aspect when the fish has to be delivered to inland towns. The high temperature of the air right through the year makes it impossible for any perishable commodity to be sent over long distances by railway, unless it be with the help of either specially built cold storage wagons; or fish should be packed with some cold material to avoid putrefaction. The former, i.e., building of special cars, will be, in my opinion, a difficult task. The wagon has to be, if possible, a double-walled one. Secondly, the power required for the purpose of refrigeration must, of a necessity, be drawn from another independent source other than the engine. It is possible to construct wagons of this type but it is feared the cost may be prohibitive and it is just likely, we may be experimenting in unknown functions. The second is a much better alternative. Ice is the only refrigerant till now used on a very limited scale to transport fish from Calicut to Ootacamund. Even there, the fish arriving in Ootacamund is far from the desirable quality: but the disadvantages of ice are many. Ice melts easily and becomes water. Being heavy it adds materially to the cost of transport. Further, being a solid, it does not adapt itself to sound packing; finally, there is the prohibitive cost of ice; further, on a long journey there is the necessity of replenishing ice from ice-stations en route, a thing not available in any of the mufassal centres. So ice can never be used as an effective protective against decomposition of fish during its transport.

Now in America, they are using solid carbon dioxide on a large scale as a refrigerant for this special purpose. I will give a brief account of the properties of carbon dioxide before dealing with the methods of use. Carbon dioxide is a gas which becomes a liquid under pressure and when this liquid is allowed to evaporate suddenly, solid carbon dioxide is formed. It is a white powder like snow. On compression in a wooden mould it becomes a compact solid mass. Owing to the very large heat of vaporization required it does not readily evaporate in the air. The specific gravity is 1.2 and its temperature is 79° C.

I am enclosing a diagram* of a railway wagon which is in all respects like any other wagons except in one or two minor details showing how the solid carbon dioxide is used in America as a refrigerant during transport. Such changes in the wagons could be easily adopted with the help of the

* Not printed.

Railway Board and fish could be easily transported over long distances without decomposition. This is made possible by two important properties of solid carbon dioxide, i.e., solid carbon dioxide requires a large amount of heat to get converted into a gas and secondly it is heavier than air. A further advantage is the solid carbon dioxide does not come in contact with the fish and so no changes either in taste, tissue or smell take place in the body of fish itself. This is an ideal refrigerent for such preservative purposes. So if we could get a cheap source of carbon dioxide, the fishing industry could be brought into being in a large scale.

Now the question naturally arises as to how carbon dioxide could be got on a large scale. Everyone knows that when any ordinary combustible substance burns a large amount of carbon dioxide escapes in the air; but it will not pay us to burn something like coal or charcoal or wood, if our object is merely to get carbon dioxide; carbon dioxide occurs as a by-product in various industries and it is here we have to look to a cheap source for this valuable article. In cane sugar industry, carbon dioxide occurs as a by-product and this is the gas that is being used now for the aerated water trade. Having very few cane sugar factories, there also this gas is not available on a large scale.

Another large source of supply of carbon dioxide is the calcining of magnesite, where for every ton of raw magnesite that is calcined, about half a ton of the gas is given off as a by-product. This will be our cheapest source of carbon dioxide. Recently a Madras firm applied to the Government for a loan to establish a magnesite industry in Salem. From enquiries I understand they intend to produce about 3,000 tons of calcined magnesite and so they will be letting 3,000 tons of carbon dioxide into the air: but I understand they have included a CO₂ collecting plant, and propose to liquify and then solidify the CO₂ for use as a refrigerent. This will be an unique opportunity for not only the fish industry but for others as well. Provided there is demand, the railway authorities could be induced to make the few alterations necessary in the construction of the wagons. These wagons could be used for the transportation of fish, meat, vegetables, fruits and betel leaves. In fact all perishables could be sent in wagons like this and the railway authorities themselves could be prevailed upon to keep these wagons refrigerated.

The above is certainly a very big and comprehensive scheme and private capital could not be induced to come forward in an industrially backward country like India. Hence it is the duty of the Government to come forward and push through a scheme like this for the well-being and material advancement of the country and I trust I will not be appealing in vain to the Fisheries Committee to come forward and not only enunciate a bold and progressive policy but also see the same is carried through.

FISH-CURING YARDS.

Now in case the Government should embark on a scheme like the one suggested above and make fish available in all districts and taluk centres, the local demand for salted fish in the markets is going to fall down considerably. Very few people will go in for salted fish, when fresh fish is available and hence no further money need be spent on fish-curing yards. The present yards may be used to meet the local demand, if any, and the export of salted fish.

CANNERY.

The chief consumers of canned fish are for the most Europeans and Anglo-Indians; and the Committee may take it for granted that when English canned fish is available these two communities will not take to Indian canned fish whatever may be its quality. The Indian does not usually go in for tinned fish, owing to the risk of tin-poisoning. Thirdly, it is not possible to compete with the large English canneries, having only a very limited market. It is likely that with improved recipe the Indian cannery may be able to fight out the foreign product on its merit; but then some sort of protection will be needed. Even the cannery in England are feeling the position very acutely and are asking for protection according to a cable in the newspapers not long ago. So, under these circumstances, any large outlay on the Canning department will not be a wise investment. Further the initial handicap of a heavy paper capital and purchases of all

stores through Indian Stores Department in London are very severe handicaps and it will be better to be more cautious in the way of expansion of this branch of the industry.

GUANO AND OIL EXTRACTION.

In the field of oil extraction and guano preparation, there is a large and lucrative field before the department. Intensive research and advertisement will make activities in this direction pay handsomely. All possible steps should be immediately taken by the Government in this direction as the demand for guano will be on the increase, as more and more people, disillusioned from the results of higher education and the search for official preferment, turn back to land.

FINANCE.

The proposals mentioned above are bound to be a costly work; but that ought not to deter the Government from embarking on the same, as the proposition will pay back the original investment in the course of a few years. We do not propose to introduce a new commodity the use of which people are to learn or to be educated in. On the other hand, we have ready markets for the commodity. Knowing that there is such a great demand, it would be almost criminal not to take up the work on hand and establish it on a sure and safe basis. Of course a large capital is needed but this being a very productive undergoing, a loan may be floated if necessary and the industry started so that the starting of this may not stand in the way of other useful activities of the Government needing Government funds: or, if the Government prefer, a large limited liability company may be floated with the Government owning a large percentage of shares and rest thrown open to the public. It is up to the Committee now to decide which would be the most advantageous.

Oral Evidence.

The Chairman : You deal in electrical goods?—Yes.

You take some interest in the fishing industry?—I take interest in refrigeration as a whole. I have been studying that part of the subject. I want to confine my remarks mostly to refrigeration.

Did you sell any refrigerating plant in Madras?—Not yet.

Have you put up any plant or anything?—I have been working on one particular object and that is to have our homes and bungalows cool. I am investigating it. During those investigations I came across certain methods of refrigeration which will be useful for preserving foodstuff.

You think that that system if brought into existence could be availed of by the fishing trade?—I do.

Will you give us some idea of what that plant is and how it will be useful?—I have got here a sketch* of a railway wagon. I have submitted a blue print* along with the written evidence. First and foremost, fish has to be caught and I propose that four or five trawlers be got with sufficient nets and other paraphernalia connected with it and deep sea fishing started on a large scale in five centres. I propose Calicut, Tuticorin, Negapatam, Madras and Cocanada. At each place there will be one or two trawlers capable of going round a distance of 100 or 120 miles into the sea. Each centre should be equipped with a trawler and other necessities. Each trawler must have of necessity a refrigerator along with it because you don't expect the trawler to come back every day. You have to stay for some days in the sea. Meat is carried from South American countries and Australia to Europe in large refrigeration chambers by most of these steamers. The same could be adopted here. Lately a method was proposed by one Dane Alenson by name. That has been scientifically adopted by Professor Plank of Germany. I am not aware of the details of the process, but I was informed that it was specially adopted for the preservation of fish and that it is largely used in Germany specially during summer to carry fish. In Germany it is warm in summer and fish is largely carried through that system and also stored. The chief ingredient used is brine and it is kept at very low temperature and fish is immersed in it. It keeps fresh without undergoing any change. It does not take even a particle of salt. That has to be investigated. If necessary, I shall communicate with the Berlin office and inform the Committee later on.

Is it still in the experimental stage?—It is in practice on the continent. It has been in vogue for the past two years. I was there in 1926.

You want this trawler to be fitted with the refrigerator apparatus?—Whichever is useful. In each of the five centres there must be a cold storage to receive the catch and keep up.

What is your idea of the cold storage?—The same system as in the trawler. The cold brine tank. The plant will keep the brine cool. Whenever you want you open it and take it. There is another method which is used in land storage and that is by the use of carbon dioxide gas. Solid carbon dioxide is — 80° C. It requires great amount of heat to become vapour. It passes off into gas without becoming liquid.

Where do you keep the thing before you supply?—You merely keep the thing in a cold room with wooden planks on the sides. Build two cages on the top on either sides. Put your solid carbon dioxide inside. Bring down two pipes and connect them to the stand pipes all round the room. The solid becomes vapour and being heavy it passes through the pipes and comes out through the pipes into the room and displaces the hot air.

So the whole room gets cooled. You merely put the fish on the floor or in baskets or any kind of arrangement you have.

That is the antithesis of warming rooms in cold countries?—Yes.

So long as the temperature is maintained cool in the room you don't think the fish will get spoiled?—Yes. Next you transport them to inland places.

Supposing it is near the aquarium how will you take it to the central station?—You can take them by ordinary motor lorries to the station because the fish will be in — 30° C. It won't go to zero degree and therefore

* Not printed.

no special arrangement is needed. A closed lorry is enough. Then the present wagons with a little alteration costing 500 or 600 rupees will do and the same carbon dioxide process may be followed here.

The train is travelling at 30 miles and don't you think it will get exhausted?—It won't.

Have you got any special arrangement?—It is used in America for packing fish.

What do they do with these compartments?—It is an ordinary railway wagon fitted up with two chambers at the two ends. They have a trap hole on the top through which they put the solid blocks. Through the bottom there are one or two pipes coming to the other end. Branch pipes run to the end of the wagons—as many as are necessary—and they come on to the sides six or seven feet high. That is the only special fitting. The same process repeated as in the land storage station. I calculated this morning the amount of solid blocks necessary to keep the wagon cool for twelve hours. Three cubic feet of these blocks is enough to keep it at zero degree.

What will be the cost?—The present price I am calculating on the basis of a large supply. You don't get solid carbon dioxide blocks here.

I thought when you were telling me that this carbon dioxide is in a solid form and need not pass through the liquid form?—When you are making it solid the first stage is to bring it to the liquid stage. The solid is not manufactured here. It is in the form of snow and has to be compressed and it becomes white blocks something like chalk blocks or marble blocks.

You cannot get the solid blocks in the market?—Nobody is making it.

Will it be paying if it is imported from foreign countries?—I do not think so.

So you will have to devise means of solidifying it in our own country?—Yes.

You want apparatus for it?—Yes.

Nobody has done it?—No.

Much less on a commercial scale?—Yes.

Are we not thinking of an experiment for which materials are wanting?—The materials are here in heaps. We are exporting them. Nobody knows carbon dioxide is got from burning wood. Secondly you get it in the cane sugar industry. That is the carbon dioxide that we get in the market for aerated waters. In the manufacture of lime you get it as a by-product. There is already an industry in Salem and they are manufacturing magnesite. If you want carbon dioxide you have only to put a collecting plant. They are merely wasting it now. They are wasting nearly 7,000 to 8,000 tons of carbon dioxide. You have plenty of magnesite in South India. Salem is supposed to be the best magnesite-bearing area in the whole world. In America they have got it. They care more for the by-product than for the main industry.

So, your scheme is dependent upon the supply of carbon dioxide which has yet to take some shape?—Yes.

Apart from this carbon dioxide system have you got any other suggestions to make with such materials as are available now in the market?—Ice is for obvious reasons no good as a refrigerator, especially for fish. The taste changes and ice being heavy adds weight. The tissue is destroyed. Being hard solid you cannot pack fish properly so that some part is exposed whereas the other part is safe.

Is it not a fact that in all the steamers fish is carried?—They have got a refrigerator chamber inside. It is not the ice system. They make ice for the table. They have refrigerator for preserving fruits and fishes.

Is there any refrigerator in Madras?—There are.

Where?—There is one at the King's Institute. There are ice-making plants.

Can you give some idea of the cost of the refrigerator for a trawler with a ton of fish?—I will give it later on. I would like to go through some of the catalogues. In the policy and programme I see mention is made of hypochloride for bleaching purposes. Various plants have been manufactured in Berlin for bleaching purposes. There is always an excess of chlorine which is responsible for the bleaching action. Whether this chlorine would have any effect on fish has to be found out.

How does it differ from common salt?—It has got some more air. Above 250 it is not suitable. To make it suitable for preservation purposes we have to add calcium chloride. That has to be investigated; I am not sure of it.

Do you think that is a practical suggestion?—I do not know if Professor Plank's idea and this is the same, because he speaks of cold brine. I am not sure. NCLO is got from brine so that it might be that the two things are the same. With regard to the railway wagons it would be better if the Committee would suggest to the Railway Board or the railway authorities that they should keep some few wagons running like this.

Do you expect them to supply?—It will be paying to them. They may take fish from here to Bangalore and from Bangalore they can bring fresh vegetables. Every day we are getting 500 baskets from Bangalore half of which becomes rotten.

Do you think that it would not involve much work to clean the wagon every day? Would not some of your community object to have their vegetables brought in the same storage room?—I do not expect any such difficulty when there is so much of shortage of vegetables. Further the railway authorities are supposed to clean their wagons every day. Secondly it will develop our betel-leaves trade.

You think there is always such a demand that the railway need have no grievance in being called upon to put up this?—Yes. After all the cost for 6 cubic feet of carbon dioxide is not going to be more than Rs. 3 and the railway authorities should not grudge to spend three rupees for efficient service.

Mr. R. S. Nayudu: Just as they do for oil tanks?—Yes.

Mr. Arpudaswami Udayar: Apart from the question of trawlers in what directions would you suggest improvements in catching fish?—I could not suggest any other improvement.

You say that Government should not care for the sentiment of the people?—Certainly not if it is a progressive policy for the good of the people.

Do you think that the catches made by these trawlers would be so much as to throw these fisherfolk out of employment?—It is bound to be so in the fishing centres I have mentioned. People twenty miles round the centres I have mentioned will be out of employment.

You think that trawlers will make fish cheap?—Certainly.

You want that the staff ought to be chiefly fisherfolk or educated men?—We must have specially trained men in charge of the departments who will be the directing heads. For the others preference should be given to the men from that community.

Do you mean that the fishermen are going down economically?—There has been no improvement in their life ever since creation began.

No improvement is found even after the advent of the Fisheries Department?—They have just touched the fringe. They have not gone to the root cause.

Mr. Arpudaswami Udayar: Is it because these people follow the occupation of their ancestors and have not broader outlook that it is impossible for them to elevate themselves?—They go to work early in the morning and

come home late and there is no chance of their mingling with other communities. It is not possible to make them attend social gatherings. There is no general culture. Facilities should be given for better education and recreations and attractions should be provided for them. If these could be done, there is a possibility of improvement in their outlook. But that will take some generations to come.

You are not in favour of opening any more of these fish-curing yards?—That is only conditional on the Government starting large-scale operations. When fresh fish is available, nobody will go in for salted fish.

The Chairman: Does that take into account the export trade?—These present areas can be kept for export trade. If there is demand they can supply locally.

Mr. Arpudaswami Udayar: Do you mean to say there is risk in taking canned fish?—I have heard some friends saying that. We do not know what it is due to, to the tin or zinc lining or aluminium coating. There have been certain accidents. We have read in the papers of some cases of tin-poisoning. Our people are naturally very conservative and such reports alarm them.

You have said something about the limited liability concern. Please explain it?—In case the Government are not prepared to finance the scheme, they could start with 50 per cent shares being owned by them and the rest thrown open to the public. A company like that can be started and worked. If Government gives a loan under the State Aid to Industries Act, a private company can manage it. But want of enterprise and knowledge stands in the way, as also want of capital. But it should be something as in the Salt Department. It ought to be State managed.

You speak of the facilities for the transport of fish and you suggest refrigerators, wagons, etc., for the purpose?—Yes. For the easy transport of fish, I propose opening centres. They could be brought in boats and put into the cold storage wagons.

You speak of the Indian stores purchase and you say that these are not people that can give proper advice?—Yes. Their purchases are not up to requirements.

You speak of the five centres and trawlers. Could you give us an idea of the capital that would be required?—I have given a rough idea. The cost would be something like 40 lakhs.

Are you quite sure that the results of the experiments conducted by our trawlers justify an expenditure of this nature?—Our experience of trawlers has been a very sad one. The trawlers have not functioned properly at all.

The Chairman: We had only one trawler and that did not work for more than two months. Our experience is limited?—I have already said I am open to correction.

Mr. Arpudaswami Udayar: You should wait and see how this trawler works?—I won't wait. Trawlers are working all right in other countries; why should they not work in India?

Is there any connexion between currents in the sea and shoals of fish?—I do not know. I have heard of some stream in Coromandel Coast; that is all I know about sea currents.

Mr. Manikka Nayakar: Don't you think that the department should exist for investigation and experiment, and that it should only have debit columns and no credit column?—Yes. The most important function of the department has been research and investigation. But I suggest that this fishing and supply of fish should also be made one of its objects, in fact, the first object. One centre can be worked out as I have suggested. You might appoint a committee to go into the details. Experiments can be started there. There is no use catching half a ton of fish and saying there is no market for it. We must find out whether fish is available for one trawler. There must be one big centre with proper refrigerating

apparatus. You may spend three or four lakhs upon it. I understand that there is very good fish in Cape Comorin. You can take advantage of that and put the centre in Tuticorin.

Are you then agreeable to the idea of putting more of the investigation into the department and turning it into a commercial branch later on when the experiment has advanced sufficiently to assure you of commercial success?—That is a difficult question to answer.

In the experimental stage, the profit cannot be shown?—No.

At the discussion of the budget every time the question arose whether the department should be done away with. If it is a debit department there will be no difficulty?—I do not stand in the way of any amount being spent on research work.

Mr. Tampoc: Have you conducted any actual experiment on cold storage of fish?—No; I have seen some when I was in Berlin and I am very much interested in it. In fact certain of the calculations and results that I have got I have sent to a firm in Germany to experiment upon and report to me the results.

Mr. R. S. Nayudu: Did you make any special study of storage and refrigerations?—Yes; I have tried my best to get such information as is possible from friends and others who knew the subject. I have not made any actual study myself in school or college. I have visited some of the big centres both in Berlin and Hamburg.

(The witness withdrew.)

M.R.Ry. D. KRISHNAMURTI NAYUDU Garu, B.A., B.L.,
Chairman, Municipal Council, Cocanada.

Oral Evidence.

The Chairman: You come from Cocanada on the East Coast?—Yes.

You are the chairman of that municipality?—Yes.

I suppose you have got to inspect your markets there in your capacity as chairman?—Yes. I am also in close touch with the fishermen of the place.

There are fishermen hamlets close by Cocanada?—Yes; Etimoga. It is a place where the creek meets the sea and the inhabitants are all fishermen. It has 150 huts or roughly 750 people; all of them live by fishing. Then Dummaliapatam is another fishing village, with about 100 houses or 500 people. There is another village called Matlapalaiyam five miles from Cocanada with a population of 1,000. Uppada is another big centre, about 8 miles from Cocanada. The fish supply of Cocanada is sufficient for the local requirements.

Will you give us some of the names of the fishes that are available there?—Yes. I will give the Telugu names: Pandugopa, Vanjiram, Gandumenu, Polasa, Mattagadi, Chandua and then prawns. These are the main commercial kinds of fish that are marketed there. In Uppada they get good catches. In favourable seasons, one single catch will bring 200 to 300 rupees.

I think this Palsa comes mostly after the floods in the Godavari?—Yes; in August or September.

What is the material condition of the fishermen?—Generally they are very poor and most of them are addicted to drink.

How many boats will there be in each village?—About 40 boats. At Etimoga side they have got more boats because they are smuggling opium. These people take opium and hand it over to the steamer people. There were a number of such cases in Etimoga, and also of salt.

The Chairman: About the condition of these people you said that for each village having 200 houses there are only forty or fifty boats?—Yes.

The remaining 150 houses have no boats?—Each boat takes two people.

The rest of the houses have no means of buying boats?—If they could get more money they could get more boats.

There is any amount of fish available?—Yes. They can catch and live and make a better income.

How will you find this money?—Give them bounties to buy boats and nets.

Are these bounties to be free or are they to be repaid in a number of years?—Loans to be repaid in a number of years would be better. I have not much faith in co-operative societies, because most of the fishermen are illiterate. Co-operation has not advanced anywhere among the fishermen. Loans may be given to them by the Fisheries Department returnable in a number of years so that the strain may not be felt. The life of a boat is ten years. A decent boat would cost about 300 to 400 rupees. To collect anything more than two rupees from them would be a hardship. Most of them have a hut and nothing more.

Have they got schools in their villages?—I find one school in Mattapalam and another, a municipal school in Etimoga. The schoolmasters are transferred every now and then. There are one or two fishermen as teachers in municipal schools. No education in carpentry is given in these schools. About repairing nets also no education is given. If the educational authorities approve it I have no objection to introduce these two items in schools. If you can appoint a teacher in manual training it will be good. There is no fish-curing yard in our district. They adopt the ancient country

method. We do not hear much of the Fisheries Department in the East Coast. Except when the report of the Fisheries Department is reviewed in the papers nobody knows anything about the Fisheries Department. In Narasapur they adopt the usual crude country method. The women cut up the fish, put some salt, dry them in the sun and thus preserved they send it to the market. From Cocanada we generally send it to Rangoon. Some Labbais (Muhammadan merchants) make a good profit by this business.

Mr. Manikka Nayakar: Are there not fishermen near Rangoon?—We sell fish at Rangoon. Prawns are much in demand there.

The Chairman: Are the prawns caught both in the sea and in the rivers?—Yes. These are sent out to Burma side. But that trade is not now flourishing, because advances are given and they collect the fish somewhere near Akavidu. I do not know much about it.

Somebody said that motor lorries are being used to transport the fish to Peddapuram, Rajanagaram, etc. Do you think it is in a flourishing condition?—It was given up for two reasons. There were serious accidents to these buses carrying fish. And then perhaps the buses were not properly managed.

There are difficulties in their conveyance being rotten?—The fishermen are not the bus-owners. The bus-owners are caste people. They used to make profit. The fish was not taken in ice. It was simply thrown into the bus pell-mell just as mangoes, etc. To reach the place of destination the buses took three hours, but the stuff was not spoiled. The fish is handled by naked hands and there is no sanitary method. When the bus is loaded with this stuff, there is a smell about it. There are different kinds of fish, cut fish and ordinary fish. A pound of Pandukoppa costs about 1 to 1½ annas. Kandumeenu is cheap and Sundra is costly.

Names of fish.

In Telugu.	In Tamil.	In English	In Latin.
1. Chanduva.	Vowval.	Pomfret.	Stromateus.
2. Pandukoppa.	Koduva.	Cook-up.	Lates.
3. Gandumeenu.	Sale Kandai.	...	Labeo.
4. Pulasa and Elasi.	Ullam.	Hilsa.	Clupea Hilsa.
(Elasi seems to be a species of Pulasa).			

The Pulasa is thicker, more fatty, more tasty, but more bony. Elasi is thinner with less of fat, less tasty and often smaller in size, but not so long eggs always in pairs.

Judging from the enormous quantity of Pulasa caught in the season, don't you think a research has got to be made?—I would suggest that a branch of the Fisheries Department might be opened somewhere in the northern coast at Uppada. For Pulasa we may prefer Cocanada. To carry on research and to extract oil from it a branch might be opened at Cocanada. There is another species of fish called Sorai. There are two kinds of Sorai (shark). One has got a saw and it is called the saw-fish and the other is called Sorai or shark. The one with the saw is more popular. There is also another big fish called Teki in Telugu. Its Tamil name is Thirukkai and in English it is called skates and rays. This kind of fish is abundantly found in the sea and the lower classes resort to it. It contains a lot of fat also. I have seen it cut and sold in the market. These are the main kinds of fish found in the sea. I found a lot of crabs in the market. There are two varieties of crabs. The colour is red in one and darkish-brown in the other. The red one is not of much use.

Do you know anything about inland fisheries?—Of course I know the kind of fish that is caught in the Godavari and in the tanks, etc. Vochi, Valuga and Jalani are found in the tanks, canals and river. But these are generally leased out by taluk boards or district boards. Different kinds of prawns are also found in the tanks, etc.

What do you want for your district?—I want for my district a station for research and for advising the people also either at Cocanada or elsewhere between the northernmost limit of the district and the southernmost. There

are three kinds of nets. There is a small net called the cast-net. The net used in the river Godavari is different from this. When this net is cast in the water, the float attached to it indicates to the fishermen where it is. They allow it to remain in water in that condition for a number of hours and then such of the fish as will walk into their parlour is hauled up. This is called the stake-net. The third kind of net is the sort used by two small boats. A man in one boat catches one end of the net while one of the other men in the second boat catches the other end. After some time they together haul up the net. I have heard of another kind of net called the drift net. This is a long one extending over one or two miles. When the fishermen go out into the sea they drop this into the sea. The fish get stuck up in it. I want the department to go into this question and see if any improvement could be made so that fish can be effectively caught without much money being spent upon it. I understand that there is some sort of net used in China and other countries. It is said that it traps the largest number of fish. If such nets could be used here the fishermen may get more and it will be good. The fisherfolk should be given educational facilities also.

What do you mean by educational facilities?—There are now a number of fishermen villages without schools. Wherever there are fifty huts there ought to be a school wherein reading, writing and arithmetic and some course in repairing the boats and nets might be taught. They should also be taught something about the season to catch the fish. There is no use of teaching people in Godavari the conditions prevailing in Malabar. If a fisherman is available he may be appointed as teacher. There is no use of giving them higher education. The schools may be left in the hands of the Fisheries Department or the Labour Department. There is no Fisheries Department in our parts. They have never made their appearance in our parts. I have seen only schools run by the Labour Department. Most of the boys in such schools are children of fishermen.

It matters little to you who manages it provided they get the necessary instruction?—I do not want it to be left in the hands of the municipalities or taluk boards.

Mr. Manikka Nayakar: Have you any objection to the Salvation Army running the schools?—The Salvation Army does not make its appearance in our parts.

The fish in the tanks and rivers can be improved by the department. Is it not so?—They come by chance and go by chance. In most of the tanks we lease out the fishing rights, but the income is very little. We lease out the municipal tanks every year. We get about 500 rupees, but the lessees generally come and cry saying that they did not get any fish and we have to make remissions. The Public Works Department also leases out the tanks. To improve the kind as well as the stock the tanks should be supplied with small fish to be reared there.

To the Chairman: These fishermen will do much better than your technical men provided they are put on the right track. Another thing that I want is that certain pamphlets should be written in Telugu and distributed to the people by the Fisheries Department. If you distribute big pamphlets they will throw them into the waste-paper basket. You may also send certain men asking them to sing certain songs to the fisherfolk just as they do in the Agricultural Department. That is what the Fisheries Department should do.

To Mr. Tampoe: The reason why I am against the taluk boards interesting themselves in educating these fishermen is the kind of education that has to be imparted to fishermen and that which has to be imparted to common people differ from each other, both in quality and in quantity. Moreover the headmasters in schools conducted by taluk boards and district boards are often changing from place to place according as the constitution of the boards varies. This change of headmasters will certainly have some effect over the management. If the department takes over the management if it appoints the headmaster solely from the point of view of the schools will be going on efficiently and well. But if we ask the taluk boards and district boards to establish these schools local jealousies in. The transfer of a teacher depends upon local politics and

also on electioneering conditions. I want the teachers of these schools for fisherfolk to remain stationary. Unless that is done these fisherfolk will not easily adapt themselves to modern conditions and improve their ways. The only criterion for the department in appointing a headmaster or a teacher for a school should be his merit and they must straightway appoint the man and see whether he does his duties properly.

Am I to understand that local boards are blind to the merits of the man?—No, no. What I want is that these teachers should not be carried away by party jealousies or anything of that sort. They should remain stationary. It is only if they remain stationary they will be able to do some real service to these fisherfolk.

Would you suggest that local boards should bear a share of the cost?—I am afraid it will not work. You must relieve the local boards of their half-share of the burden for the benefit of the people. If the Fisheries Department is convinced that in a particular place a separate school is necessary for the fisherfolk they will have to run it side by side with the taluk board school there. These schools are not exactly vocational schools. The curriculum of the Fisheries Department will differ from that of the curriculum of the taluk board schools. I said that one of the subjects taught in the schools established by the Fisheries Department should be catching fish. The curriculum based by the Fisheries Department throughout the Presidency will be more or less the same. I know there is one fish-curing yard at Uppada. Some of these fishermen dry their fishes on sands.

To Mr. R. S. Nayudu: Even during heavy catching seasons there is demand for fish. There is always demand for fish if there is any way by which it can be sent. I am for improving the transport facilities for carrying fish. There is plenty of scope for establishing a fish-oil factory. I am for establishing a guano factory. There are seasons in a year when these fishermen catch certain kinds of fish in such abundance that they actually throw them away. For instance, there is a variety called Siru minu which they catch in such abundance and throw them away for want of purchasers. They are good edible fishes provided they are prepared locally. Provided facilities are afforded by the Government for transport and instructions are given to the people as to how to preserve these fishes or to convert them into guano that will be a profitable business both to the agriculturists and caterers. To find out how far it will be a profitable business we must take some statistics. It might be a profitable concern. I would like that these schools for fishermen should be under the supervision of the Fisheries Department because I want that one standard should be maintained and there should be uniformity in the instructions given to the people.

To Mr. Arpudasingami Udayar: We will not eat the Pulasara fish. It is a fish which causes indigestion. There are also other kinds of fishes such as Gongara, Pochakayu, Pulasara, which also cause indigestion. I would advise that these fishes should not be eaten at all. I cannot say how these fishes are caught, whether by angling or in the net. These fishermen go far into the sea.

You spoke of their conditions and you suggested the system of bounties. Now do you think that they are free from habits of gambling?—They are not gambling much. Some of them are drinking. Bounties are only given to them to buy boats. On an average they earn from about Rs. 10 to Rs. 15 per month. In a family all the members work. The husband, the wife and even the little boy or girl work. The woman prepares the dry fish, the husband goes and catches the fish and the wife carries it to the market for sale.

(The Chairman: Interrupting: I suppose when a man works all the night and day on water it is sufficient exertion for him and don't you think that he cannot do his work without it?—I can't say that he cannot do without it. But I think it is not a luxury with him.)

From an economic standpoint, if the fisherfolk spend 3, 4 or 5 annas as the case may be for drinking, of what use it will be if they are given bounties? They may not be able to pay the interest even to the Government?—The bounty is given to them to buy boats. The interest has got to be paid only from their earnings. The security is their boat for the money advanced

to them. The Government may charge something like 4 per cent interest on the money advanced to the fishermen. I am not aware of any attempts being made to teach these men to make their nets. We have introduced weaving in one or two municipal schools. We expected to get a considerable portion of the expenditure from Government, but the Government afterwards disappointed us. What I say is that we can make an experiment by starting one or two fishery schools in one or two centres, provided there is support. I do not want these schools to be started in municipal areas. The fisherfolk in my parts have been declining in their economic condition. Within my experience I have found that rice used to be sold 16 seers per rupee. From 16 to 8 seers and then from 8 seers to 6 seers of rice per rupee is now considered as normal. How can people who are making on an average 8 annas per day consider that rice is selling at its normal rate now? Under these circumstances their economic conditions must necessarily go down.

Do some of the boys and girls of fisherfolk take to higher studies?—Yes. They have organized themselves now well and there are pupils in schools who are studying in school final and other higher classes.

To Mr. R. S. Nayudu: The economic condition of these fishermen is very low. They are in debts. The money-lender or the village Komatis advance them moneys at 12 or 16 per cent. If some propaganda work is done among the fishermen and if a co-operative credit society is established for the help of these poor fishermen under the direct supervision of the Fisheries Department, then it would be of real service to them.

Side by side with this society if a co-operative sales society is established, would not that materially improve the condition of these people?—I do not believe so.

When fishes are caught during heavy seasons they are thrown outside. Supposing there is a sales society under the direct control of the Fisheries Department, will that not materially improve the condition of the people?—Provided these fishes are carried to different places where they are wanted. The margin of profit, and the cost of transport, and the cost of running an establishment, all these must be calculated and if it is feasible for the Sales Department to take these fishes to the nearest market and if they are able to find sale for their goods, then it would materially improve the condition of the fishermen.

So, you are for having a co-operative society for sale along with a co-operative credit society?—I cannot be so certain unless statistics are taken.

M.R.Ry. C. NATESA MUDALIYAR Avargal, L.M.S.,
Councillor, Corporation of Madras.

Memorandum.

The Fisheries Department of the Government of Madras ought to have been inaugurated, as in other parts of the world, with a view to adding to the economic progress of our Presidency by utilizing to the utmost extent the animals available in the waters of the sea, the river, the lake or any other reservoir; some of them such as fish serve as food and manure and others as ornaments such as corals, pearls, etc. As the present and the past methods adopted are not all that are required to make use of the products of the waters, improved methods ought to be adopted and if possible invented to suit the circumstances of our country. In trying to utilize the aquatic inhabitants, they ought not to be exhausted nor even a single species be made extinct. Methods ought to be devised by which the species available ought to be made obtainable not only in many multiples of their original number but of much healthier and more valuable specimens; their supply must be made progressively continuous. In fact, it is not only the products of the land—animal, mineral, and vegetable—but the inhabitants of the waters also that ought to be reckoned as economic assets to a State. It is with this object in view, all over the world Fisheries Departments are established notably in Great Britain, United States, Canada and New Foundland. In France they not only encourage fishing in their own waters but they "encourage, protect and subsidise" their fishermen to fish in other waters too.

To achieve these objects the present primitive methods of conducting the fishing industry ought to be replaced by improved and up-to-date ones. Taking Madras shore into consideration a fisherman is seen on his tiny catamaran with a comparatively delicate net plodding his fishing journey into the sea about five or six miles off the coast. Neither he nor his catamaran nor his net is capable of hauling up fish to be reckoned as anything. Individual exertions of number of such fishermen make something which is absolutely inadequate to the consumption of the neighbourhood, nor does it meet even the demands of the few that could afford. There is the sea teaming with potentiality to afford rich proteid food for human consumption and here is the State helplessly standing on the shore gazing at it. It is certainly negligence on the part of the State to have waited so long without making adequate arrangements. Disappointments in the beginning should not be discouragements. Even in Western countries considerable developments were made only recently. In the beginning reasonable profits and adequate remunerations ought to be out of consideration of the authorities and this also should be noted by the far-sighted politicians in the Legislative Council, especially those on the Finance Committee. It is not wise to think of remuneration before the scheme is launched out satisfactorily. From the report of the Director of Fisheries for the year 1927, I find references to the need for researches for this thing and that thing and in fact for everything and nothing is provided and he could not progress. Funds are not available and with them the experts and the necessities. It is only recently a trawler was found and some work is going on in the deep sea fishing. This trawler, as I understand from the report of the Director of Fisheries, with a defective boiler was able to lay the preliminary foundations for permanent research work and survey of the sea and was able to fix up a fishing ground. Research work ought to be undertaken also as to the feeding, spawning and climatic changes of the various species of fish.

Now as far as Madras City is concerned, co-operative societies ought to be formed and the fishermen ought to be persuaded to partake in them, as they are now too poor to do anything single-handed and many of them too illiterate to understand the benefits of co-operation. Schemes should be laid down to advance loans to them for building up better kinds of boats and, if possible, the Government should undertake to buy and hire motor

or other boats by which they can go to the deep sea and fish. Educate them and their young ones and keep them under better sanitary conditions. As far as Madras is concerned, dissuade them from drinking. I do not know the habits in other places. At least here in Madras their poverty is partly due to this habit. Thus better circumstanced fisherman will feel the dignity of his profession as other labourers ought to do also and in the long run may amass riches and become highly educated as the department is expected to impart not only technical but also general education (elementary at least) as many of the members of that community have been adorning not only the East and the West Coast but also the societies of Madras and Pondicherry. The boats that are supplied to them whether a trawler or a well-equipped boat should carry not only a strong net capable of hauling up a good deal of fish but should contain a refrigerator to keep fish fresh till they reach the shores and, if necessary, to be packed from there to decent distances inland. Here I may mention casually that it is better when these trawlers go into the deep sea far off from the coast and if the fish obtained in such abundance are not likely to be consumed on shore immediately to make arrangements to have them cured then and there on the trawler itself. Refrigerators are a necessity because it is expressed that the fish soaked in ice and preserved lose their taste.

Now let us turn to the inland fishing. It is as important as the sea fishing though it may not be so very productive. But yet it ought to be exploited because the fish from the sea cannot be made to reach the people inside the country in a fresh condition. Fish is an important article of food for non-vegetarians and it is even preferred to meat. The Government in its policy in conserving, farming and thus enriching one of the resources of the country certainly is in the right direction. But this attempt is still in its infant stage. There are only seven farms for the whole Presidency. There ought to be as many farms as possible all over the Presidency wherever water facilities are found.

While advocating economy in the establishment and expenditure, I will not make any suggestion to reduce any expenditure that is absolutely necessary to carry on the policy initiated by the Government.

Although I will not be able to give statistics as to how many fishermen are employed in supplying fish to the inhabitants, I will certainly say that it is their fish that form the chief curry of the non-vegetarians of the city and the villages. The Government in enriching the fish production, will only be improving upon and supplementing the fish supplied by the existing fishermen. The fishermen themselves can be made use of for this purpose by the Government. Government is right in having taken over the Fisheries Department into their hands from the local boards and they ought to be under their care till the local boards and the inhabitants realize their responsibilities. The local boards should not stand on the formality of being adequately compensated for handing over their fishing industry to Government, for it is only in their interest and the inhabitants of the locality the Government is pushing on this scheme. In this connexion I would also request the members of the Legislative Council not to press too much upon the immediate profit or loss but look only to the higher problem of raising the economic condition of the country. Profit or loss should never be the consideration when we are just building up an industry, which has great potentialities before it. As we hope that great irrigation projects are yet to be undertaken and waters are to be conserved, I am sure our fishing culture and our inland fishing industry will develop. Every member of the Legislative Council who has a stake in the country ought to fight for improvement of this industry in the same way as he is fighting for the various agricultural problems inclusive of irrigation.

I do not know in whose charge the fishing farms are at present. I would suggest that any zoology graduate with a training under a specialist from one of the fishing industrial stations will be quite enough to be in charge.

Again, as to the rearing of larvicidal fish Government need not be anxious about the expenditure. This fishing industry indirectly helps the economic condition of the country. They destroy the malarial larvæ and thereby prevent devitalization of human beings by malarial fever and make them produce more and thus enrich the country. In all these developing departments there should be no question of profit and loss. I do not like the question "How far is the expenditure justified and to what

extent? Can you find any other methods of improvement?" Of course, methods of improvement and how best to farm the larvicidal fish can be suggested, but not how best to reduce the expenditure at the expense of having such a farm.

As to the kind of fish to be bred at the farms, let us leave it to the experts of the Fisheries Department to decide and let us not interfere with it.

Now so far for the fresh fish. As the fish is obtained in abundance and is not possible to be made use of immediately fish-curing and other manufacture from it are the only ways. I would suggest that when large trawlers are to go far into the sea some arrangements should be made on the trawlers themselves both for fish-preserving and fish-curing. Refrigerators should be provided on the trawlers and also arrangements for fish-curing. Certainly fish-curing yards ought to be preferred to private curing. Though they may not be absolutely sanitary at present, these curing yards from what I learn from the descriptions, are a great improvement over the private curing. One that visits a private curing yard will be struck with the sight, and with the smell. I saw cured fish being exhibited from the fish-curing yards maintained by the Government in various exhibitions and I happened to be a judge on more than one of such exhibitions. Certainly the cleanliness, the sight and loss of smell, appealed to me. There is much difference between a private curing and the public one. There is no use of having sentimental objections. We and our fishermen must improve and rise with the other countries of the world.

Fisheries Department is the proper department for managing these curing yards. Because the salt is supplied duty-free by the Government and the Government of India has the control over the salt, fish-curing yards need not be transferred to the Government of India. It is not the Salt Inspector that knows fish-curing but the Fisheries Expert. Because the Government of India is supplying salt to our Presidency, are we to transfer the Government of this Presidency to the Central Government, especially when we are fighting for provincial autonomy? If there are sanitary and other defects in our fish-curing yards, it is the Health Department of the locality and the Director of Public Health and the Fisheries Department who should take care of it.

As to other products that can be got from the over-abundance of fish, i.e., fish oil and fish manure, profits depend upon their being advertised. Fish manure, I believe, is in demand in so many places and it is here the Agricultural Department should come to the rescue of the Fisheries Department. As to the fish oil, sardine has got medicinal value. It is found that it contains both vitamin A and vitamin D. Only vitamin A is in a negligible quantity. It may be due to the oil being extracted from the whole fish. An experiment is being made with the liver alone and I am sure this will prove a very good oil and may contain vitamin A and vitamin D in sufficient quantity comparing favourably with the cod liver oil. Now as it exists with vitamin D, I think it is a useful medicinal oil because vitamin D is anti-rachitic in character.

X. PEARL FISHERIES.

Pearl fisheries are going on from time immemorial. It is said about three thousand years ago Queen Cleopatra had a pearl from India and in the ancient days in B.Cs. India was trading with Egypt, Babylonia and Greece in pearls, corals, etc. As to the advantage of pearl fisheries they are remunerative and let the department improve them.

As to the insanitary condition of the place, where fisheries operations are carried on, the sanitary conditions kept up last year shows that the department combined with the Health Department of the place kept the place in as neat a condition as it was possible.

I am of opinion that aquaria are a necessity not only for research but for popular education. I think the Madras one should be developed and all the possible inhabitants of the sea and the inland waters ought to find a place in it. As the one we have in Madras for the education of the people of this Presidency is not sufficient, I think it is better that we have aquaria in all the seaport towns and, if possible, in important inland places too.

SUPPLYING SPECIMENS.

As it is not possible for the authorities of the various colleges to get all the specimens that are required for the zoological study of the students, it will be to a great advantage to all such authorities if the Fisheries Department can provide them with the specimens. As the Government is the custodian of the spreading of the knowledge in the country, it is their duty to see that the specimens are provided even at some expense to themselves.

STAFF AND RESEARCH.

I would like very much that each branch of the department has an expert to do research work. But the administrative head of the department ought also to be a technical man and not a pure administrator, a technical man perhaps, a specialist in a certain subject who must have a knowledge of all the subjects concerning the department.

As to the question whether there should be any retrenchment, I am against it. The whole department is in the infant stage. It should be developed. Retain the present staff, if not increase it and extend the field of operations. I would rather have a bio-chemist, an expert, if available, from one of these fishing stations of established reputation for a short period for our officers being trained under him and eventually I would have an Indian bio-chemist so that he will be permanently attached to the department.

To sum up, Fisheries Department is doing a very useful work. It was not able to progress much for want of sufficient encouragement. There are potentialities, in the products of the waters of the sea and the land. Opportunities now existing of utilizing them are few. With no funds, no experts and no gear work was almost at a standstill. In fact, on the whole, the department is not working at a loss. At least it has a few thousands to its credit. Let the gain in one direction be compensating the loss in another till we are sufficiently advanced. I hope this committee will move in the right direction and convince the country and the Government of the possibilities of this department.

• Oral Evidence.

The Chairman: You are a registered practitioner of the medical profession?—Yes.

For how many years have you been practising medicine?—I have been practising medicine for the last twenty years and as registered medical practitioner for eleven years.

You are a native of Madras?—Yes.

You have been a municipal councillor for how many years?—Ever since the reformed Council began.

You were also a Member of the Legislative Council?—Yes.

We have read your memorandum and found it very interesting. I see you are in favour of treating fish as a national asset?—Yes.

You think it is part of our national wealth?—Yes.

You think also that it has not been sufficiently exploited in the interests of the nation?—Yes.

Is it your opinion as a doctor that fish food is one of the best kinds of food which man can have?—It is rich in proteid matter and it is also equal to meat.

I suppose it is less costly than mutton if it is available?—Yes.

Especially for the middle and poorer classes you think that fish would be a very good kind of food?—Yes. In some places I see people take fish alone and add mutton only once a week.

Provided fresh, untainted and good fish be supplied, you think it is advantageous to the people in a number of ways?—Oh, yes.

I suppose you also say in times of famine when vegetable food is less available this goes a long way in relieving the suffering?—Certainly, if it is made available.

You consider that the department has not been doing at present as much as you would like it to do?—Yes.

You think that the fishing methods of the fisherfolk are as old as human knowledge goes?—Yes.

But don't you think that these people are a bit conservative?—Yes, they should be educated. They should be persuaded to join co-operative societies. They are ignorant.

You speak of old nets and old catamarans. You would replace these with better kind of boats?—Yes. If you want them to go beyond five miles you must have better-equipped steam boats.

Steam boats for bringing back the fish?—Yes.

Ten or twelve fishermen can go and catch and the catches can be brought to the shore?—Yes.

By the time the next catch is laid this may be brought to the shore; that is your idea?—Yes.

You say that adequate remuneration ought not to be the consideration of the authorities and should be noted by the politicians and the members of the Finance Committee?—Yes.

Am I to understand that this work of the department has a tentative value of its own and we should not think of adequate returns in the beginning?—Yes.

You consider if the men are educated by the activities of the department and more fish is put on the market, that itself is a return for the money spent by the Government. In other words, what is known as the commercial theory of the Industries Department of the Government is not a correct theory?—Not at all.

I suppose you were a member of the Finance Committee for six years?—Yes.

They used to bring the capital value, the interest, this, that and everything on the business. You hold that theory is not a correct one?—Yes.

The sooner the Government dropped it the better?—Yes.

The result is to be judged by the effect it produces on the people, that is what you express here?—Yes.

Some of these fishermen are in your municipal activities. You have known them well, their homes and their living and something of their economic conditions. What do you think of their present condition?—Of course, not good, economically very bad.

What would you suggest to improve the economic conditions of the people?—Not only educate them but if possible give them some technical education for repairing boats, nets, etc., how to prepare better kinds of boats than the present catamarans.

I suppose they learn things about seasons, gales, currents, etc., from their own ancestors?—Some of them know it.

What about co-operative societies? Are there not co-operative societies in Madras at present?—There are societies for some other purpose. For fishing there are none.

People should form together into a society to catch and sell fish. That is your idea?—Yes. All can combine together and hire a boat. Then they may have bigger boats with better equipments to enable them to go far off into the sea and then catch fish.

You think they will achieve better results in catching fish collectively?—I think so. The present boats can only carry two or three. Sometimes single men go on the catamarans.

You want the improvements adopted in the West Coast should be introduced in the East Coast?—Yes.

You ask the Government to see that the habit of drinking is removed from these people. Possibly these poor people being in the water all along would like to have some relief by way of drink. I do not think you can call it a luxurious drink as educated men indulge in?—As far as Triplicane is concerned you see men, women and children drink away almost everything they earn.

You don't attribute some feeling of relief to this drink?—Myself am a teetotaller. I do not think the man who works hard requires any drinking. I am inclined to think that it devitalizes the system and the depression will be so great that the natural strength will be lost.

You do not believe that it affords some relief to the man who works hard?—I do not believe. We tried in Cocanada. We found some of them who became teetotallers were working as hard as the others and more successfully also.

You are an advocate of total abstinence?—Yes.

Have any of these people houses of their own?—Yes.

The house-sites belong to them?—Some of them own.

I suppose there are many who have no houses of their own?—Most of them have huts.

Most of them are not owners of the soil?—No.

Do you think that it is the function of the State to see if not merely occupancy right but ownership also should be acquired for them?—I think so.

Under the Tenancy Act I think the fishermen here are safe?—In spite of that Government acquire all their lands for buildings near the Women's College.

Would you recommend to the Government that free sites should be found for them with advances for building their houses?—As they have got their business in the sea I would like them live near the sea coast. I do not want that they should go inside.

As a municipal councillor would you like that the marina should be made ugly by these huts?—Let houses be built instead of huts like Mysore where frontage is done by them.

What all fish-curing yards have you seen?—I have not seen any.

So you are not in a position to speak of improvements there?—I can say from my experience of the products of the fish-curing yards and the private curing yards. The latter are ugly and bad smelling. The sight is detestable, not inviting but repulsive.

So you consider the products of the fish-curing yards are better?—Certainly. I had to examine these things in the exhibitions twice. I was a judge and they were very attractive. They were not smelling at all.

You advocate the development of inland fisheries?—Certainly.

How do you expect to develop this?—As they do now in Ootacamund by conserving certain portions. They are preserving certain species. If everybody is allowed to fish they fish away everything.

How can you conserve the big and the small?—If it is possible it is all right.

Then you say you will not advocate any reduction in the expenditure incurred by the department?—Certainly.

You say that the amount now given is inadequate?—Almost nothing. The Director says he wants money for this and for that. He finds nothing and he is at a standstill.

You consider taking expenditure per head of population India compares very badly with other countries?—Yes.

You think that when in other countries four or five rupees are spent in Madras two or three pias are spent?—Yes.

So you would advocate more expenditure; only you would expect the Director to spend it more carefully?—I have known him from his childhood. He is a very careful man.

You want the fishing rights to be taken away from these local bodies?—If Mr. Abdul Razack will excuse me they do not know the value of these things. At least now let us say that we shall compensate for surrendering their rights.

You think that one specialist will be enough?—Bring one specialist and train others under him.

Do you know of any specialist?—Except Dr. Sundara Raj I do not know if there is any other.

You approve of the expenditure on the rearing of larvicidal fish?—Yes.

You want the work to be extended?—Yes. In Madras Corporation, a local self-government body, we have our own fishermen. We have appointed two fishermen to go and get these fish. We put them in wells and tanks and then they themselves become farming places wherefrom we transfer to other places.

How long since are you doing this work?—Intensely for the last two years.

You are the Chairman of the Health Committee?—Yes.

Therefore you are doing this work in the Corporation?—We have instituted a malarial section now. In the exhibitions we have exhibited a pond with larvicidal fish going and devouring a mosquito.

You believe in that theory?—Yes, we are observing it.

What are your ideas about conveyances. You say if fresh fish is not sold you advocate oil-making, etc.?—Yes.

You advocate refrigerating arrangements for the conveyance of fish?—Yes. The steamers that come to Madras from London store animal food for the voyage. Can that not be done here?

If fish is carried in large quantities you think you can economically sell them in the markets?—Yes. Iced fish is tasteless. Refrigeration should be in the cold chamber.

Your opinion about Indian pearl is from the fact that an Indian pearl adorned the Egyptian lady?—Cleopatra had a pearl from India.

You go to the Aquarium now and then?—Yes.

You think it is sufficiently popular?—Yes.

Do you want to extend it in any manner?—The building itself should be much bigger. The tanks must be bigger ones. Everything is cramped up in a small place.

You want that it should be made into a research station?—I think so.

So that it might not only serve from the educative point of view but might also be a research institute where the department can acquire knowledge for the benefit of the fishing industries?—Yes.

You want experts to be employed?—Yes.

Do you wish to add anything more?—The canning affair may not be popular now. There are countries where tinned food are needed. Why should you not make it marketable there?

You say even if it is not sold you may try the experiment of sending out to different countries?—Yes. About the oil much more advertisement is required. From the investigations made they say that vitamins A and B are available here. A conduces growth; B prevents rickets and both are found in cod. It is said that the vitamin promoting growth is less. Our Director suggests that if oil is extracted from liver alone this will be found in a large quantity.

Your sardine is not a big thing?—It is not so big as cod. What I say is even as it is, there is vitamin B which is medicinal; only we have to advertise it and tell the doctors to try it for rickety children. And vitamin A is not completely absent. About canning. We can try it. I am not for closing the Chaliyam cannery. I want to have it developed.

Mr. Arpudawami Udayar: You say that the catamarans must give way to bigger boats. People going on catamarans act on a co-operative basis. When they sight a big shoal, they go in different directions and cover up the fish. The fish is taken into a boat and then brought to the shore. Considering that these catamarans are suited to the financial capacity of the people can we ask them to dispense with them?—I do not want you to dispense with them. But give them better facilities. With a catamaran you can go only three miles. Form co-operative societies with these fishermen and enable them to have bigger boats. You say they are acting on co-operative basis; let them do it on a grander scale.

How to recover the money?—When they get fish, let a man stand there and collect the money on the spot as it is realized from sales. First of all we must teach them the benefits of co-operation.

Mr. Arpudawami Udayar: I heard you say that even women and children drink?—Yes; as soon as a child is born, the fisherman or woman puts some toddy into its mouth. To put an end to this habit, counter-attractions must be provided. Coffee hotels should be opened to wean people away from drink.

Khan Bahadur Abdul Razack Sahib Bahadur: Don't you think that some sort of intoxication is necessary for them after a day's work?—It is not at all necessary. A man is exhausted on drinks. He gets stimulated at first, but the depression that follows is proportionately greater. Every time you give him the drink you are drawing on the capital energy. Eventually he becomes a wreck.

Mr. Manikka Nayakar: You have no personal experience?—I proceed on the facts given to us by scientists; it is known how alcohol depresses. In Cocanada there was a toddy shop; we used to go and stand before the toddy shop and ask people not to drink. As a result we got half the men going there converted and they themselves said that they were much better after giving up drinking and they began to preach on the evil effects of drink to others.

Mr. Arpudawami Udayar: Do you think that a serious attempt has really been made by the Government to open a school for the education of the fisherfolk?—I think the attempt made by the department was a real attempt. Schools are started with the object of elevating them. The only obstacle in their way is the paucity of funds.

Have you any objection to these schools being handed over to the Education Department?—The same answer as to the question why should the depressed classes schools be controlled by the Commissioner of Labour and not by the Educational Department. Here is a community which is very backward and till it comes forward let the Fisheries Department run

the schools. But let there be supervision by the officers of the Education Department. In addition to the other text-books the students ought to be given technical education—connected with fishing and other things.

As regards refrigerators, do you suggest that these big boats which the fishermen must be encouraged to make use of should also have these refrigerators?—If you go to such a distance that before the fish reaches the shore it gets spoiled, it is better to have them.

Can these experiments you have spoken of to prevent malaria be conducted on a large scale?—Yes; and in as many places as possible and wherever malaria is prevalent. Malaria is caused by the mosquito. Mosquito lays eggs in places where water is stagnating, and larvæ are formed, and these larvæ develop in four or five days. Fish will eat away the larvæ and so there will be no mosquito. No mosquito no malaria. We cover the tanks with oil so that these larvæ having no oxygen to breathe will die. We can see them going down and lying at the bottom. But in the case of wells, we cannot put oil and so we introduce the fish and this eats away the larvæ.

The Chairman: What is the size of the fish?—One inch. In two years it grows to four inches; I have seen it.

Is the larvicidal fish itself eatable?—Yes.

Khan Bahadur Abdul Razack Sahib Bahadur: You don't like that these schools should be under the control of the taluk boards?—I want the Fishery Department schools to be under this department only, till the fisherfolk are sufficiently educated.

Mr. Manikka Nayakar: Am I right in believing that you are carrying a crusade against caste? It is on that presumption I put my questions?—Not a crusade against caste. I want all people to be united.

Birth should not be the criterion of profession. Caste crystallizes itself out of profession. Not only your good self but so many other witnesses advocated that the fishermen should be educated in fishery, net-making and such things?—It is not necessary that fishermen should be fishermen. Fishermen could become highly educated and adorn the community. We have the instance of Nandagopal, Deputy Mayor of Pondicherry. There are also others equally distinguished. I have said in my note that they ought not to stick to their own profession. Let them take up some other calling and let some of us go and fish.

Temptation and facilities are provided to continue in the same profession by creating schools?—If they amass riches and become highly educated they will be an ornament to the society. I am not for fishermen being fishermen for ever. We have got cultured men from their caste like Mr. Singaravelu Chetti, Mr. Vaithilingam Chetti, Mr. Sathia Nadar and others.

I am not questioning your aim. I am only doubting the process which I fear will not lead to that aim. You have got a doctorate in fishery. Each profession has developed to some extent and a standard of general culture as basis for the development of each profession is necessary. General basic education is more important than teaching fishing and net-making?—General education is given in addition to the technical education.

Why should their education be in the hands of the Fisheries Department and not in the hands of the Labour Department?—I have no objection; only they should feel the dignity of their profession as any other labourer should do.

Should we not take care that agricultural interests are safeguarded first and inland fisheries come only as secondary to it?—Certainly, I have said so.

You agree that the agricultural interests must be given preference?—But it should not be carried on to such an extent as to destroy the fishing industry. That supplies one kind of food and this another kind. Some poor people live only on fish. I have seen it near Cocanada and other places.

Mr. R. S. Nayudu: You admit that more co-operative societies should be formed and money advanced to them for purchase of boats, etc.?—Yes.

You advocate also side by side sales societies?—Yes.

You want two departments, one for fishing co-operation and one for selling co-operation. The society for sales will come under general co-operation and that for fishing under Fisheries. Now a special staff must be appointed to supervise their activities. So you want the Fisheries Department to work in the Co-operative Department?—I have no objection.

Because it left to themselves they will not be in a position to manage the co-operative society, so they have to be given special facilities by the Fisheries Department to conduct the society and put it on a workable basis and see that the work is pushed on?—Yes.

Here the Fisheries Department will have to find market for their goods, find out the rate of sale and work it on a co-operative basis?—That is what I said; partly for fishing co-operation and partly for selling co-operation. They should not be mixed. There should be enough of advertisements. I advocate a special officer deputed to this kind of work to establish societies and see that they are working on sound lines.

It must be under the control of Fisheries Department?—Yes.

There is no use of handing over this work to the Co-operative Department?—No.

As regards transporting arrangements, the Government are to be approached to move in the matter and special facilities should be given for transport to different parts in the interior?—Yes.

Inland fishing according to you is as important as marine fishing?—Yes; though it may not be very productive, it is a thing to be exploited.

In a district like Madura we have the Periyar supply for nine months in the year. So we can have very big tanks and conserve them and the fish supply will be a very profitable concern there?—Not only that; it ought to be done, and also farming wherever water facilities are available.

You agree this branch of study should be in the hands of the Fisheries Department alone?—Certainly.

You would advocate a special school to be opened for students who go up for higher education?—I have not mentioned it. It is better as in other branches the department should give scholarships to students to go to other parts of the Empire and specialize in the subject.

Would you set apart some scholarships, especially for this community?—Yes. If students are available in this community they should be preferred to other students.

You are for awarding scholarships to students in the community who show an aptitude for higher study?—Yes.

You would also like that along with fishery training general education is given side by side to make them fit for higher studies?—Yes.

(The witness withdrew.)

**M.R.Ry. T. V. SUBBARAO NAYUDU Garu, Proprietor,
The East Coast Fisheries, Guntur.**

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

1. The object of the Fisheries Department is to develop the fishing industry such as to catch fish, to collect pearls, chank, weeds, etc., and thus to make a decent revenue from the sea, to train fishertolk in catching large quantities of fish by modern methods, to breed and rear fish in salt waters as well as in fresh waters, to produce pearls by scientific breeding, as in Japan, and to train fishermen as mariners and sailors."

2 & 3. I am of opinion that some of the West Coast fishermen were benefited as follows:—

- (a) New methods of catching fish were introduced in the West Coast.
- (b) New methods of curing are useful to prevent some epidemics.
- (c) The work of the Fisheries Department is not so popular, for want of education and for want of demonstration in several places by the Fisheries Department.
- (d) No work of producing pearls by scientific breeding as in Japan is undertaken by the Government.
- (e) The Government should open a demonstrating department in few selected places both in West and East Coasts as in the case of Agricultural Department for the attraction of the fishermen.

4. The Government did not provide sufficient funds or did not encourage any private associations or persons who take interest and work to develop the fishing industry.

5. (a) To introduce motor launches to take the catamarans three or four times a day for fishing into the sea and to bring them ashore without delay to supply to the neighbouring markets.

(b) To have some live-boats or live-wells to keep the fish alive in store.

(c) To have some refrigerators or cold storage to store fish for a week or so.

(d) To open demonstrating centres in selected places both in West and East Coasts, to introduce night fishing by demonstration by the use of electric search lights.

(f) To open curing yards to train fishermen to cure and can fish by modern methods in the East Coast.

(g) To improve the economic condition of the fishermen.

6. The objects of the department are to train fisherfolk to catch fish by modern methods and to make them good sailors.

7. Please see answers to Questions Nos. 5 and 6.

II. FISH FOOD SUPPLY.

8. No sufficient quantity of fish is caught for the food of the people

9. Fish food is cheaper than other kinds of non-vegetarian food.

10. There is effective demand for more fish food throughout the year.

11. Greater supply can create much demand.

12. There is every probability that any material increase in the supply is sure to be absorbed. I say this from my own personal experience.

III. IMPROVED METHODS OF FISHING.

13. The present methods of catching fish are not at all effective.

14. No improvements have been effected specially in the East Coast.

15. No improvements have been effected in the East Coast partly for insufficient funds and partly because the Government did not encourage the private association or persons who undertook in the development of fishing industry.

16. Yes.

(a) Present methods of catching fish are to be improved by supplying "Poliki" timber at concession rates.

(b) Yarn Nos. 14, 20, 22 is to be supplied on credit system to prepare required nets of different kinds.

(c) The improvements required for each shore or place of fishing thickly populated by fishermen vary according to the situation of the place, i.e., whether it is close to deep waters or shallow waters or the places where the rivers fall into the sea.

(d) Opening of communications wherever necessary.

IV. DEEP SEA FISHING.

38. The fishermen usually go up two to three miles from the shore.

39. They cannot go to longer distances for want of big fishing nets and on account of their inability to return in time to sell their catches in the near markets and for want of small motor launches, to provide sufficient accommodation for bringing the catches, and for easy conveyance to and fro.

40. Only the distance prevents them.

V. FISH-CURING YARDS.

46. The issue price of salt for curing yards should be reduced.

47. Salt can be supplied cheaper and more efficiently.

49. If the price of salt is reduced, the fishermen, the curers, middlemen, and public in general will be benefited.

50. On account of present high prices, the required quantity of salt is not used for curing the fish. To preserve the salt fish properly means to improve the health of the public. Unless the required quantity is used for curing, the prepared salt fish cannot be preserved longer to get a good market, and hence are sold away at a cheaper rate to the detriment of the health of the public in general, especially poor people.

52. There is a demand for more.

53. Such demand can only be met by using modern apparatus and machinery.

54. Yes. The maintenance of the fish-curing yards can be cheapened.

55. The fish-curing yards in this Presidency are not kept under the same conditions as they are kept in other civilized countries.

56. One in the West Coast and another in the East Coast are to be constructed on the same lines of foreign countries at least on a small scale to begin with.

57. No. The hygienic conditions and methods of curing are not satisfactory in the East Coast.

58. Standard plans of curing yards with modern equipment may be demonstrated and private enterprises should be encouraged.

59. Such improvements will cost not less than 15,000 rupees.

60. The Government must provide funds and the Government may grant loans to bona fide private enterprising bodies at a less rate of interest.

65. There are no canneries on the model of the Chaliyam cannery in the East Coast.

66. It is a fact that Malabar canned fish does not find a ready market in competition with imported canned fish.

68. Indian canned fish can be popularized by importing them to important distant places, where fresh sea fish is not available, for disposal at a reduced rate for a certain period and by means of advertisement for a long period in important English, Telugu, Tamil and Urdu papers.

97. The following kinds of fish are of economic importance in Guntur district :—

White pomfret, silver pomfret, black pomfret, Seer both round and flat, Mullet, Rashora Daniconius (Maga in Telugu), Jew fish (Pandugoppa Telugu), Rock cod (Goraka Telugu), Shark, Bombay duck (Kukka Chavidalu Telugu), mackerels, valai, Hilsa, Yalam Telugu, Vulava Telugu, Netheli, crabs and prawns.

98. Introduction of motor launches, live-boats, refrigerators or cold storages and night fishing by means of electric search lights, opening of demonstrating centres for catching, curing and canning.

146. It is more important and advisable for the department to investigate the possibilities of discovering new fishing grounds and of determining suitable craft and gear that will enable fishermen to go beyond their present limits.

167. I consider an aquarium a necessary adjunct to marine biological research.

168. Besides, I consider that an aquarium will be the means of providing proper education.

170. I consider that more aquaria must be established at other important fishing places like Kothapatnam in Guntur district, and Uppada and Komaragiripatam in Godavari district, in the East Coast.

171 & 172. The railway freight on the Madras and Southern Mahratta Railway for ice and for ice-packed fish should be reduced to one-fourth of the rate as the South Indian Railway authorities have done already.

173. No co-operative societies have been formed among fishermen and in the fishing industry in the East Coast.

174. I would suggest that such societies be introduced at an early date in the East Coast in few selected places.

177. No such attempts have hitherto been made to organize co-operative societies of fishermen for catching fish and sale of fish caught in the East Coast.

180. Special concessions in the form of bounties or advances are necessary for the purpose of promoting co-operative societies.

181. Yes.

182. I strongly request that this work should be extended to the East Coast as well.

184. Modified system of education and practical training are required for this community and other interested persons.

185. It should be controlled and directed by the Fisheries Department.

189. It should be extended to the East Coast.

192. I would suggest Kothapatnam in the Guntur district and Uppada and Komaragiripatam in Godavari district as centres.

193. I consider there is need for the supply of Indian biological specimens to schools and colleges, etc.

194. It should be undertaken by the Fisheries Department.

Oral Evidence.

To the Chairman: I come from Guntur. I am now engaged in the fish trade. I have been doing this business for the last two years. I supply fish to Guntur, Rajahmundry, Secunderabad and Madras. Our catches are made at Kothapatnam, Ethamukkula, Rajupalam and Gundapalam. These places are very close to each other in the Guntur district.

Can you give the names of the fish that are caught there?—Yes.

Names of fish.

In Telugu.	In Tamil.	In English.	In Latin.
1. Moyyal (or Koyyanga is the same thing as Kathapari, only it is an agreeable Kathapari).	Madavai.	Mullet.	Mugil.
2. Chanduva (There are three kinds of these—white, yellow, black chanduva).	Vavva.	White Pomfret.	....
(a) White Chanduva ..	....	....	Tromateos cinea- res.
(b) Yellow Chanduva ..	....	....	Sinensis.
(c) Black Chanduva ..	....	....	Niger.
3. Vanchram (Spotted and plain).	....	Seer.	Ceybian.
4. Vanchram (Also round and flat.)	....	....	....
(The flat variety is not as valuable as the round one.)			
5. Pandukoppa	Koduva.	Cock-up.	Labeo.
6. Gorakka	Kalava.	Rock-cod.	Serranus and Lutjanus.
7. (a) Swara .. .. .	....	Shark.	....
(b) Palaswara .. .. .	....	Milk shark	....
(c) Pidappaswara ..	Combusra.	Hammer-headed shark.	....
8. Cockasavida .. .. .	....	Bombay duck.	....
9. Jalla	Mothakandai.	Cut fish.	Arius.
10. Maga	Kala.	Indian salmon.	Polynemus.
11. Yelum	Velameen.	Saw fish.	Pristis.
12. Crabs and prawns ..	....	....	....

These are the commercial fish in which I deal. All these are found in abundance in the seasons in all the four places I have mentioned.

Will you please give us some idea of the operations both of your fishermen and yourself? When they catch and how they catch?—They leave the shore at about 5-30 in the morning and go into the sea. Two boats go together in a batch. In this manner about forty boats go out. There will be two men in each boat. These two boats carry one net. They go to a distance of two or three miles. The sea as far as that distance is not more than 8 fathoms deep. The net they use is called Irukuvala. They spread the net against the current and wait for a few minutes and then both the boats come together and haul up the net. It is called drag-net in English. They collect the fish in basket made of palmyra leaves placed in the boat. Then they go further and the operation is repeated up to 3 p.m. Then they return in time to enable to send the collection to the market. They actually catch the fish only for three hours. They cannot do so for longer hours in the sea as most of the time is taken up by coming and going. At times they catch nothing valuable. Sometimes they get a good haul. Mullet is found only in the confluence of the river with the sea. The highest price which these four men can get for their catch will be only about Rs. 2. There are different rates for different kinds of fish. On the average these four men get only Rs. 1-8-0 for a day's labour. Even assuming that they get Rs. 2, each boat (two men) gets only Re. 1. For working a whole day in the sea a man gets only As. 8. They bring all the select fish to my godown and then I take them after weighing. I issue

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them chits as soon as I take the fish and after the operation is over I pay them. I pay only for such fish as do not get staid and that is why they have to wait for payment till the operation is over.

What do you mean by operation?—For some cases, I do not cut the fish. In some cases I rip open the fish, clean them and then ice-bag them. There are several modes of ice-packing. For the fish known as Pomfret no cut is required. As soon as they are bought they are spread on ice so that they may not get spoiled. They are packed first because they are required for the consumption of Europeans. It brings more money. The other kinds of fish are cut open. I have some men to do it. They clean the inside of the fish with a clean fresh cloth and afterwards place it on ice until it is packed in ice. This is done on the sea coast in Kothapatnam. If the catches are heavy, it will take three hours for packing. The packing is done in the godowns. I send to Guntur in packets. To Madras and Secunderabad I send them in dealwood kerosene oil boxes. First, ice is put in the bottom and then the fish and then again ice is spread on both sides and on every layer of fish ice is again put.

I manage to cut the fishes into slices with a poker. Each piece will be about 2 or 3 inches in size. They will be found only in broken pieces. Every portion will be covered with ice piece. Generally each box contains 20 lb. of fish. In baskets we can have from 38 to 40 lb. of fish. From Ongole to the place where I have got my godowns there is a distance of about 11 miles. This distance is travelled by motor-car. The sea-shore is only half a furlong from my godown. The motor-car goes right up to my door. Generally they reach the railway station by 10 o'clock in the night. It takes about 40 minutes for the car to reach the railway station. During all this time there is no refrigerator. The boxes are all locked up. On account of the trouble given to me by the railway authorities, I also cover these boxes with gunny bags. My agents at Madras are Messrs. Spencer & Co., The S.I.R. Ice Factory and the City Ice Factory. I have to get ice from Madras at As. 1, per pound. The railway freight comes to about 2 pies per pound. I get 200 lb. of ice every day from Madras. It costs me Rs. 4-11-0 for every 100 lb. of ice delivered at my railway station. From the station it costs me Rs. 1-8-0 to take it to my godown. The total comes to about Rs. 6-3-0 per 100 lb. of ice. Therefore it costs me nearly 1 anna per pound of ice. For every 1 lb. of fish I have to use 1 lb. of ice. For sending the fish to Secunderabad I have to use even 2 lb. of ice. The railway freight comes to Rs. 5 for every 50 lb. of fish to reach Madras. As for labour cost, the cost of establishment, etc., if you want details I will give you. It costs me nearly As. 4-6 a pound of fish and I sell it at As. 5 to home people such as the District Judge and other Europeans at Guntur. I sell it at only As. 6 per pound in Madras. At Secunderabad I sell it at As. 7. The total number of pounds of fish that I sell per day depends upon the quantity of catch. On an average I sell 2,000 lb. per month. It comes to 70 lb. on an average per day. If the business is increased it will fetch me more profit. I have got a lot of experience in this business. There are about 400 houses of fishermen in my place and they have got 80 boats. The remaining 300 houses have no boats. They all will have to work as coolies under others.

Have you got any suggestions to make to us as to how the fish catch might be increased?—It is the idea of some people that fish has receded into the deep sea and so there will be no catches for some time. Kottapadi is situated in shallow waters and we have no locomotives to go and return. If a motor launch is provided for us to go and return we can have three or four times the catches than we have at present. The fishermen can go into the deep sea and with the same nets but with a long rope can bring more catches, because some of these people dare go to a distance of four or five miles provided other fellows go along with them, and they can bring some very good fishes such as pomfrets, etc. In the absence of a fast motor launch these fishermen cannot go into the sea and return in time when fish is required in the market, because they go only by catamarans. A motor launch would cost about Rs. 12,000. If we use motor launch we can introduce night fishing also by means of electric search lights. They can use two or three lights to a distance of about 50 or 80 yards. Some four persons will go in four boats and they will lay their nets on each corner and they throw their lights. After spreading the lights they wait for a few minutes

and then they will have a good catch. If four persons were to gather, they will catch the fish easily. When there is no catch during day time, this method may be tried during night time. We do not want any cold storage, because ice can be taken in small boxes made scientifically by myself and the fishermen are taking four or five boxes on each side, and as soon as the fishes are caught they can be spread in the ice boxes and they can be dried.

Can you bring them in cane boxes in sea water itself?—That is only used for preserving live fish. All kinds of fish cannot live. Some kinds of fish can be preserved only if they are carried in life-boats.

These life-boats can be constructed with small bamboos and they can be attached to these boats?—They cannot take so much weight. If it is motor launch it can take these live-boats right up to the shore. So we want motor launch as well as life-boats.

After that you would like to have a cold storage?—For my purpose a big cold storage is unnecessary. In S.I.R. Ice Factory they have a small machinery which would cost me about Rs. 725. That kind of cold storage is sufficient for my purpose. It is a bureau-like thing with double shelves and inside it mica powder is put in and it is air-tight and in which blocks of ice will be placed. There is a small tube outside so that the water which is melting goes through the shelves out of the almirah. This is an invention to keep the atmosphere cool. This sort of cold storage is enough to keep the fish from deterioration. It will cost me about Rs. 750. It can hold about 500 lb. If this is not supplied to me, I mean starting an ice factory myself and also a cold storage. The quantity of fish that I estimate to prepare is about 2,000 lb.

To Mr. Tampoe: Can you sell it all?—There is a good deal of demand, I cannot meet it.

Do you think you can find a demand for 2,000 lb.?—2,000 lb. can be easily sold at Hyderabad itself.

To the Chairman: You say you have got orders from Hyderabad which you cannot execute?—Yes.

Are there any more orders from Madras?—I cannot meet the demand; therefore I have to give up the orders from Messrs. Spencer & Co. They wanted all special kinds of fish such as pomfret, marga and big prawns. On a certain day they wanted certain kinds of fish. Unless we have some live storage or cold storage we cannot meet their demands. If I am provided with a cold storage room and a motor launch certainly I can have large quantities of fish to satisfy all the demands.

You have told us your experience about a single village. What about other villages?—Generally all these villages are situated within a distance of about ten miles, and the waters on the coasts of these villages are shallow. Therefore, if there is no catch in one village, there will be no catch in other villages also.

Do you reject any quantity from these fishermen?—The selected quantity I never reject.

Do you send at all any fish to Ongole?—The fishermen themselves carry. Some Muhammadans also carry it, but they do not observe any sanitary conditions.

Do you keep any register as to what kind of fish is purchased and what kind of fish is sold? Because if you keep such accounts we will be able to find out how much and what kind of fish is capable of being kept?—I have got.

Do you complain there is no fish-curing yard on your side?—Yes.

How do they cure fish in these four villages?—When they catch these Magu and Nangappa they simply cut them and keep them in their houses at nights and in the morning they go to the shore and wash them in the sea water. Government can open a few demonstration farms in a few places on the East Coast and can teach fish-curing to these fishermen and also to others that are interested in such business. About the first question I want to say something. I want the Government to train these fishermen as mariners and sailors. These fishermen generally by birth have got an

instinct to sail on the sea. If Government were to train these people in four or five years, these fishermen will make very good sailors who will be useful for Indian Navy as well as for mercantile ships. The Government should open a naval school and also teach the people to breed pearls by means of scientific breeding.

Do you know whether they contain pearls?—They do not. At times these women say that they have found one or two pearls. It may be scientifically improved.

Do you think it is possible to produce pearls scientifically?—Yes. In Japan one merchant made about 47 lakhs in a year out of these scientific pearls and he is supplying to India and China.

They are as good as your Tuticorin pearls?—Pearls put in Indian markets are Japan pearls.

Have you got anything more to say?—As for finance why not the Government issue some fisheries bonds just like war bonds. The Government of India have granted sanction for the Calcutta Turf Club as well as Indian Turf Club. Why not for the Fisheries Department?

What do you want the money for?—Crores are required to develop the department.

What for do you want the bonds to be issued?—So that Government may not grudge for money. It must be used for the development of the Department of Fisheries. Then the present method of catching fish ought to be improved. Four kolika timber logs are required for each boat. That timber is found in the Nallamalais. This timber is not useful for the construction of house or furniture or any agricultural purpose because it is too light. During the departmental operations these woods are allowed to waste and they are eaten away by white-ants. For such timber I applied to the Conservator of Forests. He fixed the cost at 11 annas at Chalamadi railway station. At this rate it costs 55 rupees to the department and for the fishermen in their homes it costs Rs. 85. It is too much.

You did not apply through the Fisheries Department. Perhaps it would have helped you. The Secretary for the Development Department is the Secretary for the Forest also?—Then yarn Nos. 14, 20 and 22 should be supplied on credit system to fishermen.

How much yarn would you require for a net?—It costs Rs. 35. When the labour is finished a net costs Rs. 100.

You want the department to supply this Rs. 35 worth of nets on condition of repaying the same in five or six years?—Yes.

Could not the co-operative society do that kind of work?—There is no society now. If a society is formed it can help. The Co-operative Department is not interested in the fishermen. One more point. The issue price of salt for fish-curing yards must be reduced.

The Committee then adjourned till 11 a.m. on Thursday, the 12th July 1928.

Thursday, July 12th, 1928

MADRAS.

P R E S E N T :

M.R.Ry. Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, Kt. (Chairman).

Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, M.L.C.

M.R.Ry. S. ARPUDASWAMI UDAYAR AVARGAL, M.L.C.

„ **P. V. MANIKKA NAYAKAR AVARGAL, B.E.**

„ **R. S. NAYUDU AVARGAL.**

Mr. A.McG. C. TAMPOE, I.C.S., M.L.C.

(Dr. B. Sundara Raj was also present.)

Mr. J. L. P. ROCHE VICTORIA, Chairman, Municipal Council, Tuticorin.

Oral Evidence.

The Chairman : You are the Chairman, Municipal Council, Tuticorin?—Yes.

Did you submit a written evidence?—I have got a rough copy in my hands but I would prefer to answer questions and read it if you would permit. My answer to the first question is: The object was mainly to develop the fish food supply of the Presidency, to improve the material and moral conditions of the fishermen and to promote scientific research in fisheries.

That ought to be the object?—I have got another list showing what ought to be the objects. My answer to Questions Nos. (2) and (3) is: I am not aware that the attempts to increase the food supply have borne any satisfactory results but something has been done to improve the economic condition of the people on the West Coast although nothing has been done in this direction on the East Coast. Then this is the answer to Question No. (4). The reason for the failure to increase the food supply is want of organized and systematic experiments in fishing. (5) I consider that such objects should be achieved and for this purpose I would suggest that the existing methods of fishing should be studied by experts who should be practical men and efforts made to improve them. There should be systematic efforts concentrating upon the existing indigenous methods and gradually improving them. (6) The main objects of the department should be to introduce model fishing methods in large towns under the charge of experts and demonstrate the use of improved fishing net, etc. The work should be like that of the Agricultural Department which runs model farms for demonstration purposes. At present most of the fishermen are chronically indebted to the middlemen capitalists who intercept a great portion of their earnings on account of the advance received by them. Special efforts should be made to inculcate co-operation and thrift among them. (7) I would mention in the following order about the legitimate objects of the department: (i) Demonstration of efficient methods of catching fish; (ii) demonstration of improved methods of curing fish, if possible, by the exhibition of

films imported from the West; (iii) special efforts to inculcate thrift and co-operation and promote temperance; (iv) special efforts to remove illiteracy by providing a school in each fishing village; (v) improvement of transport, and communication facilities.

You think that Government should demonstrate the best methods of catching fish. In doing so you don't want Western methods to be developed but you want to develop indigenous methods?—Yes.

You also advocate the economic development of these people by education, co-operation and the introduction of sanitary methods in their homes as well as their surroundings?—Yes.

Do you admit that there will be enough fish in the year so far as our shores are concerned?—Oh, yes.

You are not afraid that very large operations will make fish not available?—I do not think so.

You also think that the present supply is not enough?—In Tuticorin it is not enough. In certain villages it is enough.

You think that certain arrangements ought to be made for conveying fish to outside places?—Facilities must be made to transport them immediately to the interior so that they can be sold fresh as much as possible.

In that connexion you wanted indigenous methods to be improved, you mean the boats?—Yes with regard to nets and boats.

You think that the department ought to undertake all that task?—Yes.

For that you want Government should spend more money than they are spending now?—They will have the satisfaction of having done something for them.

Mr. Arpudawami Udayar: You say that nothing has been done in the East Coast?—I say compared to what has been done on the West Coast the East Coast has been merely neglected though the East Coast is contributing the largest income to the department.

I am told you have fish-curing yards on the East Coast?—Yes, there are.

You think that not so much has been done for fishermen in the East Coast with regard to co-operation as has been done on the West Coast?—No.

As regards education how do they fare compared to the West Coast?—In education also they are better than the East Coast. The difficulty in the East Coast is to reach the villages as they are isolated from the centres.

Therefore when you speak of transport facilities you mean that there are no roads?—Yes, I am coming to that section later on.

Can you give some example where people have been labouring under these difficulties?—At Punnayakayal fish is brought for sale. Of course people go and buy there and they are exported inside. But at certain seasons they are not able to sell them and they dry it and salt it. If only there were sufficient facilities and communications I think they may be brought to the other centres for disposal immediately.

Even granting you have abundant catches of fish in the absence of transport facilities, fish is not available for consumption in the interior?—Yes.

There is advance received by these fisherfolk. I hear that the men who advance money insist upon having nearly half of the catch; is that a fact?—That is also the custom in certain places; a share of the catch is given.

As regards the marketing of fish I am told that the fish which is got near the shore is sold away for a trifle and before it goes to the market on the way the price is raised?—It changes two or three hands in the way.

So the middlemen reap much larger profits from the catch than the fishermen themselves?—Yes.

What would you suggest for enabling the fisherfolk to have a fair proportion of the value of the fish?—In places like Tuticorin I think they should all be organized and they should be asked to sell it through a certain medium.

You speak of systematic organization. Does it comprise cases of this nature?—This is to avoid middlemen's profit. If the fishermen were able to sell directly to the bazaar-owner, I think they would realize better prices.

Do you think developing co-operation on such lines as would enable the fishermen to have a market value?—Yes.

Can you suggest some improvements to nets or boats that you think of?—I have no knowledge. I cannot suggest any better methods. The present methods are suitable so far as the fishermen are concerned. The only thing is it involves a lot of hardship on the fishermen. I think there are better methods which they could be taught.

You speak of their want of thrift and being addicted to drinking habits. Have any methods been employed to teach them thrift and wean them away from this bad habit?—Missionary bodies have tried. They have done it in isolated instances but the results have not been more. In certain villages they have succeeded. But taking people as a whole they have not improved much.

They speak of certain seasons when the season is very satisfactory, while in others they have poor catch. Can you suggest any method of enabling these fishermen to have satisfactory catches throughout the year?—In fact the methods which I have in view take into consideration the fact that fishermen must fish more.

Can he venture further into the sea than he does now?—I do not think.

So even deep sea fishing won't solve this problem of having normal fish throughout the year?—During certain seasons he is not able to fish at all. I do not know if there is any method by which they could fish throughout the year.

Supposing you have a steam launch. Have you heard of such methods in other parts succeed?—I have heard of the trawler. Apart from it I do not know anything.

Is it a fact that these fishermen are carried away by currents?—Yes, they are not to be seen for a day or two sometimes.

The Chairman: The answer to Question No. (8) is—At present generally sufficient fish is caught for local consumption but in places like Tuticorin the quantity is not sufficient. (9) Yes. (10) There is some demand but with the opening of communications with the interior, the demand is likely to grow. (11) Yes. (12) In the initial stage there may be some difficulty, but this will disappear when there is a regular supply and easy distributing facilities.

So that you think there is always a demand provided there is a good supply?—There must be good supply and also facilities of conveyance.

Mr. Tampoe: As far as you know what large towns does Tuticorin supply?—Some portion goes to Tinnevely, Palamcottah and other places.

You say very much larger supply could be sold. Don't you think that it will bring down the prices?—Prices I think will be more or less the same.

Is there great variation between one part of the year and another in respect of the prices?—It depends upon the catches. When there is a large catch we get cheap. Otherwise it will be more.

What will be the variation?—They are sold at 8 annas a pound when it is scarce and 3 annas when it is cheap.

Do you think transport in ice is possible?—Now they are doing it because it is available.

Nobody is doing it on a large scale?—They don't do it systematically. It is only when friends oblige friends.

Tinnevely gets fish from the Colombo cold storage?—Very rarely, people who know get supplied.

The Chairman: The answers to Questions Nos. (13) to (16) are—(13) I cannot say they are effective. (14) I am not aware of any improvements made in that direction. (15) So far as I am aware I believe that there were no systematic efforts. (16) As stated above, I would suggest establishment of

demonstrations, institutions where efficient methods of fishing are taught to the fishermen. Such instructions must be based on the existing methods and improvements effected upon them.

You say that the present methods of catching fish are not effective? Is it that it ought to be possible to catch more fish?—Yes.

As regards whether the department has been doing anything in this direction you have no material to base your conclusions on for the simple reason that the Fisheries Department did not do anything in your parts?—Yes.

What are your answers to Questions Nos. (17) to (42)?—It is for the departmental officials to answer most of those queries. Regarding the trawler I have a few remarks. I am not aware how far the trawler worked efficaciously, but I know that the trawler has been used for other purposes. To that extent the original purpose for which it was intended has been defeated. It has interfered with local industries. By taking over the transport of salt formerly done by schooners, it has helped to discourage the building of country crafts and schooners which were doing this work satisfactorily and cheaply before. It is well known how the Government tried to encourage the building of country crafts and schooners during the Great War and such vessels would be losing a good opportunity of employment if the trawler interferes in the transport work. It is not in the interest of fish-curing yards if such costly transporting methods were employed. Cheaper freights must be arranged. The department must provide help to fishermen in case of danger at sea. I hear there is loss on fish caught by trawler on account of want of facilities to take the fish to the market quickly. I have got something more to say about fishermen. There are some difficulties experienced by fishermen who go to deep sea. When they go for fishing nothing is heard of them for two or three days. Unless voluntary help comes forward nobody goes. I suggest that the Fisheries Department should maintain some launch or boat which should go in case of need to rescue a party. Then there is a local grievance that fishermen when they go far out into the sea stop near the islands. At present they are prohibited from doing it.

You want to suggest that certain facilities should be afforded for fish caught in the trawler to be removed in sanitary condition to the shore?—Yes.

Secondly you want that some watch boat or rescue party boat should always be in readiness, so that when fishermen going out into sea were not heard of for a day or two, it may go out and render the necessary help?—Yes.

They don't allow people to fish near Hare Island on account of the harbour works?—No. They don't go there; it is only on the southern side the harbour work is going on; they can go to the northern side.

What is your experience as regards the sale of fish there?—I have known one instance when a large quantity of sea fish sent to the market was not saleable. It was salted and dried and even then that quantity could not find a market because it was not done properly.

As for the fresh fish that arrived in the trawler, have you any idea as to whether they arrived in good condition?—They were bad when they reached the market. By the time they reached Tuticorin they were spoiled.

Have you any idea as to how many hours previous to their being caught?—They were caught in the interval between the catch and its arrival in Tuticorin?—I have no idea.

Fishermen are generally good swimmers, aren't they?—Yes.

Have you heard of any cases of fishermen being drowned or of boats sunk?—Not many cases in Tuticorin; because they somehow manage to attract attention; there is a steamer in Tuticorin and another B.I. launch plying almost daily. So whenever they are in danger they make some signal.

Do they know how to make signals?—No. A red cloth they have, but I do not know whether they make any effective use of it.

Mr. Tampoe: Ordinarily they do not wave anything, but when they do it must be taken as a sign of danger.

The Chairman: May I take it there are not many accidents of that kind?—People on the shore are very anxious about these people. I only suggest that if there is any department to rescue these people it must be the Fisheries Department.

The Port Department should also take care. It is expected that all the boats nearest to that unfortunate boat should rush to its rescue; it is ordinary humanity. I don't think there will be any difficulty on that score?—Yes.

Is there any difficulty in landing on the Hare Island?—It is prohibited.

Possibly within certain limits?—Throughout the island.

*Within these three miles there is plenty of fish?—Not within the three miles; near the island they get some fish; but they have to go beyond the island for big catches.

You advocate some cold-storage room in the trawler itself?—Yes.

Or a refrigerator?—Yes. So that fish when caught can be kept safe without being spoiled. Necessary facilities should also be given to take them quickly to the market.

Mr. Arpudasuami Udayar: You spoke of the schooners transporting salt. From the point of view of the consumer, which is the cheaper transport, trawler or schooner?—I am under the impression that schooner is cheaper than trawler.

You spoke of the prohibition on the island?—It is only on the southern side the work is going on. On the northern side there is no work going on.

Have they any fear of the material stored there being taken away?—It is possible.

Mr. R. S. Nayudu: If special facilities are given for preserving fish there will be a good market?—Yes.

There is always a good market for fish?—Yes.

If you find that the transport of salt by the trawler is cheaper than by the schooner, you will advocate the transport by trawler?—It is only in the intervals, if the trawler has no other work, it can be employed, but not at the sacrifice of its work of catching fish.

Would you like a special experimental station established on the East Coast at Tuticorin?—Certainly.

In your opinion, the activities of the department are not so much seen there except in the pearl fisheries and chank fisheries?—We contribute the largest income to the department, but the East Coast has not been properly attended to. The activities ought to be more extended here.

There is a great prospect of the fishing industry on a very grand scale?—Yes.

You get very good fish from Tuticorin side?—Yes.

If special transport facilities are given they could be sent even to Madura and Trichinopoly?—But at present not from Tuticorin. The fish is not sufficient for Tuticorin itself. It is only occasionally we get large catches.

When you catch a large quantity, if you have special transport facilities, you can get a good market in Madura and Trichinopoly?—Yes.

You are for expansion and not for retrenchment of the department?—No retrenchment is possible in this particular line.

Mr. Tampoe: What department of Government has prohibited fishing south of Hare Island?—Harbour Works Department.

Has the Port Trust nothing to do with it?—I don't think. It is the engineer who has prohibited that. I do not know whether it is done with the knowledge of the Port Trust or not.

Has he authority to do so without the sanction of the Port Trust?—Since he is always there managing the work I suppose he thought that it was one of his duties to do so.

Was a representation made to the Port Trust?—Representation was made by the fishermen themselves. He allowed them to pass along the canal, but now they are not even allowed to land on the other side.

You say that if you are persuaded that the cost of transport of salt by the trawler is less than that by sailing ships your objection to that mode of transport would not exist?—Yes. One of the objections would be removed. The other objection remains, the local schooners remaining without employment.

But the same number of schooners are employed. The cheapness is in the element of time?—In that case it goes away. I had only two objects, one is not interfering with the schooners' work and the second is cheaper transport. If this method had been cheap, at the same time giving work to the schooners, I have no objection.

We gain in the element of time, which of course is money?—Yes.

The Chairman: The cost of conveyance is much less in the case of a trawler?—I can't say.

The schooners are private schooners? They are rented out for the purpose?—Yes.

So that the schooners have not lost their job?—No.

Probably the rates may be different; when they are sailing in their own sails and with their own crew, they will have to pay something more, whereas at present the crew can be as small as possible?—Yes.

So that it cannot be said that they have lost their work altogether?—No.

It all depends on whether the Government is incurring more or less expenditure than before?—Yes.

If they are incurring less now you would not object to the trawler being used for the purpose?—No.

FISH-CURING YARDS.

Have you got anything to say on this subject?—All the questions relate to the inner working of the yards which only the departmental people can answer. These yards should be treated as model curing stations and better methods of curing should be demonstrated. The present price of Re. 1-4-0 sits very hard on the curers. The issue price of salt should be reduced to 10 annas as before. If by it the department loses they should face it at least for the sake of giving an impetus to the fish-curing industry, which would promote the material prosperity of the fishermen.

You have got some of the finest of salt cotours in Tuticorin?—Yes.

It is from that salt is exported to the West Coast on the schooners?—Yes.

You don't think there is justification for the department to charge Re. 1-4-0 on your sales at Calicut?—I don't think.

How many pounds is one maund?—80 2/7-lb.

Did you see any fish-curing yard at Tuticorin?—I have seen in Ponnakayal and Ovari. The one is about 12 miles and the other about 60 miles from Tuticorin.

Am I to understand that there is no fish-curing yard between the two?—I think the nearest is Ponnakayal. There is none in Tuticorin itself.

How many people are there in Ponnakayal working in fish-curing yards?—When I visited it there was no work going on.

Have you at any time seen fish cured by these people?—No, I have not seen.

Mr. R. S. Nayudu: Is there any necessity for more fish-curing yards near Tuticorin?—Unless the supply is increased I don't think there is any necessity.

There are fishing villages all along the coast?—I understand that several villages are asking for fish-curing yards, but not near Tuticorin. Between Tuticorin to Cape Camorin the fishing population is greater.

You think that more fishing yards are necessary?—Yes.

As you go further south of Tuticorin you have not big towns close to the coast?—No.

You think there is absolute necessity for more fish-curing yards?—Yes.

You would advocate more fish-curing yards south of Tuticorin all along the coast?—Yes.

Mr. Tampoe: Have you been along the coast during the last two years?—Recently I had been to Ovari.

Have you heard any specific complaint from the fishermen about the work itself?—I did not go into the question.

Have you heard any complaint about the issue price of salt?—Yes. From people outside Tuticorin.

Do you know Kuthangudi?—I have only heard of it.

Have you heard a complaint that the fishermen there were prevented from curing?—I don't know.

SECTION X.

To Chairman: Excepting that the pearl fisheries have been controlled by successive rulers from time immemorial I do not know their exact history. According to tradition, they were owned by Bharathas before the advent of the Portuguese. The Bharathas claim descent from the Pandian dynasty that ruled in Madura. We are supposed to have settled in Tuticorin when the Pandian kingdom extended as far as Tuticorin. When the Portuguese came, we were converted into Portuguese and taken under the protection of the Portuguese Government. They offered us a share in the fishery. We have been called the Bharathas or Paravars.

Have you got any records to show that during that period pearls and oysters were cut?—Yes. Dutch records and Portuguese records. There was a sanad possessed by our Jathithalaivan, evidencing our rights.

Are divers not available in the country?—Their number is small; they demand very high wages.

Have you heard of Arabs being imported for this purpose?—They come in large numbers.

Do you think the local divers are as good as the Arab divers?—Arabs are better men.

I suppose diving is an art in itself; not every swimmer is a diver?—No.

You say that the department should be able to get the right sort of men. Are they available?—Yes; they are and they can be got in larger numbers if their remuneration is increased.

Why then should they bring Arabs?—They are known as better divers and better than the people who are available here.

Mr. Tampoe: Are the Arabs paid the same remuneration, although they come from the Persian Gulf?—Yes.

The Chairman: Then local men have no grievance.

Question No. 101.—I should consider the operations were efficacious.

Questions Nos. 102 to 106.—Attempts should be made to train them in diving by affording special facilities.

Question No. 107.—It is not desirable or profitable to lease out the fishing rights to contractors, because the necessary capital will not be forthcoming; and they do not possess the necessary experience.

Mr. Tampoe: If a European company offers to take the lease?—I am against it.

The Chairman: You do not want foreigners to take leases of these. So far as our own countrymen are concerned, you think they are not sufficiently trained or enterprising?—No; there is an instance in Ceylon where they tried to lease out a fishery to an Indian company, but it was a failure. The interests of the fishermen and the public require State control. The preservation of pearl banks also require it. Without State control and the adoption of very stringent measures for the preservation of pearl banks, private lease-holders will spoil them in no time. Prohibition can now be removed since no more pearls are likely to be had.

You admit that the banks would be spoiled if fishermen are allowed to fish during the season?—No. When they go near the banks they are afraid of their nets catching thorns. But they will have a temptation to dive for oysters. That is the reason for prohibiting them from going into those waters. It is good to prohibit them during the pearl fishery season and when it is over there can be no objection for fishing.

Mr. Tampoe: Even if we are certain that there are no afraid that the fishermen might go down very deep in search

The Chairman: If outsiders come in, the Government revenue reduced. If we are to give half-share the revenue would be

Mr. Tampoe: It cost us a lakh last year.

The Chairman: Whatever comes to the Government contribution?—Yes. I would like Government getting as much revenue as possible without being unjust to the others.

Do you maintain that you should give them half instead of one-third?—At least something could be done to increase their wages. It is better in the long run that the local people are trained even if it might cost a little more. Local labour alone should be trained as far as possible.

Did you ever attend any of the auction sales by Government of their share of oysters?—I have attended sales by divers. The divers come to the camp and sell it there. These are sold at Rs. 40 per 1,000. Purchasers sometimes find pearls in the oysters. Some have made great profits while I have heard many instances where people have lost all their money. It is speculation and nothing else. I should think that the Government were able to sell their share of the oysters for a proper price. I have opened some of the oysters myself. I got one pearl in the last year fisheries. It was not a perfect pearl. It was estimated to cost about Rs. 200. It was about the size of a pea. I got this out of a lot of 100 oysters.

Mr. Tampoe: But that was not the only hundred he bought? (Laughter.)—That particular day I bought only 100 oysters. On other days I got small pearls. Some oysters contain pearls.

Is the shell worth anything?—There was some enquiry from a Trivandrum button factory. Every oyster has a shell. I do not know whether buttons can be made out of shell. We sent a consignment from Tuticorin. They considered it too thin for workmanship. It goes to pieces when they put it on the machine. They are not like chanks. The pearl that we get from these oysters is not the mother-of-pearl. Mother-of-pearl is thicker. It is also got from the oysters. These shells have had no market so far. Many people have been trying to find a market.

The Chairman: In Egypt they make a heavy trade of this mother-of-pearl business.

Can you tell us why mother of pearl is not used in India for any purpose?—I have no idea.

Did you hear of any complaint when the fisheries were going on—any complaint about insanitary conditions or difficulties in diving or things of that kind apart from complaints regarding wages?—I did not hear anything.

What do you mean by pearl farm, please?—We have been trying to rear oysters. It was done about thirty or forty years ago when the department was under the port officers. They tried this oyster culture. They kept them on in a bank and preserved them till they matured.

Has it anything to do with what they say about the cultural method of making pearls in Japan?—I have heard of it, but I do not know the method. It requires a lot of research work to rear oysters. It ought to be one of the functions of the department. They should have a research section to go into this question and study this thing; the life-history of these oysters, how they live, where they live, etc.

Mr. Arpudasmami Udayar: You said that the Jathithaivaan is an important factor in these fisheries. Has he any right to these fisheries? Was he given any share by the Dutch or the English?—He was given a share. Even now he is given. In the last fisheries he had his share.

Is it one of his functions to help Government with labour (divers)?—He was doing that formerly. Though he offered his services now, since the Fisheries Department has got the necessary men, they were not accepted. I am of opinion that the local divers should be properly trained, that their services should be made use of for pearl fisheries and that the benefit should go to them.

If a research scholar could be employed for the purpose of rearing oysters and making good use of these shells, the Government could show the way to the people to make large profits that way?—Yes. That could be investigated.

Mr. Tampoe: How did the sanitary arrangements in the pearl fishery camp strike you on the last two occasions?—I should think they were satisfactory.

You are the chairman of the adjoining municipality?—Yes.

Do you think that there is any risk to the health of Tuticorin town by that pearl fishery being held there?—Yes; because there is no restriction. The people carry their oysters inside the town limits. They take a good quantity and throw the oysters and the flesh here and there in the streets. It is only from that that there is danger to public health.

Can't the municipality proceed against them under the nuisance section of the Act?—We have not made the necessary by-laws.

You do not wish to risk unpopularity?—(No reply.)

It has been said by one witness that the pearl fishery was the cause of cholera?—I do not know that. But I think that where there is cholera pearl fishery contributes to it. Nothing more.

The Chairman: Cholera does not originate with pearl fishery?—Last time there was a case of cholera among the divers, but I heard that it was an imported case. I do not think pearl fishery is the direct cause of cholera. According to the latest arrangement made, the risk is greater. Because formerly when there was a camp, oysters were thrown open and placed there. It is thrown everywhere now. There is no camp.

That is a point in favour of the camp?—From the health point of view a camp should be maintained. More oysters are now taken inside the town.

You will give us some information about chanks?—Yes. The same replies under pearl fisheries hold good here also.

Do you know why while in the case of pearl oysters the diver's share is given him which he can sell outside whereas in the case of the chanks the Government purchases the whole lot and gives the divers the price of their share?—It is done to discourage catching small chanks. If as in the case of shells these people are given their share in kind, they will try to take hold of the small chanks.

Very often some Bengalis used to lease out the fisheries for chanks?—Yes.

In Bengal there is a man who utilizes these for making bangles?—Yes; they also come and purchase chanks from our province.

Do you think that the chank shells should be made use of in some industry at Tuticorin and if bangles are made they would have a ready sale?—I do not know the demand for bangles.

Mr. Tampoe: I do not think there is any community among us who use bangles made of chanks.

Dr. Sundara Raj: In Bengal the use of this is compulsory. No woman should be without it.

The Chairman: It would be more convenient for the manufacturer to have the factory on the spot; is it not so?—Yes.

How does the chank ordinarily sell?—It sells at 4 to 5 annas each. The Government pays 1½ annas each.

Is that the case also in pearl fisheries?—Yes.

So, it cannot be said that there is any unfairness in dealing with these divers?—No.

To the Chairman: The chanks of Ramnad and Tuticorin are the best and they fetch the highest price.

Of the total catch during a season, how many do you think will be best?—On an average we can find five chanks to be the best out of two lakhs. Last year there were only two chanks.

XII. RESEARCH.

To the Chairman: I have nothing to say on this head.

Mr. Tampoe: Even if we are certain that there are no oysters, we are afraid that the fishermen might go down very deep in search of them.

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XII. RESEARCH.

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XIII. TRANSPORT.

To the Chairman : I would only add about the deplorable state of the paths leading to most of the villages on the East Coast. Living a strenuous life on the coast the people are isolated from all civilized centres. The paths are mostly sandy on which even the bullock carts are unable to pass. I consider that if the Fisheries Department were to seriously try to improve the means of communication, they should take up the question of improving the communication immediately. Without improving the roads it is impossible to get in touch with a large number of fishermen living on the coast. Even the small attempts made by the department for the amelioration of these people will be of no avail without proper communications. For the improvement of the industry there should be good communications. Otherwise the cost of sending fish to inland market will be prohibitive. It is no use increasing the supply of fish if proper transport facilities are not given. When the supply is sufficiently increased, facilities should be provided by railways to carry the fish in refrigerating trucks and freights should also be as low as possible. If the cost is kept within the limits, I do not see why a demand for fresh fish in ice or preserved in some other way should not increase. I should also mention of the very bad state of the road leading to fishing camp in Tuticorin. People there suffer very much and the condition of the path is keeping away many people who should like to attend the auctions and take share of the oysters from the divers. The Government is earning a good income from the pearl fisheries and it is just that a small portion of it is used in laying a good road from the municipal limits to the camp—a distance of about three-fourths mile.

XIV. SOCIO-ECONOMIC WORK.

To the Chairman : With reference to Question No. 173 except on the West Coast nothing has been done in the East Coast.

You would suggest any modification in the organization?—I would suggest that in all the coastal districts district officers should be appointed to see to the spread of education among fishermen and generally to look after the interests of fishermen.

To the Chairman : With reference to Question No. 175 I am unable to say if benefits have accrued, but I consider benefits are likely to accrue if co-operative societies are managed by the Fisheries Department itself.

Questions Nos. 177 to 179.—So far as I know nothing has been done on the East Coast.

Question No. 180.—Special efforts are necessary.

Question No. 181.—Yes.

Question No. 182.—Certainly I consider that East Coast has been grossly neglected.

You prefer that the co-operative societies already started or yet to be started should be placed directly under the control of the Fisheries Department?—Yes. I do not think the Co-operative Department itself will be able to do much good.

What are your reasons?—The Co-operative Department have got so much other work to do that it will not give the necessary attention for this special work.

Are all these co-operative societies being captured by politicians for political purposes? Do you apprehend anything of that kind and do you think that they will possibly be amenable to such influence?—Not in our side.

Mr. R. S. Nayudu : Are there co-operative societies working among the fisherfolk?—None at all on the East Coast.

What about the conditions of these fisherfolk? Are they improving or going down?—I should consider the condition is bad.

Are there facilities for finding out sales of all their catches?—At present none. Since they are unable to take the fish to different places they try to sell the fish in the nearest market at whatever price they are able to get.

So, you think a co-operative society for sales would ameliorate their condition?—Yes.

Do you think the people are sufficiently educated as to manage the affairs of the co-operative society themselves?—It is difficult to trust these people. I would like the Fisheries Department itself to manage the society for these people.

Their economic condition is going down?—Yes, in certain respects it has gone down.

Have they adopted any improved methods of catching?—No.

EDUCATION.

The Chairman : Question No. 183.—Have you got anything to say about the education of the people?—The present system of education has only increased unemployment among these men. It is entirely unsuited to the present needs of the fishermen.

Question No. 184.—The answer is 'yes'.

Question No. 185.—It should be controlled by the Fisheries Department. Instructions in boat-making, navigation and net-making should be given in these schools.

Questions Nos. 186 and 187.—I am not aware of the number of schools.

Question No. 189.—Certainly, the East Coast has been treated very unfairly.

Question No. 190.—Same reply as I gave to Question No. 185.

Questions Nos. 191 and 192.—Fishing industry is not sufficiently developed as to require technological instructions being given to them.

Then in that case, assuming that we got a fish chemist, if he is engaged for a number of years, don't you think that some of our young men could be trained under this chemist so that they may take his place as soon as he leaves this country?—It will be of real benefit to these people.

Mr. Arpudaswami Udayar : You said that education has led to unemployment. Do you mean that young men going for general education and aspiring for Government appointments do not always succeed in getting Government employment?—What I mean to say is that boys who belong to the fishermen community try to get some other job. They are not interested in the fishing industry. They try to get some other job under Government or other people.

Is not your experience that young men belonging to this community have by some means of general education and academic qualifications risen to very high positions?—Yes.

Is it also a fact that many of these people have taken to merchandise in Colombo and other places?—Yes.

Are also many of them employed as rovers of boats and are possessing schooners and boats?—Yes.

Therefore you are not quite against general education being given to these fishermen?—I am not against it. I want that to be supplemented by some kind of technical schools started and managed by the Fisheries Department.

Khan Bahadur Abdul Razack Sahib Bahadur : Do you wish that education should be given by the Fisheries Department or by the local boards?—Not by the local boards.

Mr. R. S. Nayudu : Am I to take that you want a first-class school having the highest technical education in fisheries and also general education being given in the same school?—I want only necessary facilities should be given in special schools to be started where higher education might be given in fisheries as the students show an aptitude. Fishery education might be given in that school alone.

Are you in favour of a school of that type?—Yes.

XV. ZOOLOGICAL SPECIMEN SUPPLY.

To the Chairman: I have nothing to say.

GENERAL REMARKS.

To the Chairman: In general, I would appeal to the Committee on the following points:—

(1) The fishermen as a class are very poor and illiterate and many of them practically starve during the off-season. Many of the fishing villages are mere huts and are annually visited by infectious diseases.

(2) For the development of the fishing industry on right and progressive lines, the moral and material condition of the fisherfolk should be simultaneously improved.

(3) The main effort of the Fisheries Department should be first to improve the material condition of the fisheries and develop the fishing industry.

(4) Many fishing villages such as Idindagarai, Uvari, Periathalai, Manapa and Mukhur have no suitable harbours and hence fishing boats better than catamaran cannot be used. Suitable harbours have to be built in such places. They are also inaccessible to wheeled traffic and are out of reach as it were from the rest of the world. The sooner the communications to these places are improved the better it would be for the people and the industry as a whole. I have nothing more to add. If I am permitted to say one thing I may say this: I hear that the Committee is going to Calicut. I request that they may also pay a visit to the East Coast.

The Chairman: We would have been very glad to do so, but Government limited the scope of our visits.

Mr. Tampoe: I am here to supplement any information that is required about the East Coast.

(The witness withdrew.)

M.R.Ry. T. V. SUBBA RAO NAYUDU Garu.

Further Oral Evidence.

Mr. Arpudaswami Udayar: You said that on an average the fishermen on the coastal districts make an earning from 6 to 8 annas. Is it a fair earning for them?—They earn 8 annas when there is a very good catch and 6 annas when there is a poor catch.

Are there also occasions when they do not get any catch at all? When the catch is very poor, how do you manage to supply your customers?—With some other kinds of fish. That is why I have given up Messrs. Spencer & Co.'s order. I think I could make the business more productive by means of live-boats whenever I get more catches. If I am in a position to keep live-fish and other raw fishes in refrigerators, then I can supply more regularly.

You said you supply 15 rupees worth of fish daily. Supposing you have 2,000 lb. of fish, can you find a market for it?—Yes, immediately.

Do you think that the improved methods you suggest, viz., having a motor launch, a cold-storage room or a refrigerator, will enable you to have a large catch, i.e., 2,000 lb., that you require normally and at all times?—At times there may be a less catch. Even then I could make it up by night catch by using Denco search lights.

From what you told us are we to understand that these fisherfolk subsist by fishing alone? Do they not lend their services to towing boats?—Some twelve persons are engaged for our boats. Others are engaged in taking timber to Bezwada and Tenali. During the time they have no catches they have to do some coolie work under Baniyas and other agriculturists.

Are there people among them who are rich enough to advance money to these fishermen and also do some export trade?—No, Sir.

Mr. R. S. Nayudu: From what you were saying, you made us understand that the question of preservation of fish is a most important thing and that you spend a lot of money in getting ice from Madras? Would you suggest the establishment of an ice factory in your place?—I have got plans from Messrs. Greaves Cotton & Co. for a cold storage and also for a search light.

Would you like if the Fisheries Department itself extends such facilities?—Yes.

You are of opinion that ice factories or cold-storage operations should be carried on by the Fisheries Department in different big centres?—Yes, or to allow private persons to do the same.

If the Government are prepared to give you a loan?—I am quite prepared to undertake that work.

That is to say only in one place?—That will do for all the ten villages. Very many big buildings have been constructed and left unoccupied in my place. They can very well be used for this purpose.

What would it cost you to start an ice factory?—Rs. 30,000.

Do you want to raise this whole amount as a loan and, if so, in how many instalments can you repay it?—In as many instalments as the Government wish me to repay it or even in ten instalments.

What about the material condition of the fisherfolk?—They have borrowed from me large sums of money. Whenever they have no catches I have to advance them with moneys. I charge only 2 annas as interest per 100 rupees as it would not be legal if I advance them without interest.

To all people in the village you advance at 2 annas per hundred?—Yes. To those who come forward.

Have they been clearing all your advances?—No, for want of catches.

Are they going in for more advance?—No, their condition is so poor that some are living on prickly-pear fruits and kanji. Their condition is very bad.

What would you suggest for their improvement?—There is no use of trawler or any other thing. Some means of catching more fish and earning more food ought to be provided for them. Some money advance and yarn advance may be given. Timber may be supplied. If money advance is given that will be spent in drinking. So if yarn is given and timber is supplied their condition will be to some extent improved.

You are sure that you can find sales for all the catches?—No doubt. Secunderabad itself consumes about 2,000 lb. and Guntur about 100 lb.

Then why is their condition so very bad?—No catches at times for about fifteen days. If they want to go into the deep sea they want some convenience. If they venture they cannot come by the evening with their catches and they cannot realize any amount from their catches immediately. This will have to be cured and dried and if any merchants come and demand then only will they realize any money.

You are there to purchase?—Only to take some selected kinds, not all.

Mr. Arpudaseami Udayar: Do they not catch flying fish—what is called Kola in the south?—There are; but they generally don't catch.

That is found in the deep sea. Fishermen on the southern coasts venture far into the sea and they take all possible precautions. They even take vakkarisi because they are not returning safe. A large catch means exportation to other places. I want to know whether it is not got on your coast?—Near Pandukopa in nearly two villages thousands will be caught. There will be a bladder in the belly. That bladder has got medicinal use and is exported to America and Germany.

Do you think that the catches on the coast when improved as a result of the many improvements you have suggested would justify the starting of a kind of farm for the purpose of extracting oil or at least making this guano, etc.?—For oil Masula is the proper place, because there is that oil fish called sardines. Here there are no sardines but only mullets. Inside it there is a thick fat layer and if it is extracted it will be useful for medicine. I know that it will be useful for making soap for horses and dogs and also for iron foundry.

Is there any experimental station for all this in your coast?—No.

You think an experimental station for all this will really do good?—Chinna Ganjam will be a very useful centre for extracting oil, because there two rivers fall into the sea. There we can get large amounts of mullet for extraction of oil.

How far is it from Masulipatam?—By sea it will be about 50 miles.

So either at Masula or Chinna Ganjam you think an experimental station may be started for this purpose?—There is Pendanur lanka and Kumaragiripatnam.

As regards abundance of fish you are convinced that large quantities are available and will be available at all favourable seasons throughout the greater part of the year to justify an experimental station?—Yes. There is no track in the rainy season. Footpath at least may be provided. When the sea is in ebb and low people find it difficult. Therefore a footpath at least is necessary. Owing to the absence of that footpath these people are shut up in their chambers. Whenever they have big catches, they have to convert them into dry fish, salt them and sell at reduced rates. If there is a footpath to take to Ongole they can make some money.

So in addition to experimental stations it is very important that facilities for communication ought to be provided?—Yes. That will not cost much. Only a footpath; no bridges need be constructed. I have to say two more things. Some of the fishermen in the Godavari district are not allowed to fish in the coast border around the reserved forests. Each man is paying at the rate of Rs. 3 annually for catching purposes to the Forest Department.

Because they catch the fish within the forest limits?—Yes. I think it is unjust and at the same time the colouring bark is sold by contract by the Forest Department and fishermen are put to much loss because they have to pay too much to colour their nets to give them long life.

Colouring material is made of bark?—Yes. That has to be given free of cost. At the same time along with that red mongro should be given free for smoking fish. It may be given for bona fide fishing purposes. Some poles are also required for drying nets.

Have representations been made to the authorities through the Fisheries Department?—No, Sir. As for myself I applied for timber which will last long for three years or more to the Conservator of Bellary. I was informed that 11 annas will be charged. When departmental felling takes place that timber will be burnt down.

Do you think the licence charged is prohibitive?—I want it to be cancelled. I think it will be no good reducing it.

Is there no danger of trees being carried away in catamarams when they go out fishing?—They are not useful for catamarams. There are the Forest Department people. Even in the hills in spite of the guards, rangers, etc., thefts are going on. Let them also take something. Therefore these people ought not to be taxed.

Mr. Tampoe: With regard to the forest timber all you want is a free permission to go and cut it yourself?—Most probably the department won't allow me. I am quite prepared to pay the felling charges as well as the carrying charges to the railway station. Let the timber be given free to the actual fishermen or to myself. I am not going to use them for any other purpose. Nobody will come forward to pay that amount.

You were talking of smoking fish. What kind do they smoke?—When curing smoking is required.

Not for salt fish?—Only for salt fish.

The Chairman: Chappidi Pariki is smoked?—Kattar pariga and Nettali will be smoked without salt.

Can you not smoke with other timbers?—Sir Frederick Nicholson recommended this. Generally people also use the same.

Mr. Manikka Nayakar: You remember you said that the monthly average quantity of fish sold by you is about 2,000 lb.?—Yes.

You sold at the rate of 5 annas, 6 annas and 7 annas in three different places, and the average may be taken as 6 annas?—Yes.

So the monthly consumer's value of your fish is Rs. 750?—Yes.

You said 80 boats are engaged with 40 nets?—Yes.

Can you give a rough idea of the capital necessary for these 80 boats and 40 nets?—Each net now costs about 100 to 120 rupees.

Forty nets means about Rs. 4,000; not less than that?—Yes.

Eighty boats?—All are bought at Madras at second-hand, at Rs. 50 or Rs. 60.

That is another Rs. 4,000 or Rs. 5,000?—So, the capital value of 40 nets is Rs. 4,000 to Rs. 5,000 and the capital value of 80 boats is another Rs. 4,000 to Rs. 5,000, and so the total value is Rs. 8,000 to Rs. 10,000 at the lowest?—Yes.

Then the boats are owned by fishermen?—Yes.

These men are whole-time men?—Yes.

The Chairman: In the off-season, don't they do any other work?—They do coolie work for their own purposes.

Mr. Manikka Nayakar: Fishing they exclusively do for you?—Yes.

You said that sometimes they come without catches and sometimes they bring plenty. On what basis do you pay them?—I pay them by weight.

Is it a fixed rate?—Yes; contract rate.

Have you any objection to place it before the Committee?—No objection. The rate is: for prawns at the rate of 1 anna a pound (if the catches are scarce at 2 annas a pound); for Maga and Pandugoppa at 2 annas a pound and when there is scarcity, at 3 annas a pound; for Jalla at the rate of 1 anna a pound; for sharks at 9 pies a pound (good quality) and the other quality at 8 pies a pound. These are the increased rates of mine. Generally they are sold at low rates.

They were selling in open market?—The middlemen will purchase at lower rates.

Previous to your adventure they were selling at lower rates?—Yes.

Do you pay any advance to these men?—Yes, Sir.

What are the outstandings?—They are all pending. Not a single pie is recovered from them.

How much have you advanced?—I cannot say the actual amount. Roughly, Rs. 800 or so.

This is a sort of earnest-money to them. Does it bear any interest?—Two annas per Rs. 100 per month. This is only for legal purposes.

Have you any security for these moneys?—A pro-note is executed in my favour.

And they have got their house there and their profession is also a security?—Yes.

As regards your venture, so far there has been no competitor?—No.

(The witness withdrew.)

M.R.Ry. P. LAKSHMANASWAMI Garu of Cocanada.

Oral Evidence.

To the Chairman: I am a native of Korangi, East Godavari district. I belong to the fishermen community which is called Agni Kula Kshatriya. Sufficient quantity of fish is not got for local consumption. Fish food is cheaper than meat or other kinds of non-vegetarian food. The present fish food supplied is not adequate. There is more demand for fish food. The supply will create a demand. As a matter of fact there is now enough demand for which there is no adequate supply. The present boats and nets can be used only within a distance of three miles from the shore. In deep waters the present boats are no good. The present fishing craft is not big enough. If bigger boats are constructed and used fishermen can go much farther than they are at present going and can go somewhat into deep waters. The nets also require some improvement. Bigger nets and more modern nets ought to be brought into existence. One other point which I should like to mention is that in drainage channels and big canals in the delta licences are required by Government to enable fishermen to catch fish. This licensing system should be abolished. They charge generally Rs. 3 per head. This is unjust and should be removed. Their catches will be small and Rs. 3 is too heavy. The longest distance which fishermen go into the sea is four or five miles from the shore. As regards fish-curing yards my suggestion is that it is not necessary that the Government themselves should build these yards. If the methods and the sanitary conditions insisted upon are shown, the fishermen themselves may construct them and use them. But the Government should advance the necessary funds on condition of recovering the same in ten yearly instalments. Salt should be supplied at half the present rate. The present rate is very high and is a very heavy handicap to fishermen.

Have you anything more to say?—I should like to mention some of the grievances of the fisherfolk. The first thing is about education. There are not sufficient elementary schools. Even the education imparted in these schools is not a right sort of one. Their present methods of teaching are different from the old methods so that a boy who passes out of the sixth or seventh standard is unable to write a letter. The next grievance that I would mention is about the auction of the creeks and tanks. The forest authorities are levying a tax of Rs. 3 per annum on every canoe or dhoni intended for fishing. It is submitted that this tax should be removed. The Forest Department should allow the fuel to be taken by the fishermen free of any royalty. They must also be allowed to take bark. The colouring of the nets gives them longer life. Government should not put to auction the bark of this tree which is useful only for this purpose and no other. Government should also assist the fishermen in building bigger boats than they are at present using. It may be allowed on the same basis as the co-operative societies do. The fishermen's villages are in the most insanitary condition. In the rainy weather they are slushy. Arrangements should be made to improve their sanitary condition. There are also no communications to their villages. The catches cannot be taken to the nearest market easily and especially in the rainy season it is almost an impossibility. Roads should be built from their houses to the nearest existing roads to enable them to take the catch to the nearest market. It will also be very convenient if some best conveyance can be arranged to distant places such as motor buses. There are no fish-curing yards in our part of the country. Some fish-curing yards should be established and the salt supplied should be cheaper than at present. Our community has a population of 160,437 according to the latest census in the Telugu area alone. There will be larger numbers so far as the Tamils and the Malayalis are concerned. Therefore these communities should be represented on the local bodies such as taluk boards and district boards and municipal councils. In that case their grievance would be better attended to and there is a greater chance of constructing roads to the fisherfolk villages.

You spoke of a three-rupees receipt. For what purpose?—It is for catching fish and to remove headload of fuel from the forest. It is a tax for carrying one headload of firewood and enabling the licensee to catch fish in the creek.

Under what is it done?—I do not know under what law this tax is being levied. Whether it is legal or not it is desirable to remove it. Fishermen also want posts to tie nets in order to dry them. Posts also are necessary for fixing them in water. These stakes are at present very costly and Government should arrange with the Forest Department to supply stakes to the fishermen at cost price. Near about my place there are ten or twelve villages on the sea coast all containing fishermen only. They are—

Gadimuga.	Koringa.
Peddavalasa.	Ramannapalam.
Chinnavalasa.	Matlapalam.
Ch. B. Venkatayapala.	Kollavuri.
P. Venkatayapal.	Etimoga.

In Gadimuga, there are 500 fishermen houses with a population of nearly 3,000, and they have only about 70 or 80 boats. There is need for more boats, but being poor they cannot afford to build or purchase these boats. The Government should assist them by giving loans recoverable within a certain time, say ten years. The names of the fishes are—

Telugu.	Tamil.	English.	Latin.
1. Royyalu	Era	Prawn	Pennaeus.
2. Cuttachapa	Madawai	Mullet	Mugil.
3. Panduchappa	Koduva	Cook-up	Lates.
4. Magalu	Kala	Indian salmon	Polynemus.
6. Gorakkalu	Kalawa	Pereh	{ Serranus.
			{ Lutjanus.
6. Jellalu	Keluthi	Cat-fish	Macrones and Arius.
7. Chanduvulu	Vowwal	Pomfret	Stromateus spp.
8. Sorralu	Sura	Shark and dog fish.	{ Carcharias.
			{ Chiloscyllium.
9. Tekkulu	Tirukkui	Skates and rays	Trygon spp.
10. Koyyingalu	Madawai	Large mullet	Mugil spp.
11. Ingelaya	Irungeluthi	Cat-fish	Plotosus and Clarias.
12. Savalu	{ Olaivalai	Ribbon fish	Trichiurus spp.
	{ Savalai		
13. Nethalu	Nethili	White bait	Engraulia.
14. Pethalu	Nandu	Crab	Squilla, Neptunna and others.
15. Bungaroyyalu	Era	Prawn	Palaeomon.

We do not know of the existence of the Fisheries Department in our parts of the province. We want the department to take interest in the fisherfolk of our parts and depute their officers to teach them new methods of fishing, to introduce new nets and new boats; they should also establish fish-curing yards and teach the fishermen how to cure fish on sanitary principles. There is much smoking fish prepared in our part of the country. For that wood should be supplied by the Forest Department free of charge. The prawns are also smoked. There is a fish put on the market known as Sappidi-parugi, literally, saltless fish. It is a very good and tasty food.

(The witness withdrew.)

Mr. M. SAMUEL, Retired Telegraphist, and a Magistrate of the First-class Bench, Vizagapatam.

Oral Evidence.

The Chairman: You come from Vizagapatam?—Yes.

Where were you employed?—I served in the Telegraph Department.

What are you now?—I am now the First-Class Magistrate at Vizagapatam.

Have you had any occasion to interest yourself in the fisherfolk and their trade?—The fisherfolk are living on the beach very close to my residence.

Have you seen the questionnaire?—Yes.

Is there any question on which you would like to say anything?—Here and there there are some questions which I can answer.

How many houses are there of fishermen near your house?—There are nearly 500 to 600 houses and there are about five people in each house.

What is the occupation of these people?—They have no other occupation except fishing. The male population go out into the sea and catch fish while the females take them to the market for sale.

Are they living in huts?—Yes. They have got thatched houses of their own. They were formerly living near the backwaters. The Government wanted their house-sites for harbour works and they were evicted and given lands very near the hill. The Government did not like their huts on sea-front of Vizagapatam and that is another reason for their eviction. The site near the hill was found to be marshy causing several deaths among them and then they were given sites near the sea.

All the male members including boys go out fishing?—Yes. They go out at 5 o'clock and return in the evening. Sometimes they go at midnight and come back with their catch early in the morning.

Where do they sell their catch?—They take the fish to the merchants who come to the shores and sell the major portion. The rest is taken to the market. Some take their catch direct to the bazaars.

How many men go out in a batch?—Two boats go together. There will be four persons in each boat. Thus eight men go in two boats. They take only one big net.

How much do they make a day?—Sometimes they secure a good catch and at other times very little. In some trips they get Nakkallu in large quantities. That is a cheap stuff. It is taken as dry fish to the interior.

What is the maximum that eight men with two boats get a day?—On the average they get about Rs. 20. But these people are assisted by other men, about twenty persons who pull the net to the shore.

What kinds of fish are caught?—

Names of Fish.			
In Telugu.	In Tamil.	In English.	In Latin.
1. Nathallu	Mulluvai .. ..	.. ..	Chirocentrus.
	(Valai is full of bone).		
2. Bonthalu alias Kayyangu	Madavai	Mullet	Mugil.
3. Chanduvulu	Vowwal	Pomfret	Stromateus.
4. Soorankalu	Kelangan	Whiting	Sillago.
5. Suthumulu or	Suthumbu .. ..	.. ..	Lactarius.
6. Karalu	Karal	Silver bellies	Equulla and Gazza.
7. Magalu	Kala	Indian salmon	Polynemus.
8. Jellalu	Keluthi	Cat-fish	Arius and Macrones.
9. Borasalu alias Gorakkalu.	Kalava	{ Sea-perch	Serranus.
		{ Rook-ood	Lutjanus.

This is a kind of fish found under the rocks. It is not tasty and is of a big size.

In Telugu.	In Tamil.	In English.	In Latin.
10. Vanchiralu	Vanchiram ..	Seer ..	Cybiium.
Konem is a variety of the above fish, only it is bigger and grown up.			
11. Sorralu	Sura ..	Shark ..	Carcharias.
12. Royyalu	Era ..	Prawns ..	{ Penaeus and Penaeopsis.
13. Kavalu	Soodai Nonalai ..	Sardines ..	Clupea.

These are caught in the season in large quantities. They go in shoals like Nathaloo and are caught in the net.

(Dr. Sundara Raj: East Coast sardines are the best of the sardines. They have tender bones. Its taste when tinned is excellent. Just like the sardines got from the West Coast these can be tinned and exported.)

The next kind of fish is

14. Thimiriachappa (circular thing).	Thimilei ..	Electric ray ..	Narcine.
It has got electric eel or ray. Medically also it is used. It cures numbness. There are also various other kinds of small fish and crabs in plenty.			
15. Pethalu	Nandu ..	Crab ..	Scylla.
Various kinds of prawns are also available.			

Do you know whether the fish is sufficient only for Vizagapatam consumption?—It is becoming rare. The price is daily increasing on account of fish being taken away to Calcutta and other places by railway. They put it in ice. The harbour works are going on and other people have come to the city. So the price of fish is daily increasing. The supply is the same, the demand has increased and therefore the price is increasing daily. Now we have to spend 4 annas or so for purchasing fish. It is not a case that fish is wanting in the sea. There are also number of fishermen. But boats are not available.

How many families have got boats?—Two families. They all unite together and work. The males who are strong fellows go in the sea and catch fish.

You say more boats can bring in more fish. Then why are these fishermen not having as many boats as possible?—Poverty is one of the causes and therefore they are not in a position to purchase more boats and more nets.

Can you give us some idea of the cost of a boat or a net?—A net costs about Rs. 50 or Rs. 60 and a boat Rs. 30 or Rs. 40.

What will be the size of the boat?—As long as this table (referring to the table on which the Committee were sitting).

Is there a school among fishermen?—There is a school in the fishermen's village.

Do they require any help for repairing their nets?—There is nothing like repairing their nets. Some of them will be repairing, and others will be doing some other work. They never take any outside help for anything. Some of them repair the boats themselves.

Is there any co-operative society for them?—No.

Did you at any time serve in those parts?—I was a touring officer in Ganjam and Vizagapatam districts.

Did you at any time come across Fishery officers in those parts?—In Vizagapatam there is the Inspector of Fisheries.

Is there any fish-curing yard there?—There is a fish-curing yard at Dolphin's Point where the fish is cured. The fishermen are near the sea coast and when they have their catches they dry there. The present method of curing is very much better than the old method. Formerly they used to get a kind of fish called Magets in plenty. They cure all those kinds of fishes which they cannot sell. Maga and Bontha fishes when they are cured sell at Rs. 1-8-0 or so. Dried fish is more costly. Formerly salt was supplied to the fish-curers cheaply.

What is the price of salt at the fish-curing yard?—Half anna per seer.

What is the price at which they sell salt in the open market?—At Rs. 4 per bag or Rs. 2 a maund.

So the fishermen get salt for curing purposes at 12 annas less than the market price?—Yes.

Do you know the proportion in which they put salt for fish?—I do not know, the department must know it. They put salt according to the size of the fish.

Supposing a dried fish is worth 8 annas how much worth of salt will it contain?—It will not contain more than 2 annas worth of salt.

This curing is done by merchants?—They advance money and get things done. By having fish-curing yards we get better salted fish. Formerly we used to get fish with very bad smell.

Mr. Arpudraswami Udayar: What about the economic condition of these people?—Their standard of life is very low.

Are there any co-operative societies?—There is a Christian co-operative society.

Is it working very satisfactorily?—Yes, but loans are not given to these people because they have not much property.

What about their boats or their nets?—Oh! boats and nets. They will not give loans on the strength of these small things.

You speak of the Indian Christian co-operative society. Are missionary bodies helping these people?—There is a board school there which I think gives them education. But usually they do not like to go to schools. They go to the sea both morning and evening and during rest of the time they will be sitting in the midst of their children, and simply chatting.

So are you in favour of a compulsory system of education being given to them?—Yes.

Are there panchayats working?—Oh! yes. I never saw fishermen coming to the Court. They settle disputes between themselves.

In our parts people have a prejudice against salt fish, because they think that it is prepared by what is called Kallipadam?—It is simply a prejudice.

You don't get this kind of flying fish?—Sometimes they get. In Ramba you will find flying fishes.

Are they able to catch in large quantities?—The people of Ganjam and Orissa are not properly educated and the systematic way of catching fish is not known to them.

Do you think that these people are given to drinking?—Supposing there is a dispute between some of them it will be settled by themselves and the culprit will be fined and the fine so collected will be used for drinking. If one person dies the other people collect some money and drink. That is to say to avoid the horrors of death they do like that. They are very backward and illiterate. But they are always honest and timid. They are very strong and fine fellows and each man will get daily 12 annas or Re. 1 as his wages.

Mr. Tampoe: You know the fish-curing yard at Dolphin's Point?—Yes. I constructed the fish-curing yard there.

Do you think it can be improved?—You can erect a permanent shed instead of trying to repair it often and often. If you erect a permanent one it will be of lasting benefit to the people.

How much would it cost?—Rs. 1,000.

Is it your opinion that since the establishment of these fish-curing yards the quality of dried fish has very much improved?—Greatly improved.

Have you heard of any complaints that there are not enough of fish-curing yards on the East Coast?—Vizagapatam requires one. You have one at Waltair. It is three miles off Vizagapatam. But there are a good lot of fishermen in Vizagapatam and if there is a yard there it will be of benefit to the fishermen there.

Have you visited the one at Polavaram?—No.

(The witness withdrew.)

Dr. B. SUNDARA RAJ.

Further Oral Evidence.

The Chairman: You were telling us that you have reduced the cost of transport of salt by using the trawler from Tuticorin to the West Coast. Will you give us some idea of what it was costing before and what it is costing you now? Will you first of all let us know what salt you annually take to the West Coast?—On an average we transport about 210,000 maunds per year.

How were you transporting this before the trawler?—We employed a contractor who loaded the salt into his schooners and sailed to the West Coast.

Will you give us some idea of what we were paying previous to this trawler?—The average cost of the transport of salt by sea on a maund of salt paid by the Salt Department is As. 9-4.

It is the Salt Department that transported?—Yes. The salt-curing yards being in the possession of the Salt Department prior to 1924, the Salt Department did the transport work. The department was paying at the rate of As. 9-4 for conveyance to take them to the West Coast.

That must be the rate which the Salt Department must have paid to the contractor?—Yes.

It was only in 1924 that it was transferred to you?—Yes.

The trawler did not come till 1926?—It came in 1926. There was some difficulty in using the trawler. Therefore the same old contractor who did the work for the Salt Department was conveying portion of the salt.

How did you tranship that year and what did it cost you?—I will give the figures to-morrow.

In 1926-27 you did not employ?—We employed to some extent because there was difference of opinion between the Development Department and the Finance Department as to the use of this trawler.

Therefore you could not employ the trawler?—To the extent to which it could be used. A portion of the salt was entrusted to the contractor.

How did you pay that man?—The same old rate. There was a slight reduction in the Salt Department amount; that was all. The lowest rates for sea transport were Rs. 11 per ton for Calicut and Rs. 10-14-0 for all other yards on the West Coast.

How would it work out?—It comes to about As. 6-6 per maund of salt.

It is pretty good advantage?—It includes other charges. Only sea transport costs As. 6-6.

So far as the use of the trawler is concerned, it is only sea transport?—Yes.

We are now trying to find out the difference between the cost of using the trawler for the purpose of conveying salt to the West Coast and the cost which you would incur in case you don't employ the trawler but give it to a contractor to be sent by schooners?—One charge is not common, that which is due to the expeditious transport.

That does not come into the rates?—It does. Immediately a demand arises I raise the cost sufficiently and naturally then you do away with the more costly system of transport by rail. The Salt Department used to send 80,000 maunds by rail simply because the schooner system was dilatory.

To my knowledge of economics it seems to be somewhat different. When the supply is large the price is less. By taking the trawler at one time you dump the yards at one time and therefore you cannot price it very high. Supposing you take only a portion of it, more people will rush to you?—The price of salt being fixed that temptation goes.

If that is so, nothing turns upon the fact of the schooners going full?—This comes in because for railway transport we have to pay double.

Even the contractor takes it by sea?—Yes. Where that contractor fails the Salt Department has been supplementing that supply by railway transport. For transport they are paying double the amount.

I am not able to follow you. Why does the railway come in?—The fair weather season when sea transport is feasible and possible is between the months of October and March. If we fail to transport salt within that period, the balance of salt that must be sent there must be sent by some other means. If it is not sent, work will suffer. Therefore the Salt Department had to send by rail on an average 80,000 maunds.

If you had entered into a contract between October and March, is he not bound?—But he will demand more price. The question is entirely one which is more economical.

Why should he demand more?—He will say "You tried to do it. You know what it costs us. I am not going to do any better. So pay me the whole amount."

You undertake to pay 6 annas or 5 annas and contract with him that he should have the whole of it transported. Will he not take it?—He will provided certain conditions are given. Supposing the contractor chooses to take the whole quantity of salt that is required to the West Coast, if you allow him to do it, he will dump the whole where there is no provision for storage. The fluctuations in the consumption of salt is dependent upon favourable or unfavourable nature of the season. That fluctuation is so enormous that nobody can foretell. We have had to send to the West Coast nearly three lakhs of maunds. Two lakhs ten thousand is the theoretical average. We are not in a position therefore to say what exactly the quantity of salt is that we require in the West Coast.

So you were obliged to send it by rail though it cost you more because you have no storage godown?—No storage, fluctuation of cost or the previous year's balance will be very large or very small. The quantity will depend upon what we have used in the previous year. All these counteract. No department is capable of saying this is our fixed quantity.

Will salt be spoiled if it remains stored continuously?—It will remain for five years but there will be shortage.

Just as paddy?—More in paddy.

Provided you have godowns?—Even then moisture will have its effect.

What will a godown cost you?—We must have godowns with a capacity of 16,000 to 20,000 maunds.

You want five godowns for a lakh of maunds?—Yes, in different places.

How much will a godown cost?—It will depend upon the size. I think we have estimated for the ordinary storage to accommodate 10,000 bags at Rs. 6,000.

So you want Rs. 60,000 for ten centres?—Yes.

Would you have us recommend anything like that?—Government are considering a recommendation like that. I have asked for godowns in the yards.

You think such a recommendation from the Committee will serve the purpose?—Yes.

You think it is a necessity?—It is an absolute necessity. It will reduce the subsidiary transport and the railway transport.

The Committee then adjourned till 11 a.m. on Friday, the 13th July 1928.

Friday, July 13th, 1928.

MADRAS.

P R E S E N T :

M.R.Ry. Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, *Kt.* (*Chairman*).

Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, M.L.C.

M.R.Ry. R. S. NAYUDU Avargal.

Mr. A. McG. C. TAMPORE, I.C.S., M.L.C.

Dr. B. SUNDARA RAJ.

Further Oral Evidence.

At the request of the Chairman the witness had prepared a statement (appended) showing the transport charges of salt incurred by the Fisheries Department during the last four years, which he filed before the Committee.

APPENDIX.

Statement showing the transport charges of salt incurred by the Fisheries Department during the years 1924-25 to 1927-28.

	Total quantity of salt transported.	Quantity by contractor.	Cost.	Rate per maund.	Quantity by rail.	Cost.	Rate per maund.	Quantity by trawler.	Cost.	Rate per maund.
	MDS.	MDS.	RS. A. P.	RS. A. P.	MDS.	RS. A. P.	RS. A. P.	MDS.	RS. A. P.	RS. A. P.
1924-25 ..	168,952	168,952	63,911 15 0	0 6 5-2	10,000	6,510 6 8	0 10 5	Nil.	Nil.	Nil.
1925-26 ..	203,366	150,150	72,436 5 0	0 6 5-2	23,216	15,114 9 4	0 10 5	Nil.	Nil.	Nil.
1926-27 ..	100,352	40,910	16,444 2 0	0 6 5-2	46,414	26,640 15 4	0 8 10	12,998	4,627 12 0	0 5 8-2
1927-28 ..	190,306	21,396	8,604 0 3	0 6 5-2	147,430	77,554 5 2	0 8 5	62,254	22,113 2 2	0 5 8-2

Statement showing the average cost of transport of salt by sea and rail incurred by the Salt Department for the seven years ending 1923-24 :—

Year.	Average cost of transport per maund of salt.	Remarks
	RS. A. P.	
1917-18 ..	*0 6 8	* Owing to shortage of railway freight and to low stock of salt at the Madras Depot, all the yards on the West Coast were supplied with salt by sea from Tuticorin.
1918-19 ..	0 11 3	
1919-20 ..	0 9 0	R. The rates of freight paid by the Salt Department for the salt transport contractor were as follows :—
1920-21 ..	0 8 5	(i) Rs. 12-13-0 per ton (27-29 maunds) of salt from Kayalpatnam to fish-curing yards in the Udupi Circle, and
1921-22 ..	0 8 5	(ii) Rs. 12-8-0 per ton (27-29 maunds) of salt from Tuticorin to yards other than those in the Udupi Circle.
1922-23 ..	0 10 4	
1923-24 ..	0 9 1-5	

(Dr. Sundara Raj explained the several items in the statement to the Chairman and the other members of the Committee.)

The "rate per maund" is what we have paid. That includes cutting, packing, etc., charges. Transport is inclusive of these charges; we do not pay the contractor separately for these items.)

The Chairman: This does not include the cost from the shore to the yard?—Inclusive of it. He is supposed to do it. There is a clause exempting him from that work provided the weather is very bad; and when he could not do it, the department does it. Very often the contractor foregoes it and we extract it from him.

This charge does not represent correctly what we would have to do in case we convey it ourselves?—This charge only indicates what the contractor from Tuticorin has been doing. He takes salt from Tuticorin and sets it at the door of the yard.

Annas 10-5, does it include the cost of conveyance from the railway station to the yard?—No; it does not include either the preliminary charges from the Salt Cottars into the van or the final charges of distribution from the railway station to the yard. It is purely railway freight.

But the figure given by the contractor includes both these charges?—Yes.

Would it be right if we add one pie per maund for transport from the railway station?—At the least it amounts to 2 annas a bag, only at the West Coast.

On this side?—It will amount to 3 annas per bag. That is only in the case of yards which are adjoining the railway station. In the case of yards which are distant, we have to incur special charges. That is why it is not worked out there.

So that by rail it would be As. 12-5?—Yes.

Taking the cost of the contractor carrying it and of yourself doing it by the trawler, the difference per maund does not appear to be more than 9 pies, the difference between As. 6-5 and As. 5-8. So, 2-10 lakhs maunds multiplied by 9 pies will give Rs. 9,843-12-0; that is, it will come roughly to Rs. 10,000 excess?—Yes.

But we have to make allowance for interest, depreciation, wages of the crew, etc.?—That has been worked out in the As. 5-8.

So that you may say that Rs. 10,000 will be the net profit, if you are able to carry all the 2 lakhs odd maunds on sea transport?—Yes; as I have said in the previous statement. I have explained in it the relative cost as between the Salt Department transport and the Fisheries Department transport. Then, besides the reduction in cost price of salt and transport charges, there are other pecuniary savings if the trawler transports the salt. Then, the lack of godowns is a great handicap. Even with the trawler

it may come to railway transport if there are not a sufficient number of godowns. There is not sufficient accommodation on the West Coast for the average season's consumption of salt.

It takes 48 to 50 hours to take salt by the trawler from Tuticorin to Calicut. Supposing there are no storms or obstructions in the way, how many days do they take?—They take anyway between four and five days, if there is good wind; otherwise a fortnight or three weeks.

Mr. R. S. Nagudu: What is the distance?—Nearly 300 miles.

Khan Bahadur Abdul Razack Sahib Bahadur: What is the number of bags taken by the trawler at a time?—If you ask me the maximum quantity, Mr. Cribb says there is absolutely no technical difficulty in taking four schooners with a capacity of 6,000 bags. That will be a strain. As a rule, we have been doing only with three schooners of a capacity of 4,000 bags. Within six weeks we can transport the whole quantity to the West Coast. There is no accommodation in the yards. Secondly, if it comes to hard blowing (suppose she meets with very strong wind) we do not make her work at the maximum capacity. For 2-10 lakhs maunds, I have put it down as as eight trips.

The Chairman: Do you think you can dispense with railway transport absolutely?—I don't see why we should not.

Mr. Tampoe: How much have you transported this year?—About one-fifth of the quantity.

To the Chairman: There were no clear orders when the trawler should work. I was not allowed full discretion for transport of the entire quantity by the trawler.

The Chairman: Is the trawler all right to-day?—No, she is not.

If the trawler is allowed to be made use of fully for six trips, it need not occupy more than forty days in the year, and the Government will be saving a good sum. Forty days may be taken as the period which will be occupied by the trawler in doing this work?—Yes.

The Chairman: What is the research work she is doing in her long-shore trips?—She is doing research in meteorology, hydrography and plankton work. That work can be undertaken by the trawler while she is engaged in transporting salt. She explores water conditions, currents, salinity, temperature, etc., and finds out the minute drifting food in the sea.

How do they find it out?—By collecting it both horizontally and vertically. There is one other point I wish to mention. It is utterly impossible for the trawler to be worked any more intensely for research or for trawling than what I have planned out. You cannot work the trawler even for forty days in deep-sea fishing under existing conditions.

What are the difficulties?—Various Governments have got vessels deputed for this kind of work. You could call for the number of days in which they are out. It is necessarily small, because the amount of information, data and material collected on trips has got to be classified and put together and that can only be done on shores. You cannot do chart work on board the trawler except in a rough way.

How does that come in in this calculation?—Our officer would not do the work when he is towing the schooner.

Therefore these days cannot be counted against delay?—If I go into a little detail, I can answer the question. Let us take the trawler going out for trawling, say, to Capo Comorin. She records the depth of the water on her way, whether the bottom is sandy, rocky, etc., and keeps samples. All these have to be landed in a place and worked up; and the material thus collected is shown on a regular chart of the sea. The time at which it was taken, etc., is also recorded. Mr. Cribb would record the materials and send them to shore, Krusadi Island, where they are then attended to. He then goes out again with the materials required for further research.

How does it come in in this calculation, the utility of the trawler?

Mr. Tampoe: If he did not transport salt, he will have to ride at anchor.

During these three days he will also be on the trawler?—Mr. Cribb does not do the work. It is his assistant that does this.

If these days are used for fishing, further data could be collected by him and the men on the island can go on with their work?

Mr. Tampoe: We cannot eat faster than we can digest.

Is it an advantage to have this vessel for the transport of salt also?—Yes; in working on a full programme of trawling there will be idle times and those idle times can be economically used for the transport of salt.

My objection to that answer is this. Why should it remain idle? The man on board will take his points on paper and hand them over to the man in the island and he can go to the sea to do further research work during the time which is occupied by sailing to Calicut taking salt?—The difficulty is this. Until I know what extent of land has been explored, it is impossible for the trawler to decide on the next stage of operation. There is no use going anywhere and everywhere.

What do you mean by next stage of operation?—It is absolutely necessary for Mr. Cribb to get to the shore and test the materials collected before he can go again. He must know where he stands. This testing is done by the staff. He is in the meanwhile engaged in other work.

If this salt transport is not undertaken he will have to be idle on the trawler?—Yes.

What prevents him from going and continuing the work of the very nature which he did before?—He cannot do so until he knows what he has done and where he stands.

I can understand your saying that he cannot go and fish outside the areas which he has not explored. Here and there are certain areas which he has not explored. How is he prevented from exploring the unexplored areas while his subordinates test the materials collected by him in the Krusadi Island?—There may not be difficulty in exploring unexplored areas. But he would not be at this centre for working out. The Krusadi station has nothing to do with the fishing banks outside Calicut. Until the charting is done on the result of a cruise by the trawler, we do not know which operation requires to be investigated.

Mr. Tampoe: The second step in research is determined by the result of the first trip.

Therefore some kind of interval is absolutely necessary?—Yes, and only during that interval he can fit in these trips.

If you supply salt during these periods it will serve the purpose of the curing yards and they would not be put to any inconvenience?—Yes. They want salt in dribbles. They cannot store any large quantity at one time.

Therefore while nothing is gained by non-transportation, there is something to be gained by it?—Yes. That is my whole contention. That is how the original scheme was conceived at the beginning.

(The witness withdrew.)

M.R.Ry. P. E. MANIKKAVELU CHETTIYAR Avargal of Rayapuram.

Oral Evidence.

The Chairman: You are a native of Madras?—Yes. I belong to the fishermen community.

Have you got anything to do with the fishing trade?—No.

Did you receive a copy of the questionnaire?—Yes.

Have you got written answers to those questions?—No.

(*Mr. R. S. Nayudu* then examined the witness in Tamil.)

Have you anything to say about the fisheries?—A trawler came and worked here for one and a half months and then it went away carrying stones. It did not do us any good. Among the people in Madras our people are the poorest. They go out into the sea for a distance of 15 to 20 miles and bring enough fish to make a livelihood. If they get karivadu in large quantities they earn Rs. 5 to Rs. 7 in one trip. A catamaran consisting of five pieces costs about Rs. 100. They buy this from Colombo. Nothing else than catamaran would be useful here. There are no schools in our village. I had a school of my own. Now the Labour Commissioner pays something for the school.

How many men go in a catamaran at a time?—Sometimes 1, sometimes 3, 5, 7 and 9.

How can one man go alone?—He can go.

If seven men go what do they get in all?—They get between 25 and 40 rupees. If seven men go they will even catch man-catching sharks and tie them in the catamarans.

When do they leave the shore and when do they return?—They go at 4 a.m. and generally come back at 6 p.m. but when the wind is unfavourable they come only at 8 p.m. In the night they will be guided on their return trip by lights shown from the shore. They keep the Tirupati hills in view at sea when they are not within sight of the shore.

How many fisherman families are there in your neighbourhood?—There are about 500, big and small. In Bowerkuppam—a place called after the name of Mr. Bower who was Labour Commissioner and who got this land for the fishermen—there are about 24 catamarans, 78 houses and 250 people. The people of this kuppam go in barges and do lascar work also. In Tondiarpetkuppam there are about 35 catamarans, about 125 houses and 500 people. These people have their own houses. In these two places they have no boats. In Puthumanakuppam in Suryanarayana Chetti street there are about 200 houses. These houses were given them by the Collector as a gift, but for some time the authorities were collecting about one rupee from each house. There are about 500 people there. I am the headman of the place. Many people (about one-third) go and do other work. There is a temple in this kuppam and a certain proportion of the catch by the fishermen of that village goes to the temple for the celebration of the temple festivals. The catch is divided into so many shares. A portion goes to the owner of the boat. The catch made in a Masula boat is shared by the owner. Koora-kathalu or seinu fetches about Rs. 3-8-0. In three nets once they caught about 100 fish of this sort and got Rs. 900. We give a fisherman Rs. 50 as advance. When he leaves he will return the money. There is no interest charged for the money. He pays for his debts from the catches that he makes. If to-day a fisherman sells a fish for Rs. 10, for the net and other things the fisherman takes Rs. 5 and pays the remaining Rs. 5 to the owner who advanced money to him.

Is there any other kuppam?—There is one kuppam at Kasimedu.

How many nets are there at Kasimedukuppam?—There are 100 nets and 2,000 people in Kasimedukuppam. All these people, when they do not go for catching fish, work in Messrs. Best & Co., Parry & Co., and other firms as coolies. They go and fish at nights and work as coolies during day time.

Is there any other kuppam?—There is one kuppam at Panamarathu-thotti, Rayapuram. It is called Old Rayapuram. There are about 400 houses. They have something like 150 nets. It is only there they have got big nets.

What is the cost of these big nets?—Net and boat all joined together formerly used to cost Rs. 250 or Rs. 300. Now it comes to Rs. 700, Rs. 800 or Rs. 1,000. Panamarathottikuppam is the only hamlet where they use Masula boats. Masula boat is bigger than a Malabar boat.

Is there any other kuppam where fishermen live?—There is one kuppam called Mattankuppam. In this kuppam there are more than 300 houses and there will be something like 700 people. There will be about 60 catamarans and 60 nets.

Is there any other kuppam?—There is a kuppam called Nadukuppam.

How many houses are there?—There are about 100 houses and about 50 nets in Nadukuppam.

Is there any other kuppam?—In the neighbourhood of Nadukuppam there is another kuppam called Nochikuppam. In its neighbourhood there is another kuppam called Mullikuppam in which there are Christian fishermen. There are about 100 of them and have 30 nets.

Do they sell all the fish they catch?—Yes.

Do they simply throw away if there is any surplus left unsold?—They make it as dried fish. Dried fish from Malabar is very bad.

For drying fish where do they get salt from?—From bazaars they purchase at $1\frac{1}{4}$ or $1\frac{1}{2}$ annas per measure?

How many Madras measures make one maund?—About 24 measures.

So in the bazaars it comes to Rs. 2-4-0 per maund?—Yes.

Do fishermen know that Government sell salt at a cheaper rate to the fish-curers?—No.

Do you know that there is a fish-curing yard at Sathanattukuppam near Ennore?—Yes.

What is the annual quantity of dried fish during a month which is sold in Madras?—The fishermen at Tondiarpet will bring Rs. 40 worth of fish.

Dr. Sundara Raj: We want the quantity of dried fish that is sold in Madras in a month?—At one time Rs. 1,000 and at another time Rs. 2,000 and so on. (As the witness was not able to give information upon this point, this question was not further proceeded with.)

Mr. R. S. Nayudu: If a yard is established for dried fish and if Government could sell salt free, would these fishermen make use of it?—Oh yes.

You gave the names of so many kuppams. In which kuppam would you like to have the yard established?—In the Bowerkuppam. It is only by the side of the Bowerkuppam that you can establish a fish-curing yard.

Do you use any new nets or only old nets?—Yes, we are using only old nets. Of course some fishermen have got certain new kinds of nets in which they are able to catch netthul fish.

If the Fisheries Department gives you new nets, are you prepared to make use of those nets instead of the old ones?—Yes.

Is there any school for fishermen?—There is one school conducted by the Labour Department.

How many children are studying there?—About forty boys. So, if you open schools, thousands of boys will come and learn. Now the Corporation has got a school and in that school they teach the boys net-making.

If the Fisheries Department establish a school and teach new methods of catching fish, would they like it?—They would like to have such schools.

What about their economic condition? Are they all in good condition?—No, they are all indebted. If one day a man gets a good fish and sells it in the market for Rs. 100 or Rs. 200 then he will purchase good clothes for himself and his wife. But that happens very rarely.

Have these fishermen got their own houses?—No; the Port Trust authorities, the Corporation and the Collector have purchased the plots and built houses for them? Every fisherman has got debts. So if a man wants to go to his native place only his owner has to advance money for his expenses. They are all very poor people and if the Government were to build a line of houses and leave those houses for their occupation, it will be a great benefit to them.

These fishermen spend a lot of money in drinking. No doubt Government have established sufficient staff to prevent illicit distillation but these fishermen bribe the police and other people and they carry on illicit distillation which is known as *sontisoru*.

If you establish a co-operative society for helping these fishermen, can their condition not be improved?—Yes, they are all good fellows. Their condition can be improved if a society is established. They want a co-operative society.

What is the rate of interest they ordinarily pay to these owners?—They pay in kind. It comes to As. 10 for Rs. 100.

Supposing a fisherman confines himself to one owner and the latter does not want him to do fishing work on a certain day?—He should not go and work elsewhere.

To the Chairman: There is demand for all the catches. No selling society is necessary. All the year round we fish except on very stormy days. The catches vary with seasons. From October to February we will have good catches. It is only in this season that the fish will be of good taste. The long net has been in existence even before my birth. To a certain extent fish does not get caught into it. Once the fish rushes into it it gets rolled up and cannot extricate itself. In that struggle it bleeds and the blood contamination scares away the other fishes. The following are some of the kinds of nets: Thoori, Varai, Kanni, Kooni, Edai, Payandai, Mada, Big, Kondai, Small, Medium, Mattal. The big net costs Rs. 1,000. Except the big net all nets are available in every village. I finance and get them the nets and the money is collected for the temple.

To Mr. R. S. Nayudu: If arrangement is made to preserve fish that comes after 9 o'clock it will be good. There is a Muhammadan contractor who trades with Moore Market and the Mangalore market. He gives a present of Rs. 1,000 and in return all should sell fish only to him. He purchases at reasonable prices.

To the Chairman: Motor launch is good. But even that won't come fast if it tows boats. If fish alone is brought it can be brought very fast.

To Dr. Sundara Raj: Fishes that come after 9 o'clock are salted. I have no objection to getting the fishes in separate boxes in a motor launch, but the question is whether it will be worth while economically to employ a launch to bring Rs. 2 worth of fishes. Ice is not generally used to preserve fish. Only half the price is realized if fish is dried and salted.

To Khan Bahadur Abdul Razack Sahib Bahadur: If you liberate the fishermen by paying the advances they should not be asked to work individually. Some more concessions should be given them to purchase boats, nets, etc. Then they must be asked to work collectively.

To the Chairman: If a man runs away with the advance people will go and catch him wherever he is. Such a case rarely happens. The Masula boat costs Rs. 500 and for each man we pay sometimes Rs. 1,000 as advance. We have no trouble in getting back the money. Education is the only way to stop drink. Boys educated in municipal councils do not drink. The other boys take their parents to the toddy-shops. Woman also drinks and she becomes a matron only when she drinks.

(The witness withdrew.)

Dr. B. SUNDARA RAJ.

Further Oral Evidence.

The Chairman: You have got to say something about the fish-curing yards?—The problems about the yards may be stated to be these, whether the salt must be carried with the help of the trawler or has to be left to the contractor or the railway.

You have generally agreed that the first method is the best method and also the originally intended method. You have also shown that any other method would work at a loss to the Government whereas no purpose would be served and nothing gained by not using the trawler, because you are using it at such times when it is not required for other purposes?—Yes.

As regards the cost of salt, you think that Government will not be a loser if it is sold at 12 annas a maund?—Provided these economies are effected.

Are there other problems connected with the fish-curing yards, would you establish some more yards on the East Coast?—Yes; but the improvements should be suitable to the local conditions. The other problem that has been discussed so much in the papers is that the fish-curing yards to a large extent are resorted to by middlemen as curers.

What does it matter which man cures your fish?—Personally I do not think it is a problem. It is a fact that in many fish-curing yards there are people other than fisherfolk who have entered into that business. But these are not the new comers; they have been in the trade from the earliest periods of which we have any account. An attempt was made to start yards purely on co-operative basis. A number of fishermen in a village would be got together as ticket-holders. They were to bring in whatever they captured to the yard and cure it there and market it. In the end they not only were able to discharge the loans borrowed but also became owners of the yards.

When the catches come, will not the society purchase them? Have you applied the principles of co-operation right through, a co-operative society consisting of 40 members of fishermen, going out to catch, the society purchasing all the fish, having them cured by employing all the 40 people, selling this and giving the dividend to the fishermen, the fishermen thus getting the value of the catches and also a certain amount of profit by way of dividend if the fish-curing yards make a profit?—It may be tried.

So it has not been tried anywhere?

Mr. Tampoe: That scheme would have another benefit this way, instead of having experimental fish-curing yards, if in a centre people should think there is enough fish for drying purposes, they might form a society and give us a guarantee of certain profit, then we can open a yard through that society.

The Chairman: How far can the co-operative system be introduced into the fish-curing yards, so that all the catches may be purchased by the society and the curing done at the instance of the co-operative society and sales also effected by that society?—As far as co-operation goes, it has been a failure; these fish-curing yards have not been a success.

What was it they did in fish-curing yards?—They got together the fishermen of the village in a place where there was no yard; a number of them joined together and formed a co-operative society and that co-operative society gave them money—I cannot say wherefrom they got the money. In Tellicherry it came from some individual persons. It need not necessarily be a bank. One of the difficulties is the fishermen have no assets, and no security. Somehow they found the money and built the huts in the yards.

How many sheds does a yard contain?—There are as many as 13 huts with more than 100 curers.

What happened?—Now we are running the yard for them. We found that the yard could hardly pay its way; and the transactions are very poor. The individual curer who has built the shed goes out and finds it more advantageous to sell the fish to another curer. The middleman pays him more than what he would get by curing the fish himself.

Someone said that cured fish is more valuable than fresh fish. Is it so?—It is so in the interior villages.

Take a place like Calicut or Tellicherry?—The comparison is certainly in favour of fresh fish.

Therefore, you cannot object to any fishermen catching the fish to sell it away fresh as long as he could get the price for it?—But selling fresh fish would not be unwise compared to putting that fish into the yard, submitting to all the troubles and then selling it for lower price. Selling for market purposes is one thing and selling it to another curer is a different thing. He is not prepared to wait for his own fish to be converted into salted fish, and then sell it and realize the money. It is there the necessity for middlemen comes in. Then there is the question of inducing the curer to put up a shed of his own with money borrowed from Government without interest. He puts up a shed but he has to pay interest in the shape of cess. There is another suggestion which has been made and which is worth considering, whether it may not be advisable for Government to build these sheds to begin with and hire them out, seeing that the yard is Government property, common property in any case.

Do you think they will always be engaged?—There is the initial difficulty of their being always engaged; the second difficulty is the yards having to be shifted from place to place they must necessarily be of a temporary character, because the yards have to be built close to the sea, and the sea erodes. We have been shifting a yard three or four times.

What is the distance?—Fifty or 100 yards from the sea.

Are you quite sure that these godowns will be fairly constantly engaged and that there will not be dearth of tenants?—They will be fairly constantly engaged, because we know the number of curers that are working. I would like the Committee to consider it. In 1920 enormous powers of taxation came into the hands of the local bodies. They imposed profession-tax, trade-tax, etc. These people have to pay profession-tax, then a licensing fee for carrying on their trade (this trade is included in noxious trades) and it has been unfortunately our experience that the cupidity of some of these bodies has been so great that they look to the licensing fee, which is intended purely to safeguard the health of the place, as a source of income.

You want the Act to be amended?—Or Government should have a hand in regulating the taxes.

Mr. R. S. Nayudu: Government have powers to frame rules under the Act?—It is worth while examining that. The abuse is so great that I have known instances of a fish-curer being charged twice over—The municipal tax and the taluk board tax in addition.

The Chairman: Do you think the tax is oppressive?—The tax looks unjust in the case of fish-curing sheds.

Supposing he lives outside the municipal area, will he be liable even then?—Yes.

Therefore the question arises whether the tax is such in its extent that can be called oppressive?—Very often the curer may not choose to have a shed or any definite place of his own.

You can put forward this argument—that your curer is supplying a better and more sanitary food to the citizens of the municipality; therefore the municipality can forego the tax.

Mr. R. S. Nayudu: We can make a suggestion that the fish-curing yards are under the direct control of the Fisheries Department and if the Fisheries Department conforms to the conditions fixed by the municipality then the municipality could forego the licence fee?—If a fisherman has a few dried fish it is considered a store house for curing fish and he is taxed.

The Chairman: If the Government and the legislature can redress the grievance and put the matter in a proper way, all this need not happen.

At the request of the Chairman, the Secretary (Mr. Tampoe) promised to compile a short note on the subject of the levy of municipal and taluk board taxes.

Dr. Sundara Raj: Then there is a third case, that is, the use of the foreshore land. It must be strictly reserved for the fishermen.

Mr. Tampoe: There was some correspondence on the matter. They ultimately decided not to do anything. They left it as it was.

The Chairman: When was the cannery started?—In the year 1912.

What was its staff at that time?—When the canning experiments were started there was one superintendent and one maistri. It was originally started at Calicut and then shifted to Chaliyam because fishing could be taught there.

When did they begin the canning business?—They started it at the very beginning. But canning on a commercial scale was begun only in 1915.

In the beginning they limited their activities only to canned fish?—Yes.

Only canning is done in this cannery?—No.

How did they get those tins?—I might mention one other thing. They made some experiments in refrigeration. Sir F. Nicholson bought a small plant for experiments in refrigeration. The idea was to work on steadily; they did not get sardines whenever they wanted it for operation. Sometimes they got much in excess of what they wanted and at other times nothing at all. In order to provide a uniform supply and also in order to test the possibilities of refrigeration the experiment was started with a small plant.

Regular work was begun in what year?—In 1915.

From 1915 to 1924 the work went on?—Yes.

Have you got any statement showing the number of tins made, the number sold and the number unsold?—No such statement can be made out.

Can you not give it to me before the next meeting of the Committee? My recollection is that Secretariat or your office will have them?—Yes.

There was a file in 1922-23 in which the question came up before me and I remember that figures were supplied to us?—Then probably it exists. I can get them for the next meeting.

Generally speaking, between 1918 and 1923 there were many occasions on which canned fish could not be sold?—Yes.

And some tins had to be written off?—I do not remember up to 1923. But one thing is certain. During the war a number of experiments were made for the manufacture on a large scale of tinned fish and lots of tins had to be written off. These tins were not unsaleable. There was some suspicion as to the ingredients that went into the tin. When you are performing a series of experiments you try certain recipes and if they turned out unsatisfactory you destroy the whole lot. Like that lots were written off.

Between 1914 and 1920 this factory made a lot of profits?—Yes.

So that there was no writing off in those days?—No.

So that if accounts of that period were looked into it would show a large profit?—Yes.

I want the figures for 1920 also. After 1920 foreign imports began to pour in with the result that you could not compete with them and there was loss?—Yes.

It was officially closed in 1924?—Yes; closed in the sense that operations ceased, but the superintendent remains there and will remain till July. In view of the fact that he has no work I have shifted him to the nearest available vacancy in the regular staff.

So that he has not been working at all from 1925 till now and the doors are closed?—Not closed, the sales are going on even now. We had a large stock of unsold tins. Even now there are a few left.

It is in charge of a clerk?—A clerk and a maistri and one or two peons. The whole thing is in charge of a superintendent. The superintendent's post remains there, but he has been doing other work. That has been done to

save the concern from unnecessary expenditure. He was at Ootacamund as our Inspector.

Do you think that this industry should be revived?—I think, it should be.

You think you will be able to make good sardines and can them alright and sell them?—Yes. The position is this. The cannery has proved that canning is a feasible proposition so far as the technique goes in the tropics. It is true that, before the Government started the cannery, there was a very small cannery on the West Coast run by a Frenchman for a long period. It was as it were a cottage industry. This private concern limited its operations entirely to canning sardines. When Sir Frederick Nicholson started the department, he felt that canning was one of the most important methods of preserving fish and as such should be experimented upon and if possible introduced into the country. Therefore, he started to get the Frenchman Joselin to his side and acquire his building. But at the time there was difficulty and Joselin himself died so that it was necessary to start an experimental station separately for canning purposes. What this cannery has accomplished is that it has proved to the people that it is possible to can other fish besides sardines and also that it is possible to can sardine itself in various ways. Various other manufactures such as fish paste and the tamarind fish of Malabar are the result of his labours. In 1915 when he was able to demonstrate the possibility of canning fish in the tropics, Mr. Wilson took up the concern of Mr. Joselin. Subsequently, thanks to the initiative of Sir Frederick Nicholson, so far as the technique of canning goes we have attained a large measure of success. It is possible now for the cannery to place on the market an article which can very favourably compete with the large bulk of import from other countries. It is true that the cannery is unable to produce the actual delicacies. The delicate kind of sardine made in France is considered to be the best in the world. Such stuff our cannery is unable to produce for want of material. The material here is not good. Our sardine is different from theirs. These sardines have hard bones and scales and therefore it is impossible for our cannery ever to attain that stage.

I suppose at any rate where these compared very favourably with the best of foreign sardines in the world, you have done all that you can do?—I have not said so. We have succeeded in producing an article that can compete favourably with the bulk of our imports.

Is there anything more that has to be done from the point of view of improvements?—Very great deal more.

What?—First of all there are tangible defects which it is possible to remove by research. Secondly, the canning trade like every other trade being a scientific trade is ever on the march for further and further improvements. Therefore, unless you are quick enough to bring your produce up to date, your trade is bound to deteriorate.

The acknowledged theory or doctrine is that all Governments should start experiments with a view to see that if anything could be done in the direction of improvements, it should be looked into; and when that is achieved they should leave it to the trade, to the people themselves and ask them to go on with it. Now, have we reached that stage or not?—We have not reached that stage.

If your last proposition is correct that science is ever advancing, the time may never be reached when you could hand it over to the people?—It can never be reached.

Therefore the Government must continue to have a cannery?—Yes.

And produce things for the market?—As to the question of marketing, I have not touched it yet. The question is whether the cannery has definite work to do in future. I have not looked at the question from a commercial point of view. What I am contending is that even in advanced countries like England to this day they are experimenting on fish meal.

Do they produce anything and place it on the market?—I am not aware of that. Probably not on a commercial scale. England is an advanced country with any amount of capital and initiative.

What do you say to the suggestion that it is no function of the Government to produce this stuff to be placed on the market?—There are a few considerations which I will place before you in reply to this question and

leave it to your judgment. Now, we are in a backward country. The conditions here are totally different from what they are in any advanced country. The fish industry is in the hands of backward people. There is no initiative or money forthcoming for these adventures. It may be argued that it is also definitely the function of Government to show the way up to commercialization. The function of the Government is not only to produce an article, but to show the way to market it and make it a remunerative trade. When it comes to the question of a remunerative trade it really involves commercialization. How else are you going to test it except by entering into commercial lines?

For all these, from 1915 to 1924, you have experimented and put your stuff on the market. Is it not time that you should hand it over to others and reserve for yourself a small place where you can carry on experiments?—In my opinion I do not think we should venture on commercial lines at all. We have done enough I think. But still there is another phase of this question which may be put up by other people. There is something to be said in favour of commercialization, but still there are private companies here and there and it may be asked why should not Government show the way?

Besides the Malabar canneries, is there any other body carrying on this business?—The Nanu Brothers and the person who has purchased the Malabar canneries have also started the manufacture.

Do you think they are thriving?—I cannot say. They have incurred loss last year.

Do you think that if your production on a commercial scale is continued for some time, people would learn those methods and be profited?—I should think so. Certainly it will help them to popularize Indian canned goods and maintain a standard for them. I have evidence from people to show that the Malabar canneries have deteriorated from the standard. Immediately the Government cannery yielded ground to a private concern, the quality of the produce went down. Therefore, I am inclined to think that at least for maintaining a standard quality it is necessary to have a Government cannery. But personally I should be inclined not to have anything to do with it.

You do not claim that this Malabar cannery was the result of learning anything at our cannery?—I have written evidence to show that it is the direct result of experience gained at our cannery. Their brands are our brands.

What about Nanu Brothers?—They are proceeding on the same lines.

Do they employ any man employed or trained by us?—I am unable to say at present.

I want to ascertain how far this institution and the results of the experiments made in it have been availed of by the public. So far as I can see Nanu Brothers seem to have got not much from us?—Their methods are our methods.

If no man employed by you is employed by them how can you claim it?—It is not necessary. If recipes and information are got from us what is the difficulty? Their recipes are ours. Their brands are ours. Sir Frederick Nicholson himself stated that he was consulted by them.

Mr. Tampoe: The public are freely admitted to the Chaliyam factory.

Somebody has applied to us about this cannery being handed over to him either by way of sale or for working under your supervision? Do you think any of those suggestions deserve consideration?—They deserve certainly consideration; but the difficulty is that I for one do not see how another man can work the cannery and we carry on the experiment and train people. He is bound to charge us something and might say that his profits are interfered with.

On the other hand he may be benefited?—I do not think private factories will go to the extent of training people.

Suppose you make it a condition of sale?—But it will be against his interest. There will be difficulties in the way. This training will go contrary to his interests as the owner of the cannery. He would not like to have competitors in the field. Secondly he may not maintain the quality of the stuff if it is expensive.

Do you think if you are allowed the necessary staff and equipment you will be able to carry on this institution without any pecuniary loss to Government?—I believe you mean exclusive of experiments?

I suppose you will have some amount for it. Suppose the whole institution costs you Rs. 10,000 a year. If you can make a profit of about Rs. 8,000 and the net cost of the institution is only two or three thousands a year, is it possible to bring it within this limit?—It is possible. I have been trying to see why the cannery had been working at a loss and I have pointed that out to the Government.

Mr. Tampoe: The remedies you suggest would require a fundamental modification of audit rules, etc. The real difficulty is about pension and all that. In a company if they do not find profit they dismiss their men. We can't do that.

The Chairman: If you want to engage in commercial ventures, you should go just as any other merchant would go?—But then a different set of rules would have to be framed. With the rules as regards service as they are at present, success cannot be attained.

Do you think that any recommendations made by this Committee can induce the Government to alter their policy in regard to purchase of materials for this department?—Possibly this Government cannot do it.

I suppose the Secretary of State's sanction is necessary for such a thing?—Yes.

So, you don't think that any alterations could be made, so far as stores purchase rules are concerned, by the Madras Government?—No.

To show profits, commercially speaking a business must be self-supporting. Is it not?—I think the cannery has shown by her history that it has not sustained a heavy loss. The loss comes to only about Rs. 3,000 for the last twelve years.

Have there not been wind-falls during the war?—No. But now the markets have stabilized to some extent and with some improvements in the cannery it should be possible to work the cannery without loss. Loss should not be a consideration so long as you are not given commercial facilities.

Mr. Tampoe: What would you consider a reasonable loss which will be commensurate with the educative value that you derive from such a loss?—Rs. 10,000. At the utmost, that is the figure.

Supposing your production in the cannery is limited to the extent of illustrating the principles of canning to those who are learning in the factory, and supposing you stop at that stage?—You are competing with large firms in London and if you say that your production will be only to a small extent, then it will certainly entail in a loss to the Government. The larger the production the cheaper is the cost of the article that is produced. If we are not given facilities for producing on a large scale, then we are deprived of making a sufficiently large profit.

I suppose we have not reached that stage when we can have anything like protection and impose a duty on imported canned fish?—There is not a sufficiency of production. You cannot tax the consumer.

What about the disappearance of sardines from the sea coast?—That I consider is a perfectly normal phenomenon. There is no year in which they altogether disappeared from the coast. That never was the case.

Does it indicate that they have migrated to some other place?—In the economy of nature wherever we have large fisheries such as the sardine fisheries of the West Coast, herring fishery in England or cods in Norway they are subject to normal fluctuations which extend for a number of years. Therefore we need not flutter over such absence. This kind of absence was known even twelve years ago. There is no indication that they will not come in larger shoals in future. So we need not worry about their disappearance now. Once they disappeared for five years and in the last stage they appeared in very large abundance.

Do you think that a trawler would be useful in finding out the direction in which these fishes have gone? Have the researches that have hitherto been made been in any way useful in finding out the places where these sardine fishes have gone?—The little research that has already been made is only near the shore.

For how many months these fishes live and to what size they grow?—They live for seven months and grow one and a half inches in size.

How many years working are necessary and for how many months should this trawler be employed?—Even the number of months I am unable to postulate. It all depends upon the results that we get in the first research. There was a time when people thought that herring was a surface fish, and it could be got by employing nets. They never thought that it could be had every season. They were deeper down in the bottom and when the trawler began to work we were able to find out that these fishes were living at the bottom.

I suppose when the shoal comes you just follow the track?—We study the incidence on the coast.

Don't you think that you need the services of an expert even to furnish you with the necessary information? It may be that you may have made researches in a track which does not suit your purpose?—That is why I have said a whole-time biological staff is necessary. I myself have done that work but still a whole-time staff is necessary for this purpose. The Director of Fisheries should also give his attention to this work piecemeal. But I say the proper business should be entrusted to a fisheries biologist. I have asked and urged for that appointment.

A fisheries chemist?—No, no. I have asked for a number of experts, but, specially for the present, two experts are necessary, viz., one who is well versed in the techniques as to how to employ the trawler and the other who is a biologist and research worker.

You think that for the present these two will suffice your requirements?—Yes. This research officer will make research work as to where sardines and mackerels are available.

Now when you are going to Europe, are you going to consult any of these big fisheries research experts and get some information regarding the way in which they have made researches?—I have done so already and I have got literature at my disposal.

I cannot understand it even if you produce it here?—The total amount of research that has been made all over Europe has already been published in a book. We have that information available.

You think that that will serve your purpose?—Yes. First of all a staff is necessary and the ordinary necessary material for biological research must be equipped such as a microscope, etc.

As regards the expert that you speak of, you would prefer to take one who has done this work?—I personally think that in the present constitution of the department he should be a young man who has received the necessary training and done a certain amount of work himself in some of the biggest fisheries and he will have to take my place and he must be engaged as an expert for a period of five years.

You can put our young biological graduates under him and ten years ought to be a sufficient period I think, for these graduates to learn the work under him. For how long are you going to depend upon these foreign experts? Probably you may engage him even for 30 years?—Yes, yes. From what knowledge I have of the biological work carried on in this country, I personally believe that there are people in our country who are capable of doing their work provided they are given the necessary training. If necessary, you can send them to foreign countries. But, what I say is, if there is a sufficiency of work for an expert in the department, why not he be employed for a number of years?

What I say is keep him for a period of ten years and pay him if necessary even twenty years' pay, but train our young men under him within that period so that we may send away the expert after a period of ten years?—I personally think 'yes.' The experts that are engaged in this kind of work are only ordinary people who have studied at some University and who have made it their life-work to make researches. If you really have a distinguished biologist and if you give him a little training in some of the fisheries laboratory, I think he will be able to do the work. I do not want you to give him the necessary training here. After undergoing the training in England he must come out here and take up the work. A brilliant first-class graduate, to begin with, probably with a certain amount of

research work to his credit, if such a man should be chosen, he will be able to carry out the duties under proper directions.

Now have we done with the problems concerning the Chaliyam cannery? We have considered the question whether it is desirable to keep it on. For the appointment of a chemist have we got a proper man in this country? I suppose if we appoint a man as chemist he will be a chemist for the whole department. I do not think you will require him at Chaliyam?—The emergent problems that he will have to solve are connected only with the Chaliyam and Tanur factories. Still I will not place him at Chaliyam. He may be placed at Madras.

Would you like to have a chemist solely for the purpose of solving questions connected with canning or would you like to have him for other purposes such as the training of young men. Do you want to train young men under him so that their knowledge might be utilized afterwards?—I am afraid no regular training was given. There were quite a number of young men sent to us by various Governments such as those of Travancore, Baroda and Bengal and they of course had a smattering of canning just like our elementary school teachers having a smattering of English.

Have you any objection to this institution taking up young men and training them?—The cannery will give them as much training as they can. There may not be openings for them immediately they leave the factory. It is because of dearth of openings for these young men that they were not given sufficient training previously in the factory. Where would you fix them after they leave the factory?

They may start their own business. What I say is you get applications for training. You select the best men, and give them training?—That has not been done hitherto.

You have no objection to it I suppose?—No.

Are there any other problems connected with this?—That is all I think.

As regards popularizing canned fish from the station, I suppose one way is to improve the quality. There is enough demand I suppose?—There is no difficulty about the demand, provided your cost is less, or equal to the imported stuff. That cannot be done if your running charges are high. That again brings us to the old question of altering the purchase rules.

Supposing these rules are not altered, where is the justification for your asking for the institution being continued?—So that other people may take it up and run it on a commercial basis, the Government running it merely as a research institute.

In other words, you would divide the institution into two sections, namely, research institute and commercial one. The commercial one will always be profitable?—If I am allowed to purchase my materials locally. For instance, we purchased 56 sheets of tin for Rs. 48 through the Stores Department in London after a delay of six months. I could have purchased the same immediately here at the rate of 112 sheets for Rs. 20.

What is the basic principle on which the Government insists upon the various departments purchasing their materials through the Stores Department? What does it matter to them whether we purchase through the Stores Department or from some private firms? The only criterion should be that the rate at which the departments purchased their articles is as low as possible?—There is no scheduled rate for the Stores Department.

Mr. Tampoe explained that in the Punjab the Development Department ran its own Stores Department. In Mysore also they ran a Stores Department of their own. He was speaking to an official of the Mysore Government who said to him that although they were allowed to have their own Stores Department, yet it was not free from trouble.

Mr. Manikka Nayakar said that the Engineering Department was the most expensive department and the same trouble also occurred there. Although the officers of the Engineering Department were prepared to estimate their works at market rates and materials were available at the time of estimating at a lower price, by the time the rates from the Stores Department reached them the local market rates doubled and trebled. That was their difficulty.

(The witness withdrew.)

The Committee then adjourned till 1-45 p.m. on Tuesday, the 17th July 1928, at Calicut.

Tuesday, July 17th, 1928.
CALICUT.

PRESENT :

M.R.Ry. Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, Kt. (Chairman).
 „ **Diwan Bahadur S. KUMARASWAMI REDDIYAR Avargal, B.A., B.L., M.L.C.**
Dr. F. H. GRAVELY, Superintendent, Government Museum, in charge of the Office of Director of Fisheries.
Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, M.L.C.
M.R.Ry. P. V. MANIKKA NAYAKAR Avargal, B.E.
 „ **R. S. NAYUDU Avargal.**
Mr. A. McG. C. TAMPOE, I.C.S., M.L.C.
Dr. B. SUNDARA RAJ was also present.

M.R.Ry. M. C. GOVINDAN Avargal, Merchant,
Cannanore.

Oral Evidence.

The Chairman: You belong to Cannanore?—Yes.

Did you submit any written answers?—No.

Will you please let us know on what subject you wish to give evidence?
 —On fish-curing yards.

Are you connected with fish-curing yards?—My people are all on the fish-curing yards. I belong to the Mukkua community. There is one fish-curing yard in Cannanore. There are about fifty huts. There was dearth of sardines last year. Other fish were available and they were salted. The commercial fish available were Varian, Vanchiram (Soer), sharks and skates. No prawns were available last year. The Government supplied salt at Rs. 1-4-0 per maund. The former rate of 10 annas a maund will be encouraging to the business. The fish-curing is done only in the yard, and not outside it. The treatment of the men is better now than under the Salt Department. There are about forty to fifty families in Cannanore. Majority of them have each a shed in the yard.

Is there a school at Cannanore?—There is no separate school for the fisherfolk. But there are other schools—elementary schools. I welcome compulsory education. There has been improvement in three directions by the transfer of the fish-curing yards to the Fisheries Department: firstly in improved methods of curing and preserving fish, in a variety of experiments being conducted by the Fisheries Department, and thirdly the officials of the department showing greater sympathy to the community and relaxing the rules and restrictions a bit. Still the results have not been up to our expectations.

What remarks have you to offer on Question No. 45?—The Fisheries Department should demonstrate the results of their experiments on the several kinds of fish treated in the yard so that the curers might follow their methods and be able to market their fish. At present, the fishermen

are following their old methods. No improved methods have been taught to them. They require 1 lb. of salt for 6 lb. of fish. As to cheap supply of salt, that depends upon transport by rail or schooner.

Question No. 48.—I am not very particular whether the Madras Government supplies the salt or the Government of India, so long as the supply is cheap. If the salt is supplied cheap it will benefit both the fishermen and the curers. As regards middlemen they will make their profit anyway.

Question No. 50.—If the issue price of salt is reduced, it will go to relieve the poverty and suffering of the fisherfolk. We look to the Government as the source from which we can get help and to the present Committee to recommend such steps as would ameliorate our conditions.

Can you tell us something about the fish salted at Cannanore?—All the surplus fish after consumption will be taken over to the yard. Fish not consumed at home and not sold fresh will be converted into salted fish. And the salted fish not sold will be put into a pit and converted into manure. Ordinarily speaking, there is demand for fish. As to whether the fish-curing yards can be maintained at less cost than now, it can be done if the high-paid officers are replaced by clerks and petty officers for distributing the salt and the restrictions are not so tight. As to the hygienic condition of the yards, with the cemented flooring they are certainly cleaner than the huts the fishermen live in, but unless these huts also are improved and kept sanitary, the one will affect the other also. Then I would suggest the starting of co-operative societies. These people must be redeemed from the clutches of the middlemen. If only the Government will give them some loans they would get out of the clutches of the middlemen and then be able to repay the loan. There are about fifty families and the Government will have to advance 15,000 to 20,000 rupees. The boats and nets and other movables these people possess will be the only security. Each family has two boats on an average.

(Mr. Tampoe suggested that one single hamlet might be tried; and the economic conditions there might be studied. Witness agreed to furnish information with regard to any selected hamlet.)

The Chairman: We want statistics of people who have got sheds and who go out on the sea for fishing.

The witness: We shall be much obliged if there is a monthly publication by some publicity bureau under the Fisheries Department giving the details in vernacular. There will be members in every family who can read and write Malayalam, and it will be read and interpreted to the illiterate members of the family. There must be a workshop for rope and net making and other things connected with fisheries, so that the idle people might go there and learn; and it will also prevent them from gambling or resorting to taverns. Carpentry may also be taught there. There must be some side vocation, so that their time instead of being wasted may be utilized to some purpose. Then there must be a sort of advisory board to settle any differences that might arise between the curers and the officers, just as there are non-official visitors in the case of jails. I am a non-official visitor to the Central Jail at Cannanore, and I think that system would work well.

Diwan Bahadur Kumaraswami Reddiyar: Are all the sheds of the modern type?—Yes. The department advances some money, and a cess of 1 per cent is being collected by them towards cost. Each shed costs about Rs. 150. The shed is tiled.

Don't you think it would be an advantage to have a body of visitors for a number of yards, so that they can know what takes place in different yards and compare notes?—Yes; they can meet and confer together and compare notes.

Mr. R. S. Nayudu: Almost each family has got a separate shed of its own in the yard?—Yes; some females do not agree to go to the yard; they feel delicate to go and work before officers day and night; they are old-fashioned people; young people don't like that their wives should go and work in the yard.

Then there is private curing in their homes?—No.

To your own knowledge there is a good deal of improvement in the way of fish-curing?—Not a good deal; the sheds are no doubt cleaner and more neat looking. The process of salting and curing are the same old methods.

What about nets?—There are some slight improvements which they themselves have made. The department has not done anything in that line.

What about the economic condition of the fisherfolk in your place?—They are going down; the entire profits of their labour go into the middlemen's hands. Co-operative societies may be started which will remedy the evils they are at present suffering from. There is one co-operative society working. It is only an ordinary credit society. It does nothing else. A society must be started specially for the fisherfolk advancing money to them for the purchase of boats and nets and other things connected with the fishing industry.

You have a ready market for fresh fish?—There is a ready market for fresh fish.

You would like to have a wider market for your goods?—Not for the fresh fish. There are people who will take them according to their wants. A market has to be found for the dried fish. There is difficulty for finding out purchasers for dried fish. A society for the sale of dried fish would meet the difficulty.

You want two societies, one for advancing money for the purchase of boats and nets, and the other for finding out purchasers for your commodity?—One society doing both the business will do.

The witness: We are out of employment for four or five months in a year. It would help us very much if an institution be established to find out work for these people during the non-employment months. Even in working season, some men do not care to go out fishing and for such of them it will be useful and prevent them from going astray. The manufacture of nets and implements needed for fishing may be done there.

Would you like to have a school of the Fisheries Department in your locality?—Certainly. The principles of co-operation may be taught in addition to the three R's.

Mr. Manikka Nayakar: You are a Hindu?—Yes.

Are all the fishermen in your village Hindus or have they adopted other religions?—They are all Hindus.

The economic condition is measured by the change of religion in very many places and that is why I am referring to religion. You say the indebtedness continues in the village and you ascribe it to want of profits in that trade and nothing else?—No.

Not bad habits?—That too.

If indebtedness is due to drinking and gambling, how could Government's lending money help them?—Side by side we want schools to train and give them employment.

It is not money-lending; it is general education and culture that is required?—Yes. But money is more important to remove the initial difficulty, to free themselves from the clutches of the money-lenders.

You were educated in an English school? What is your profession?—Personally I am a boat contractor; I was educated in an English high school; I am an honorary special magistrate on the bench court and president of the co-operative society. I attach more importance to higher education. It is highly necessary.

Almost every witness advocated the teaching of fishing, not making and boat making, giving less prominence to general culture and the Government granting of lands and giving scholarships for general education and all that just as they do to the depressed classes of which your community is also one, to elevate them and make them take their rank along with other communities? There are other and greater advantages of general culture and education of which I take you as an illustration. Having had general education and having developed a capacity for commercial enterprise you

are now in a better position to plead for your community?—Certainly. Higher education is highly necessary. The fishermen should be attracted to other lines and not confined to fishing alone.

The fishermen who have accepted Christianity on the Tuticorin side are given general education and many of them are rich merchants, and there are even millionaires amongst them?—Yes.

Don't you think it would be a good thing to copy their methods with regard to the elevation of these people?—Yes.

Dr. Gravelly: I have observed that once these people are out of debt, they are ever ready to run into it. There is a tendency on their part to spend and not to save anything. The only way to keep them from such improvidence is to give them general education and culture. Don't you think so?—Yes.

Mr. Tampoe: What do you think would be the effect of reducing the issue price of salt in the curing yard?—If the price is reduced, they need not pay what they are paying now.

Would more fish be cured?—That depends on the catches. But there will be an inclination to cure more fish if they get cheaper salt.

Which is the more important factor in determining the quantity of fish to be cured, the price of salt or the non-saleability of fresh fish?—The price of salt is to be considered the more important factor. Reduction in price will improve the sale.

Do you think it will cause fresh fish to command a high price?—That is a point on which we cannot give any definite opinion.

We want to know whether fish, if salted, would fetch as high a price as when it is fresh?—I cannot say; sometimes there is loss, sometimes there is a small margin of profit.

Have you any knowledge of the Christian fishermen of this coast?—No, Sir. There are Roman Catholic Christians at Cannanore.

Are they indebted in the same way?—Yes.

Are the Muhammadan fishermen also indebted in the same way?—That I do not think. Such of them as are capable of buying a boat take to the boat and they are fit for it, whereas those people who are poor borrow money and then become paupers.

The Roman Catholic missionaries would not allow their men to get into the clutches of the money-lender?—Yes.

Khan Bahadur Abdul Razack Sahib Bahadur: How many Muhammadan huts are there?—There are about thirty or forty. They have only got the old pattern boats and nets. They go out far into the sea. They make use of long line angling. The Hindus have not done it here so far.

So you say that the Muhammadans are better off financially?—I should think so. They are not as indebted as these people are and they have not the vices which I just admitted.

I want to know whether any Muhammadan fisherman there is addicted to drink?—No. I have not come across any.

Has there been co-operation between the Hindus and Mussalmans?—Yes. No rupture.

Will there be any objection to boys of both the communities studying together?—No. But there are Mappilla schools there where Arabic and Urdu is taught.

Suppose a fisheries school is opened, can both Hindu and Muhammadan boys be taught there?—Yes.

What about Urdu? Will they insist upon the Fisheries Department teaching them Urdu?—Certainly. There must be a professional man to teach that language besides Malayalam. I do not quite appreciate the necessity for transferring the Fisheries Department to the Government of India.

Dr. Sundara Raj: You are a very important leader of the fishermen community in one centre and you are a fisherman yourself. Could you tell me how you were impressed with the fisheries schools?—As a matter of fact,

there is no fishery school at Cannanore. As far as I can see, the fishery school started has done some good to the community and it will be continuing to teach the people the principles of co-operation. The line chalked out by the department for improving the condition of the fishermen community is quite suited to our wants.

Has it borne fruit?—For want of a school in the hamlet I am living, I cannot say definitely. I should think the school has been doing good work. We consider the fisheries schools as our own. The Education Department may not have any liking for us.

Do you mean to say that the special department will care more for you than the Education Department?—Certainly.

Is there anything more that you wish to say?—No.

(The witness withdrew.)

**M.R.Ry. Rao Bahadur J. A. FERNANDEZ Avargal,
Superintendent, Pearl and Chank Fisheries, Tuticorin.**

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

1. The Department was inaugurated with the following main objects:—

- (1) Increasing the fish food supply,
- (2) promotion of fishing industries, and
- (3) promotion of the material and moral welfare of the fisherfolk.

2 & 3. I do not think that any of these objects has been achieved in a satisfactory measure; except the oil industry on the West Coast, which, I understand, has become a permanent fishery industry. I am not personally aware of the progress made in the inland waters, but so far as the marine fisheries are concerned, the experiments made to introduce Western fishing gear have not been successful. No efforts have been made in the East Coast to improve the material and moral condition of the people.

4. I consider that there were no systematic and organized efforts. Also want of finance and experts.

5. These objects are worth being achieved and I would suggest the recruitment of experts engaged in the fishing industry in Europe on attractive terms. Socio-economic work should be organized in the East Coast as well. For this kind of work, no experts are necessary as the problems are purely of administrative nature.

6 & 7. I would consider that the main object should be the promotion of the material and moral condition of the fisher class and the other objects of increasing the food supply and promotion of fishery industries should come next to it.

II. FISH FOOD SUPPLY.

8. Sufficient fish is caught for the existing demand, but it is likely to increase enormously if there are inducements.

9. Yes.

10. Vide reply to Question No. 8.

11. Yes.

12. To start with, there may be some difficulty, but in course of time, the demand is expected to increase absorbing all the supply. More supply means cheap food and in the present state of the country will be greatly welcome.

III. IMPROVED METHODS OF FISHING.

13. The present methods of fishing are effective, so far as the supply is concerned.

• 14. So far as I am aware, none.

15. The fishermen are as a class suffering from chronic poverty. Most of them are in the grip of petty capitalists who take away the lion's share of their earnings. Initiative, enthusiasm and adventure are sadly lacking in them, though as a class, the Indian fishermen are in no way inferior to any in the world. In hard-working they are unsurpassed; in their skill of managing boats and fishing gear, they are as good as anybody else, but on account of their economical condition, they could not take to improvements. I am personally aware of this, as I am well acquainted with the customs of the fishermen in the Tinnevely, Ramnad and Tanjore districts.

16. I would first suggest removal of illiteracy and promotion of thrift among the fishermen and I consider that, with improvement in these directions, the fisher class would become self-conscious and the fishing industry is automatically likely to improve.

IV. DEEP SEA FISHING.

17 to 19. There are under me the following vessels—

- (1) One motor auxiliary schooner.
- (2) Four motor launches.

All these vessels are engaged in the pearl and chank fisheries and none in deep sea fishing. The motor schooner is mainly used for the inspection of pearl banks. The four launches are used as tugs for towing the chank boats. Two of them are old and have become unserviceable and I have already submitted proposals to condemn them.

20 & 21. No retrenchment of expenditure in these vessels is possible as only the minimum charges are incurred. During the off-seasons, these are laid up with skeleton crew.

22 to 42. The experiments are in charge of the Assistant Director of Fisheries (Marine) and so I am unable to offer my views on the matter.

V. FISH-CURING YARDS.

43. The main consideration was, as I understand, that the Government of India refused to bear the losses incurred by the Salt Department on account of the administration of the fish-curing yards.

44. With the increase in the sale price of salt, there has been no loss.

45. I would suggest the appointment of a curing demonstrator who should visit all the yards, and frequently demonstrate by means of magic lanterns, films, etc., improved and hygienic methods of curing. For this purpose there should be demonstrators who had their training in the fishing industry in the West Coast.

46. It should be reduced to just the cost of transport to the yards.

47. I consider that the present method is efficient enough.

48. It is the Government of India who should supply the salt, as it is they who have the benefit of the salt monopoly.

49. It is the fishermen who benefit.

50. I do not see any reason for reducing the price below the charges of transport and production. If the fisher class get salt free of duty, that would be a sufficient encouragement to the fishing industry. Reduction below transport charges would otherwise mean a bounty which I consider as artificial and unnecessary.

51. No statistics are collected in this respect. What comes to the yards is a very small proportion of what is caught in the various fishing villages.

52. The demand is fluctuating and depends upon the fishing seasons.

53. I would consider the establishment of more yards and a relaxation of the existing rules, care, of course, being exercised that no duty free salt passes into consumption.

54. It is not possible.

55. I am not aware of the conditions in other countries, but considerable improvements are possible.

56. Vide reply under Question No. 45.

57. I cannot say that they are satisfactory.

58. Same as Question No. 56.

59. I have not gone into the details of the scheme.

60. I think that the Government should bear the expenses, as it practically means fishery education.

VI. FISHERIES CANNERY, CHALIYAM.

VII. EXPERIMENTAL STATION, TANUR.

VIII. INLAND FISHERIES.

61 to 96. I am not acquainted with the working of the above.

IX. KINDS OF FISH.

97. The fish that are of economic importance in the Tinnevely district are—

- | | |
|--------------|-----------------|
| (1) Valai. | } Wild herring. |
| (2) Sudai. | |
| (3) Chalai. | |
| (4) Kola. | |
| (5) Thondan. | Sardines. |
| | Garpiki. |

All these are caught in drift and seine nets and are in great demand with the poor class of fishermen. Fishing for these is confined within 7 to 9 fathoms of water.

98. The fishermen experience considerable difficulties in getting necessary yarn, etc. If the department could stock them in the various yards and sell them at purchase price, it will help the industry a great deal.

At Tuticorin, the fishermen experience considerable difficulty to reach and return from the fishing grounds. On occasions for want of favourable breeze, they are either unable to go to or return from the grounds. They require the services of a tug specially during the south-west monsoon. The fishermen may be given such assistance by the department. I understand that they are willing to pay for such services.

X. PEARL FISHERIES.

99. Mr. Hornell has given a complete account of the pearl fisheries in the Fisheries Bulletin No. XVI. I may however mention the following:—

The pearl fisheries off the Gulf of Mannar have been very famous since the ancient days. The fisheries off the coast of Tuticorin find a place in the descriptions of Ptolemy about 160 A.D. and Marco Polo who visited the coast in the thirteenth century describes Kayal (a small village now) which was then the headquarters of the pearl fishery as a great and noble city. The fishery in those early days appears to have been very prosperous, as in 1330 Friar Jordanus who visited India reported that as many as 8,000 boats were employed. This means that there were about 80,000 divers working as compared with a miserable 1,000 who worked in our large fisheries and about 300 to 500 in our small fisheries.

In the fifteenth century, the fishery was under the control of the Naick Kings of Madura and in the sixteenth and seventeenth centuries, the fisheries were a source of friction between the Muhammadans, the Naicks, the Dutch and the Portuguese. No records are available as to what the fisheries brought in those days, but it is said that a fishery held in 1663 brought the Dutch 18,000 florins or about Rs. 22,000. The next fishery was in 1689 and the third fishery was in 1691. There were fisheries in 1700 and 1708. The 1708 fishery gave a revenue of about Rs. 1,35,000 and there were nearly 8,600 divers engaged in it. In 1736, the control of the fishery passed into the hands of the Nawab of Carnatic by whom the fisheries seem to have been rented out. In 1796, the fishery passed into the hands of the British. Since then there were fifteen fisheries excluding the recent ones and the largest revenue was in 1807 when the gross receipts came to 2,91,539. In the nineteenth century, the Tuticorin fisheries seem to have been very unproductive, while the Ceylon fisheries were unusually prosperous.

100. The only important problem is the question of labour supply. There is no gains saying the fact that a large number of oysters remain unfished for want of sufficient labour. The fishery of 1889 is an instance.

101. I consider it efficient.

102. The only improvements necessary are (1) increase of labour supply and (2) systematic inspection of pearl banks.

103. I do not consider that this is possible.

104. The only improved method I would suggest is to increase the remuneration given to the divers and thus induce more divers to join the fishery and thereby fish more oysters.

105. Personally I have no faith in these things. Naked diving, I consider, is the best method in shallow waters.

106. I consider direct management is vitally necessary.
 107. It is neither desirable nor profitable to lease out the fisheries.
 108. Vide my reply under Question No. 104.
 109. Yes. Give an increased remuneration, say, 50 per cent of the earnings.
 110. Research work has been done in the past both in Ceylon and in India and the results have not been encouraging.
 111. The problems connected with the pearl fishery are purely of administrative nature. There is nothing in it that the layman cannot tackle. I have been associated with the pearl fishery for nearly twenty years and I entirely agree with Mr. Hornell "that reliance should be placed first and last on efficient inspection and that the watchword of the officer should be inspection, efficient and comprehensive."

XI. CHANK FISHERY.

112. Like the pearl fisheries, the chank fisheries have been the monopoly of the Crown and has been a far steadier source of revenue than the pearl fisheries, as the chank fisheries are conducted annually. Like the pearl fisheries the chank fishery passed into the hands of the Portuguese and the Dutch and in 1801 to the British. During the first 27 years of the British administration the fishery was a source of considerable revenue and brought at an average Rs. 17,000 per annum. The total net profit for the 27 years was Rs. 15,26,336. In 1824-25, the net revenue amounted to as much as Rs. 43,500. Subsequently the fishery was leased out and the revenue considerably decreased and in 1876-77, the Government abandoned the renting system and worked the fishery departmentally through the Port Officer, Tuticorin.

113. Like the pearl fisheries the only problem is that of labour.
 114. Yes.
 115. More labour could be recruited if the earnings are increased.
 116. No.
 117. I consider that naked diving is the only satisfactory method.
 118. Vide my reply under Question No. 105.
 119. Yes.
 120. No.
 121. Chank fisheries are the property of Government. If the questionnaire refers to the Ramnad chank fisheries, strictly speaking, the fishery is a Government monopoly and the Raja pays peshkash on it. The Raja has been successively informed of this fact. Pearl and chank fisheries are so intermixed that the interests of both will suffer, if they are under dual control.
 122. In view of the above reply, no.
 123. There are enough divers, but the earnings are not sufficient to induce them to work at Tuticorin. They prefer to go to Ceylon and work in the free fishery there, where they get nearly double the prices.
 124. The only method seems to be to increase the wages and thereby get more divers and fish more chanks.
 125. So far none.
 126. I consider that the submarine research is a problematical affair. The organization of the chank fishery is purely an administrative affair.

XII. RESEARCH.

127 to 170. I have been associated all my life with the actual working of the pearl and chank fisheries and I am unable to offer an opinion on these.

XIII. TRANSPORT.

171 & 172. Transport facilities are poor in the country. If there are good roads, with the available transport facilities as at present, I have no doubt that more fish will reach the interior.

XIV. SOCIO-ECONOMIC WORK.

(a) Co-operation.

173. Nothing has been done in the East Coast.
 174. I would suggest that in each district there is a fishery officer of the grade of Inspector of Fisheries to supervise and promote thrift and co-operation and education among the fishermen.
 175. Yes.
 176. No.
 177 & 178. So far as I am aware, none.
 179. Vide my reply under Question No. 174.
 180. Yes, if my suggestion under Question No. 174 is approved.
 181. Yes.
 182. Yes.

(b) Education.

183. The general education, not to say of the elementary education in the country, is entirely unsuited. Its only achievement is unemployment.
 184. Yes.
 185. It should be directed and controlled by the Fisheries Department. Education in net making, boat building and salt curing and such technical studies are necessary. Fisheries officers are the most suited for imparting such education.
 186. I do not know.
 187. I am unable to say, as I have no personal knowledge of same.
 188. Yes.
 189. Yes.
 190. Vide my reply under Question No. 185.
 191. It has not sufficiently developed.
 192. The problem does not seem to be very urgent. The present training school at Calicut could be improved to give fisheries technical training.

XV. ZOOLOGICAL SPECIMEN SUPPLY.

193. Yes.
 194. I think the Museum Department would be the most appropriate agency for this work.
 195. None.

XVI. STAFF.

196. I have no personal knowledge of the various branches of fisheries research.
 197. I think the fisheries research is entirely independent of administration.
 198 & 199. I have not gone into the question.
 200. Yes.
 201. Research and administrative staff should be entirely different.
 202. No.
 203. I have not gone into this question.
 204. They are not attractive enough even for the ordinary administrative needs. Even a clerk prefers, if he has the choice, to go to other departments as the prospects are very limited here.
 205. A specialist on a high salary for a limited period.

XVII. FINANCE.

206 to 217. No information available.

218. The average annual expenditure on pearl fisheries in a non-pearl fishery year including supervision charges is Rs. 18,400. The average receipt in a non-pearl fishery year which consists of sale of stores, etc., is Rs. 2,950 per annum.

219.—

	Rs.
Annual expenditure on chank fisheries	43,000
Annual receipt on chank fisheries	82,300 (gross).

The receipt and expenditure for the last five years with regard to pearl and chank fisheries are given below :—

	Pearl Fisheries.		Chank Fisheries.	
	Receipts.	Expenditure.	Receipts.	Expenditure.
1922-23	4,640	19,462	97,913	51,546
1923-24	664	15,829	98,656	48,122
1924-25	3,562	19,882	50,462	30,298
1925-26	2,25,734	89,317	62,735	31,332
1926-27	2,90,691	1,07,158	41,854	22,382

Notes on the above.

Oyster nursery, Tuticorin.—Capt. G. A. Phipps, the Superintendent of Pearl and Chank Fisheries, proposed in 1863 the building of an artificial bank to breed pearl oysters after keeping them in a basin or nursery for two or three years and then transfer them to the deep sea banks. The Government sanctioned the scheme, the commencement of which was made in 1864 and completed in 1866. It was intended at first to construct it on a large scale, but in the course of construction it was curtailed to about 10 acres.

The position selected was in the centre of the harbour of Tuticorin, the bottom of which was clear sand. Young oysters were placed in this nursery on good cultch, such as heaps of coral, hard blue stones and in tables with slate top. It was noticed that the bank was getting covered with blue mud, killing the oysters. Thinking that the death might be due to the young age of the oysters, about 2,500 grown-up oysters were brought specially from Ceylon, but these also shared the same fate. Oysters were brought to the nursery on many occasions, but, as they did not survive, the scheme had to be given up. Government sanctioned the abandonment of the pearl oyster nursery experiments.

Use of dredges.—I have used dredges occasionally and have found that they frequently get entangled in rocks and could not be used in the pearl banks, as they are generally rugged. Even for recording the presence of oysters, they are unreliable. The authorities in Ceylon have come to the same conclusion. Dr. Pearson, in his Pearl Fishery Report of 1925, reported that “by reason of the small area covered and also because of the inability of the dredge to operate on uneven ground, we have generally found the dredge to be unsatisfactory and unreliable, as a means of recording the presence of oysters, etc.”

Research under pearl fisheries.—Mr. Hornell conducted experiments on surface drift on the pearl banks area. On the Ceylon side, similar experiments were carried on by Messrs. Southwell and Kerham.

Transplantation of oysters.—Experiments were tried in Ceylon. Mr. Hornell transplanted in Ceylon a batch of ten million oysters, without success. Mr. Southwell transplanted nine million oysters which all died in the following year. Transplantation was done with a view to avoid overcrowding and Mr. Hornell who was originally the advocate of transplantation, after his long experience, had to say that “the game was not worth the candle.”

Cultching.—In Ceylon, cultching was done and when the banks were leased, the company was required by Government to lay down no less than 500 tons of cultch each year. This idea was taken from the edible oyster

farms in France. This was later on given up, as it was considered impracticable, not to say of the colossal cost. They are also liable to be covered by sand.

Control of the pearl fishery.—Experts who were closely associated with the pearl fisheries, have come to the conclusion “that the condition on the (Ceylon) pearl banks are such that culture work and all efforts to control the pearl fisheries are doomed to failure.” Mr. Hornell also recently came to the same conclusion and wrote that “cultural operations are so uncertain in the results and entail such heavy expenditure that it pays better to restrict attention to inspection and to let nature have a free hand.” In this connexion, I cannot but quote the words of Mr. James Stuart, who was associated with the Ceylon pearl banks a century ago and which has been quoted in the Ceylon Pearl Fishery Report of 1925:—

“The success of pearl fisheries in the Gulf of Mannar depends primarily upon natural events beyond the control of man; nevertheless, we may, by the most vigilant attention and good management watch the progressive workings of nature and not fish-up the oysters before they have reached maturity; nor after they contain pearl, suffer them to die on the banks and the pearl to be lost. We may know the ages of every deposit of oysters upon the banks and by letting the youngest remain undisturbed until the last, we may protract each successful period and in corresponding proportions shorten the unsuccessful intervals. We may presume from past experience that unsuccessful intervals will continue to recur. We cannot promote or facilitate the production of pearl oysters. We cannot cause the spawn to settle down upon nourishing ground. These are events beyond the control of man. The winds, the wave and the uncertain currents of the ocean carry the embryo over an unlimited space. It is only in the infinite wisdom of the Creator of all things, the oyster brood descends upon the banks, suited to nourish and support it, that it comes within our limited power to watch its advancing age and to fish-up the respective deposits in succession as they approach the proper age; not letting them rest on the banks until they die off and the pearl is lost and carefully abstaining from disturbing those that are too young to contain it.” Words of wisdom!! Good for all ages so far, as the pearl fisheries of the Gulf of Mannar are concerned. Only those who are closely associated with the oysters and who have in their own life experienced the pride or the disappointment of the success or loss of a bank can alone realize the saintly wisdom of the above words.

Irregularity—What are the causes?—I believe that the correct cause of the irregularity has been located by Dr. Pearson, when he said “that the true explanation of the irregularity of the pearl fisheries is to be sought in the geographical peculiarities of the pearl banks.” Many of these banks are so situate, that in a spawning season, most of the larvæ is carried over a vast distance and they get populated only when the vagaries of the current create a favourable situation.

Madras pearl banks—Future prospects.—I consider that the only thing to be done is to watch nature sow and then ourselves reap the oysters as efficiently as possible. In this I require the assistance of an Inspector of Pearl Banks, whose chief duty will be the annual inspection of pearl banks. It is hardly possible for me to attend to this personally in view of the large number of banks in the coast and other responsibilities. Government have been recently pleased to sanction an Inspector of Fisheries and he will come in for this work.

I consider that in the past there was no unproductiveness with regard to our pearl banks, but the inspections were not frequent. The Port Officers with their heavy port duties were not able to attend to this as frequently as it should have been done and Mr. Sullivan has recorded instances of oysters that have been obviously missed. As stated in my written evidence, the work connected with pearl fishery should be confined to the following dictum of Captain Worsley who said:—

“Find them, watch them, fish them.”

Chank Fisheries—Research.—What hold good with the pearl fisheries apply equally to chank fisheries. What is required is to fish them as efficiently as possible. The beds are not tapped to the present potentialities for want of labour.

Oral Evidence

The Chairman: You are in the Fisheries Department?—I am Superintendent of Pearl and Chank Fisheries at Tuticorin.

How long have you been in service?—Twenty-four years.

You are a Rao Bahadur?—Yes.

All these years you have spent at Tuticorin?—Yes.

So you must be specially acquainted with pearl and chank fisheries?—Yes.

About the ordinary fish, are you in a position to tell us anything from what has been done round about Tuticorin?—Yes, Sir.

Have any improvements been effected in the old catamarans?—No improvement of any kind. Even the nets are the same old ones.

The department did not interest itself in that direction?—Yes.

How about the fish-curing yards?—They also continue in the old state.

You have received a copy of the questionnaire?—Yes, Sir. I have sent in answers.

Were you on the trawler at any time?—I have nothing to do with the trawler.

Now, about the chank fisheries, are the catches increasing or decreasing every year?—I should say they are increasing.

There is no reason to suppose that in the near future there will be any decrease?—There will be decrease in the Tinnevely district if the Ramnad fisheries are not taken over. That is to say, the labour for the Tinnevely fisheries consists of men from the Ramnad district. Tinnevely does not produce many divers. There are about 100 divers at Tuticorin.

How many are there in Ramnad?—At Kilakarai there are about 1,000 divers.

How many will go to Tinnevely?—300 to 400 will go.

Still there are 700 divers there?—Yes.

Will they not be sufficient for your purposes both at Ramnad as well as at Tinnevely?—If we work also the Ramnad chank fisheries together with the Tinnevely chank fisheries the Ramnad divers will be available; otherwise not. If we work the Tinnevely chank fisheries alone the Ramnad divers will be working under private men at Ramnad and we would not get them. There are only 22 divers at Tuticorin. At Tuticorin they have advanced in education and acquired higher standards of life and so there are no new recruits.

The Chairman: I am told you sometimes get Arab divers?—They do not come for chank. Only for pearl they come.

You therefore think that it is necessary that we should always lease out the Ramnad side?—Yes. Both should work together.

If they are worked under two different masters there will be clash and Tinnevely will lose the service of the large number of Ramnad divers?—Yes.

Have you ever considered the question of mechanical appliances being utilized for diving?—I should say, with all due deference to the experts, from my experience, that it is only the naked diving that would be best suited for pearl and chank.

In other countries they do use appliances for pearl fisheries?—But I do not think it is possible here.

You are not aware of any country in which pearl fishing is done by mechanical appliances?—I am not aware. I do not think they will do us any good here. The pearl banks are always uneven and there are rocks here and there. So far as the chank beds are concerned, the chanks stand on capsules. Each capsule will contain about 10,000 chanks. I do not think any mechanical appliance would be of use in chank fisheries also.

Do you think it is impossible to train more men in diving? Now that you are feeling the necessity for more divers, that mechanical appliances are out of the question and that men are taking to other professions, should we not train some men?—Instead of training new men you should increase the remuneration of the existing men. This is not a matter for training.

The Chairman: Has anything been done either in connexion with chanks or pearl oysters to study their life-history?—Yes. In 1863 one Captain J. A. Cribbs was the Superintendent or Port Officer. He struck upon an oyster nursery.

How far is it from the shore?—It is quite close to the shore, near the Hare Island. They carried on some experiments there for three years. In 1886 after experimenting for three years they closed the nursery. I do not know whether a similar experiment was tried elsewhere.

Was anything done to find out where they came from and where they went?—Mr. Hornell conducted some experiments to find out the currents, the surface drifts, etc. But no useful result was achieved. I think the oysters develop there and do not migrate. Their migration depends on the current. When the thing floats on the surface the current may carry it off to a great distance from the pearl banks region. Only when the current is favourable the larvæ deposits and the oysters grow. It all depends upon the current. When once they deposit the larvæ it remains there.

Is there any literature on the subject? Have not the civilized nations furnished any book as regards the life-history of these things, what their habits are, etc.?—Mr. Arnold published a bulletin about pearl fisheries.

Do you think there is any one in the Fisheries Department who can be entrusted with this kind of work that we have been speaking of?—Yes. Research Assistant, Mr. Moses, was doing it in connexion with chanks and oysters.

What do you say to getting a fisheries expert from Japan or Ceylon or from some other country in which fishing has been going on for a longer time than ours?—It is worth while getting an expert. I think it will pay the Government.

You think that there can be no mechanical appliances for diving for pearl oysters?—No. In 1886 one such device was tried and it was a failure. In 1887 they brought helmeted divers. That was also a failure. But I agree that the science was not probably as much developed then as it is now.

Mr. Tampoe: What do you think the lease of the Ramnad chank fisheries would fetch?—Rupees 5,000 would be a reasonable figure for twenty years.

Rupees 75,000 paid at the beginning of the period plus accumulated interest?—Yes.

Is it a proper thing to accept Rs. 1,10,000 for fifteen years paid at the beginning?—I think it is rather too much.

Do you think that at the end of fifteen years if it is administered by your department, the Ramnad chank fisheries would be better than they are now or any worse?—They would be better.

You are allowing for depreciation in the capital value of the fishery in fixing this amount?—Yes, Sir.

Have you any personal experience of mechanical appliances for diving?—I have got some experience and I do not think they will be of any use. I have myself used the dredger.

Leave the dredger out?—Besides that I have no experience.

Have you seen a picture of the device for Japanese divers?—That is a mechanical device. The diver goes down with a sort of apparatus. I like it. I am not against all apparatus.

You said that the oyster research was given up in 1886?—Yes.

Did you find any case of disappearance of oysters?—I did not find.

You don't expect a port officer to contribute much to biology?—I don't consider it biology. It is practical experience only.

You said that nothing has been done with regard to pearl oysters?—Yes. We have not improved very much in these parts during the last fifteen years. I cannot say we have improved.

Do you think the old charts give absolutely accurate knowledge?—I cannot say. I am not an expert in that line.

Dr. Sundara Raj: Would you say that we have effected improvements in the pearl fishery management?—Pearl fishery management we have improved.

Would you say that we have also improved the methods of inspection, etc.?—Yes.

Has the department done any research work at all on pearl fisheries?—I have answered that.

Do you think any more research is necessary?—If I am told what that research would be, etc., I may answer this question.

That is because you are not a biologist and you do not claim to have any knowledge of biology?—Although I am not a biologist I claim to have vast experience and so I may be able to say.

Have you any reason to think that there may be oysters beyond the ten-mile line?—There may be. It was not tested before, because it did not strike the curiosity of the people who managed it.

Do you think it is only an accident that it did not strike them?—It might have struck them as well.

The Chairman: Did you see any chanks beyond the ten-fathom line?—Yes. The fishermen go and find. They are in the rockbottom and it is beyond the ten-fathom line.

I should like to know whether any man has found oysters there?—I have not heard.

The bottom may be the same, but yet these things may go or may not go?—Yes.

You have spoken of improvement in the management?—Yes, on the administrative side.

Diwan Bahadur Kumaraswami Reddiyar: When was the experiment of Mr. Hornell made?—Between 1909-1910.

Do the divers go deeper than ten fathoms?—They go twelve fathoms, but the average is between seven to ten.

If there are oysters beyond the ten-fathom line, how can we work it?—That has to be seen.

During these twenty years, on how many occasions you come across pearl oysters?—It was only in 1922 the oysters appeared. There was one at Ramnad in 1924. That was under the Fisheries Department. In 1922 the oysters appeared.

The Chairman: At what stage you discover that?—When it takes shape as a living being; then it is as small as a silver two-anna piece.

Mr. R. S. Nayudu: Pearl fishery was formerly conducted once in ten or twelve years?—Yes.

And now it is conducted continuously each year?—In a year we have two pearl fisheries, which has never been heard of previously. We tried it in 1926 and 1927 and we have succeeded. Pearl fishing was being done in spring time, now it is done in winter months also.

The Chairman: That is due perhaps more to the adventure of the divers than to any action on the part of the department? It may have to be given up in winter months in other places because of climatic conditions or of sea currents or waves?—The same conditions prevail all over; the credit is due to the department.

Dr. Sundara Raj: Are you in favour of increasing the pay of the divers?—If you improve their remuneration, you can get more of them, and the revenue also will increase.

The Chairman: There must be sufficient quantity below; at present you don't know whether there will be any oysters?—An inspection has to be made.

Has anybody been sent out from India to study this pearl fishing during the last thirty years?—The Madras Government has not sent out any one so far; I do not know whether there are any pearl fisheries in other countries.

Dr. Sundara Raj: Did not Mr. Hornell go to Japan?—I don't remember.

There is ample literature on the subject?

The Chairman: Are those that come for diving, are they fisherfolk?—There may be a few fishermen among them, but others are from Pavalars.

You are not in a position to tell us anything about fish-curing yards?—There are some fish-curing yards in the East Coast, but they are very small ones. We have not done socio-economic work or anything of the kind there.

What is worse, though the conveyance charge of salt is much less than what it would be on the West Coast, they are paying the same price of Rs. 1-4-0?—Yes.

Mr. Tampoe: How many fish-curing yards are there between Cape Comorin and Tuticorin?—Three yards. There was one at Kuthagudi, but it was abolished by the Salt Department which was then in charge of it. There has been a requisition for re-opening it. According to rule, the petitioners have to provide a certain quantity for the fish-curing yards and bear the cost of construction, which they are not prepared to do.

Were not they told that the Government would advance money and collect it as cess?—They were told.

The Chairman: You don't require more than an acre for a yard?—No. So the question of ground does not arise; as for the building, the Government are prepared to advance money and take repayment in instalments?—Yes; we can start yards.

I suppose the yards are mostly on the foreshore?—Yes; they generally belong to Government.

Even otherwise it would be of very little cost?—Yes.

You never crossed over to Ceylon to see the pearl fisheries?—I went there with the Director in 1925; Government deputed us. We have found that our methods are cheaper than theirs. We have done admirable work, and we have regained the name which we lost.

Mr. Tampoe: Altogether what is the profit (since 1922)?—About seven lakhs net. This year we have earned five lakhs.

Do you think that the pearls would be worth as much as seven lakhs?—I mean to say 'Yes.' One pearl was sold by a merchant from Bombay for Rs. 2,500.

The Chairman: Did you ask him whether he has preserved the flesh of that oyster which will give us a clue to the finding of similar oysters?—No; it will be one out of 20,000. He could not find out from which oyster he got the pearl, because these oysters are all massed together and allowed to rot and you could not distinguish the one from the other.

Diwan Bahadur Kumaraswami Reddiyar: What was your last valuation?—About Rs. 20,000 per thousand.

What is the average price?—More than 50 or 60 rupees.

Do you know how they value?—According to weight, size, colour.

I think the purchasers gamble in this as they do at the race-course?—It is all luck.

Mr. Tampoe: There is an element of probability whether a particular catch would be good.

You have heard of the making of artificial oysters in Japan?—Yes; they are called cultural pearls; it was only for such experimenting that the

Krusadai scheme was launched. Mr. Hornell was then in charge. No work was done and it was given up. Mr. Hornell did not train any one in that work.

Dr. Sundara Raj: What is your idea about leasing out these fisheries?—I am not in favour of it. Firstly, the divers will feel safer in the hands of Government than under lessees; secondly, the divers may be sure of a fixed price; thirdly, the lessees will have an eye to their own profits; and according to the labour available they may increase or decrease the rates paid to oysters or chanks. Besides, the divers will become indebted to the Mudalalis (capitalists) and they will be under the control of these capitalists.

The Chairman: What is the harm in overfishing? Do you think there will be no more for you to fish next year?—There is likely to be a depletion of the chanks. No such thing occurs as regards pearl fisheries.

Dr. Sundara Raj: Can you tell us what is the proportion of undersized to full-sized chanks in Tanjore and what is the proportion in Ramnad and Tinnevely where the department is controlling them?—In Tanjore, full-sized chanks will be about 25,000 to 10,000 of the undersized. In Tuticorin, out of one lakh of chanks only 4,000 will be undersized.

The Chairman: What do you do with the undersized?—They are dropped back into the sea.

How long will they live after they are caught?—I don't know; from evening till 10 o'clock next day they must be in water; we change the water occasionally in order to give them fresh oxygen.

The outer flesh would be used for manure?—Yes; the flesh inside them is edible; the divers eat them. There is a particular shell attached to them which is called Nahanam. This is used as an ingredient in the preparation of Ooduvathis, because it has a sticky quality.

Sometimes they contain pearls?—Yes, of good size too.

Has any attempt been made to open an industry for making bangles out of these?—No; the bangle industry existed at one time in our shores. There are proofs of the existence of a factory at Tuticorin carrying on this industry. The Fisheries Department can, with great advantage, revive this industry.

They could enquire whether men would come here from Dacca to revive this industry?—It is a good problem.

Assuming that some research has got to be done with reference to the pearls in particular and possibly chanks, what kind of expert would you have? Will an ordinary biology man do?—I cannot answer that. The Ceylon Government have got one Dr. Pearson, I do not know whether he is an expert. I would have a man who has specially qualified himself in pearl fishery; a mere biologist won't do.

(The witness withdrew.)

Rev. A. T. COLDMAN, Chairman of the Malabar Welfare Committee.

Oral Evidence.

The Chairman: How long have you been in this part of the country?—I have been here since 1924, but not continuously. I was here for six months in 1924-25 and since May 1926 I have been here.

Did you see the questionnaire issued by the Committee?—I did not see.

It is a pity you did not get it. You take some interest in the fisherfolk here?—Yes, on the social and hygienic side.

Are there Christians among them?—There are a few.

These fishermen are both Hindus, Muhammadans and Christians?—My work is in connexion with the duties of Chaplain of Calicut. I work chiefly among the Christian community.

When was the Welfare Committee constituted?—It commenced its work during the fish famine of 1926 and it has opened welfare centres for the benefit of their children.

Are you doing the work which the child welfare committees are doing?—Our committee works on the same lines, but through a separate organization.

Has it anything to do with the Government?—No.

Anything to do with the Servants of India Society?—No.

It is an independent organization started by some of you who took interest and organized yourselves into a committee. Am I right?—It is working with other committees doing the same work.

What is the main purpose of this Welfare Committee?—The main purpose is health propaganda, relieving distress to a certain extent and chiefly in the usual work of child welfare centres such as giving maternity help to expectant mothers, etc. I can best explain this by saying what we are actually doing. We have two centres, one mainly for the fishermen community in the south and another for all people. At these two centres we are attending to about 100 children coming to us each morning. We give them cod liver oil, virol and other things and in some cases we have a system by which we send them on to the local dispensary or local hospital. The committee also runs a dispensary at Pudiyaatha five miles from Calicut at the Government Fishery School. Twice a week an honorary doctor visits it.

The funds are collected from local subscriptions?—Yes and we are getting a grant of Rs. 25 from the municipality for one of the centres. That is the only public money we get. We are trying very hard to get more money.

With reference to these fisherfolk, will you be good enough to tell us if anything can be done by Government and, if so, in what direction and also whether these people have any grievance to be redressed?—Do you think that the Government are doing all that they could do or can be expected to do?—I am told that one of the great drawbacks is that they never save anything. When the season is good they catch a fair amount of fish. They do not save anything. Their catches are booked beforehand by people who advance them money.

Is there a co-operative society here which could free them from the middlemen?—I do not know. I do not think there is one in active condition. Also apparently there are disagreements among the members of the community which rather helps to paralyse matters.

A co-operative society for the fisherfolk alone will be of some advantage in relieving their indebtedness?—I believe there is a co-operative society in existence, but I do not think it is in a very active condition.

Don't you think that this habit of not saving, which was one of your reasons, requires a certain amount of education and culture? No doubt you can expect the co-operative society to teach them the habits of thrift?—I think they should have some education up to a point. I do not think higher education is necessary. I think that the Mappilla and Hindu fishermen can read and write. I think they ought to be taught to read and write.

These ideas of economy and thrift will be better inculcated if they are a little more educated than they are at present?—Certainly. The committee I represent has very few Muhammadans on it. It consists mostly of Hindus and one or two Muhammadans. We are interested in teaching them health principles. We concentrate our attention mainly on women and children.

Most of the welfare societies are of that kind?—The welfare committee is not confining its activities to fishermen. But the circumstances are such that in our place they are mostly fishermen. I cannot say that they are addicted to drink. But I know that there is a good deal of gambling. I cannot say among which community the drinking habit predominates.

Have you anything more to say about the fisherfolk?—The work which the Malabar welfare Committee is doing is public work which should be done by the public authorities. The only help that we get from the authorities is a grant of Rs. 25 per month paid by the municipality and we spend about Rs. 230 a month on the three centres. Our funds are getting a great deal exhausted and unless we receive greater public support, either from the Fisheries Department or from the Government or from the Madras Central Child Welfare Association our activities will have to be curtailed. And we do believe that our activities have resulted in tangible results in the health of the children.

You think the Government should come in for its share?—Yes. In Cannanore the municipality is itself running it and at Ootacamund also the municipality is running a welfare centre. There ought to be a centre at Panniankara and Chalapuram. There is one Women's Indian Association and they are doing absolutely necessary and vital work. I certainly think that it is the duty of the municipality to provide funds. We are shortly going to issue another appeal to the municipality.

I believe it is one of the functions of Government and it would be easy enough for us to think of recommending something for this society. But if in other places only the municipalities are carrying on this work, I do not know whether we would be justified in recommending any financial assistance. It must be the recognized policy of the Government to come to the assistance of societies such as this?—I understand that the recognized policy of the Government is not to impart education in moral and physical culture. We are doing work of that sort. Mr. Karunakara Menon (Assistant Director of Fisheries, Calicut) is a member of our committee and he knows exactly what is being done by it. Also we have been engaged in propaganda and we have issued printed leaflets to the child welfare workers instructing them in the treatment of various diseases.

But you cannot limit your activities to the fishermen alone? The Committee will not be justified in recommending you a grant if you do not limit your activities to the fishermen?—But in the coasts, the work is mainly done for the fishermen. More than three-quarters of the people are fishermen.

Dr. Gravely: Do you think the fisheries schools are meeting a real need?—I have no doubt about it. But I am not in a position to give direct information. One of our active men in the Welfare Committee in Calicut at present is Mr. Kuni. He is the teacher in Government Fisheries Institute here. He will be able to give very much better information.

Khan Bahadur Abdul Razack Sahib Bahadur: Are there any child welfare centres here?—There are two run by the Malabar Welfare Committee and two run by the Women's Indian Association. The two run by our committee are in the quarters inhabited by fisherfolk and there are dispensaries also. We get a contribution of Rs. 25 from the municipality and the Women's Indian Association also gets Rs. 25. We do not get any support from Government. The only support we ever got was a sum of Rs. 50 granted some months ago by the Collector.

Have you ever heard Government contributing to such centres in this Presidency?—Does not the municipality constitute the Government?

No, no. Are these child welfare centres affiliated to the Madras Red Cross Society?—We were not till recently a registered society. But now we are a registered society. And on the strength of that we expect relief from the Madras Child Welfare Association.

They also make some contribution towards these child welfare centres?—We were not a registered society till recently.

Dr. Sundara Raj: Do you consider that a department like the Fisheries is the best one to look after the economic welfare of the fishermen and that it should undertake work of this sort or rather should contribute towards the work that you are carrying out?—I certainly think so.

Mr. Tampoe: Is there a department in England which contributes to the welfare of the fishermen?—I do not know.

Does it contribute towards any work of that kind?—I think it does. I have no information.

It does not.

Mr. R. S. Nagudu: As far as you know, has the economic condition of these people improved or is it going down?—I cannot say. I do not think their economic condition has very much improved.

What is your remedy?—A united and strong co-operative society worked on a sound basis would be a great thing.

So you think the Fisheries Department should run a co-operative society?—I suggest that.

Is the fishermen's poverty due to thriftlessness or is it due to the fact that they are not able to dispose of the catch they make every day?—The expert should speak on the point. There is no scarcity of fish now. After 1925 there has been no shortage of fish food.

Do they find any difficulty in selling their catches?—I do not know. But there is the middleman pouncing upon their catches. If there is a properly managed co-operative society and if it is effective, it might put a stop to the middlemen. A co-operative society sales department would go a great way in the direction.

(The witness withdrew.)

**M.R.Ry. S. T. MOSES Avargal, Research Assistant,
Krusadai Island.**

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

1. The objects with which the Fisheries Department was inaugurated are, according to Mr. Hornell, (1) to increase the food supply of the people by developing both the marine and fresh-water fisheries of the country to their utmost capacity, (2) to improve the material and moral conditions of the fisher community by introducing better methods and improved gear, by demonstration to them of the value of thrift, co-operation, education and temperance and by gradual enlightenment to lead them by degrees to become happier men and better citizens, (3) to introduce new fishery industries and to develop old ones, (4) to fight mosquito-borne diseases by the breeding and supply of larvicidal fishes into waters in malarial localities, (5) to popularize interest in our operations and incidentally in marine and fresh-water biology by means of public aquaria and the publication of popular zoological literature; also to facilitate the study of zoology throughout India by the provision of zoological specimens suitable for teaching purposes, (6) to carry on such scientific study of the bionomics of the food fishes of the Presidency and of the animals on which they feed as our limited means will permit bearing in mind that our resources must be utilized in the first instance for strictly practical and economic ends.

2. All have been attempted and much progress shown.

3. The results could have been better, though the complete achievement of the objects is a question of time—years, perhaps some decades or even a century.

4. The reasons for the apparent failure are the lack of funds and expert staff. Research work had to be neglected as administration became increasingly important, and the research work done till now is the result of the labours of a few scientific subordinates who served in various sections. Some of the administrative officers who were experts turned out important research work, when free from administrative work.

5. The first remedy is the separation of administrative offices from research duties. More research officers should be appointed and given all facilities for work, well-equipped laboratories, etc. The subordinate staff in all grades should be trained. One or more training institutes may be established like the one temporarily run at Ennore in 1920-21 for the training of the Inland Assistant Inspectors and all subordinates given a training to fit them for their duties.

6. Scientific investigation, fishery development and socio-economic work among fisher-communities.

7. The most important is scientific investigation. The development of the industries and the elevation of the people could go together. The practical results of investigations should be demonstrated. Effective propaganda regarding improved methods, etc., should form part of the educational work.

II. FISH FOOD SUPPLY.

8. No. Two sets of statistics which I analysed support my statement. In the city of Madras during 1921-22 the average annual quantity allotted per head was 13½ lb. In Malabar and South Kanara, assuming that the total yield of the maritime fisheries is shared only by the people there, it leaves a little over a maund for the annual consumption of each individual.

9. Yes.

10. Yes. Apart from the local consumption in and around places of capture there are the inland regions and plantations demanding far more.

12. The market problem presents no difficulties if speedy transport from the fishing grounds to favourable markets is arranged for. This will prevent tainting of the fish and glut in the market.

III. IMPROVED METHODS OF FISHING.

13. Though primitive, many of the methods are effective, considering the average buying power of the fisherman in the matter of boats, nets, etc.

14 (a). Importation of Ratnagiri boats into South Kanara and adoption of Tuticorin outrigger for whiffing for seer, ousting the Ceylon kulla.

(b) Importation of Ratnagiri nets into South Kanara, adoption of long lining in Malabar and adoption of Ennore method in tank fishing.

(c) Opening up the deep sea fishing grounds, demonstrating the fish wealth as has recently been done by "Lady Goschen."

IV. DEEP SEA FISHING.

24. So far as my work at Calicut was concerned, she was expected to trace sardine shoals once they left the inshore waters and to locate their breeding grounds, etc. But no such work has been done till now.

26. Yes, as she had too many items of work.

28. No, not well equipped.

29. Both scientific and technological work was, I think, expected to be done.

30. No.

34. No; but the assistant, a zoology graduate, is doing his best.

37. Yes. At Calicut a successful demonstration was made and the fish after a scientific study by me was sold by auction.

38. On the West Coast the fishing zone is within the 40-mile limit but the 5-mile belt with a depth of ten fathoms is most regularly exploited; only the deep sea shark netters and the Ratnagiri men venture to the uttermost limit of the zone.

39. The chief reason is the unseaworthiness of the boats employed. The greater the distance of the fishing ground from the shore the question of transporting the catches to the markets before the fish get tainted becomes a difficult problem.

40. It is the distance.

V. FISH-CURING YARDS.

52. Yes.

53. More fish-curing yards should be opened. The staff manning them should be trained. Curers and their men, etc., should be taught improved methods and the staff should insist on their adoption. Teaching the men may be done by 'demonstration peripatetic schools.'

57. Yes, except when the catches are too large and the staff insufficient for proper supervision.

58. The increase of trained staff and the inculcation of sanitary principles among curers and coolies. As civic consciousness grows both among the curers and the consumers, revolting methods of cure like the 'Madura cure' will not be resorted to, as is now sometimes done if the staff is not vigilant. The fish trade being the most offensive of all food industries and fish being likely to spoil quickly, the hygienic aspect cannot be ignored.

VI. FISHERIES CANNERY, CHALIYAM.

61. Yes, in its early days when I accompanied Mr. Hornell to the West Coast on tours of scientific investigation.

66. I think so, because at the Aquarium I have seen European ladies literally turning up their noses at our goods.

67. Somehow the Malabar stuff have earned a bad reputation latterly, for during the early days, e.g., during the Madras Exhibition of 1915 and 1917 they were very popular.

VIII. INLAND FISHERIES.

81. Yes, growth experiments are being done at various farms, besides connected research.

86-A. Mostly commercial and administrative with scientific investigation when officers are free.

90. An assistant inspector is in immediate charge.

91. Yes, for they were given special training at Ennore in 1920-21 both practical and theoretical in pisciculture by the present Director who was then (Piscicultural) Assistant Director, in zoology by myself and in engineering by Assistant Inspector Mr. Ethirajulu Nayudu.

92. One or more permanent training institutes for fitting the staff for their work with well-equipped laboratories, etc., and a competent staff should be established.

IX. KINDS OF FISH.

97. In the Ramnad district of true fishes the important are Kuthippu (*Lactarius*), Soodai (*Clupea fimbriata*) and Mural (*Belone* and *Hemirhamphus*). Using the term fish in its commercial sense, prawns and turtles may be added.

98. The bionomics of the above are worth study, as the problem of uncertain periodicity (this year the mural fishery, fishermen say, was a failure) and possibilities of pisciculture should be tackled.

X. PEARL FISHERIES.

100. The important problem is that of the irregular periodicity of the pearl fisheries.

110. Research work relating to the anatomy, life-history, pearl-formation, etc., has been done, but as more details regarding the depths at which they live, powers of locomotion, especially in relation to sea currents, their food, the conditions under which they spawn, are required before the main problem is attacked and remedies undertaken, exhaustive experiments both in the aquaria and sea around Krusadai Island are contemplated and initial work commenced in the aquarium which is being fitted up there.

XI. CHANK FISHERIES.

113. Cultural stocking of chank beds is an important problem.

125. Research in connexion with the anatomy, life-history, food, etc., has been done by Mr. Hornell and myself; but there are more details to be filled in as regards age, growth, bathymetrical distribution, migration, etc. These questions will be taken up when the Krusadai laboratory is fitted up. Marking and other experiments will be done at Rameswaram, one of the headquarters of the chank fishery. If, however, experiments, etc., cannot be done at Rameswaram because of the Raja of Ramnad (I am sure he will do all to help us in the research), they may be done at Tuticorin.

XII. RESEARCH.

127. There is no separate section though officers scattered in various sections are now doing research. The Director, the present Personal Assistant, some inspectors, some research assistants and the laboratory assistants are doing research work.

128. The work they have been doing till now and the results are found in the Director's 'ten years' programme of fishery research.

129. Most of the results have been published in the Fisheries Annual Reports and bulletins. The results of the experiments on currents on pearl banks with drift bottles were charted by me for purposes of exhibition at Madras. All the papers were sent to Dr. Pearson of Colombo by him presumably for publication. Some results of my research, e.g., on colour variations of fish, anatomy and life-history of the edible oyster were read at the Indian Science Congress and published in the Quarterly Journal of the Bombay Natural History Society.

130. Yes. Flying fish by Messrs. Hornell and Ramaswami Nayudu, sardine by Mr. Ramaswami Nayudu, myself and Mr. Madhavan and mackerel by Mr. Jayaram and Mr. Madhavan.

131. A preliminary report on the sardine has been published and one on the mackerel is ready. The papers on flying fish have also been published.

132. Equipment was rather desultory till the taking over of the department by the present Director who has given us more facilities than before.

133. No.

134. Yes.

135. Recent years have been lean ones as regards sardines but not so for mackerel.

137. Investigation into the causes of the vagaries in the migration of sardine and mackerel is being done and data collected.

138. Certainly. Considering the fact that much has been achieved already, with a floating laboratory, e.g., in "Lady Goschen," much more is possible.

139. In the Presidency there are over 60 kinds of fishes to be investigated thus. I have already in answer to Questions Nos. 97 and 98 indicated the kinds of fish awaiting investigation in the Ramnad district.

140. No.

141. More research officers should be appointed both in the gazetted and non-gazetted ranks. And they should be well qualified.

142. It is given in the ten years' programme.

143. Yes, in 1907 and now recently by "Lady Goschen."

147. The Director has given the scope of research for the next ten years and the programme is satisfactory. The five biological stations—Vizagapatam, Ennore, Madras, Krusadai and Calicut—should be well equipped as also the chemical station at Tanur. They should be in charge of well-qualified scientific men and over them should be placed scientific officers in gazetted ranks corresponding in number to the gazetted administrative officers now functioning under the Director. A new section for the Northern Circars should be maintained with two gazetted heads—one for administration and the other for research. On the West Coast there will be two gazetted research officers—one chemist and the other a biologist.

148. Yes, in a way.

149. Yes. New facts and data relating to the deep sea throwing much light on our fishery problems have been collected.

150. Not well.

152. Yes, though desultory till now, because of no co-ordination good work has been done. Mr. Hornell wrote "It is indeed encouraging to find valuable research work of high economic importance being done by men whose training has been received wholly in India. I refer especially to the investigations of S. T. Moses, Ramaswami Nayudu, Panikkar, etc."

153. The investigations so far have a bearing on all the three fisheries but more needs to be done.

154. I would recommend the directions suggested by the Director in his programme.

155. All the three lines are equally important.

(a) Research on Inland Fisheries.

156. The lines of research are given in the programme.

157. None.

158. No. More research officers in the subordinate ranks and one gazetted research officer are necessary.

(b) Technological research.

160. Both are equally important.

161. The proportion is borne out in no way.

162. The reorganization of the staff as suggested in answer to Question No. 147.

163. Not much.

164. This work should be continued till the Indian fishing community adopt up-to-date methods. There is no end to progress and so this work must continue as long as the department exists.

(c) *Aquarium.*

167. Certainly.

168. Its educative value is undoubted.

169. Yes. Provision for a well-equipped laboratory, technical museum and a training institute may be made there.

170. Yes. Vizagapatam and Rameswaram, especially the latter. The coral reef fauna around cannot be surpassed for brilliance, colour and diversity of form. Its rank as the second important religious centre for the Hindus makes it certain that an attractively equipped aquarium would prove a remunerative proposition.

XIII. TRANSPORT.

171. As fish is likely to taint quickly, speedy transport is necessary from fishing grounds to the markets. Fast vessels, good roads, quick conveyances are the chief requirements.

XIV. SOCIO-ECONOMIC WORK.

(a) *Co-operation.*

181. Mostly so though I know Mr. Govindan, Mr. Ramaswami Nayudu and the Assistant Director (Inland) used to do some propaganda work on the East Coast.

182. Yes.

(b) *Education.*

183. It is not suited to their needs and has not influenced them perceptibly.

184. A modified system as devised by the Fisheries department and recently perfected by the present Director is required.

185. It should be directed and controlled by the Fisheries Department. The officers actually supervising the schools besides the staff should be well qualified and trained to do the special work necessary. Besides the regular schools, peripatetic demonstration schools to teach fishermen, old and young, and make them better fishermen and good citizens may be introduced.

188. Yes.

189. Yes. Labour seems to do something in this direction there.

190 (a). The curriculum as recently revised by the Director satisfies all needs.

(b) The staff should be trained at the Fisheries Training Institute, Calicut.

(c) The schools should be so equipped as to be a true centre of education for the fishermen in every sense of the term. Without ignoring or intruding upon general education the vocational side of the fishery education should be worked in.

(d) Selection may be made as at present from among the fishing classes and given training at the Calicut Fisheries Training Institute.

191. Yes.

192. The establishment of a technological institute to do this work is necessary; it may be combined with advantage with the existing Teachers' Training Institute at Calicut. The subordinate members of the establishment also could get their training. A similar institute will be needed for the East Coast and may be located at Madras if the present aquarium is developed and a technological institute added.

XV. ZOOLOGICAL SPECIMEN SUPPLY.

193. Yes, especially to schools and colleges in the North and inland.

194. Yes. This department is the pioneer in this business. The Madras Museum may be able to undertake the work.

195. Nothing special except the changes recommended in answer to Question No. 147.

XVI. STAFF.

197. All the gazetted officers except the Director and the Assistant Director (Marine) who as master-fisherman is doing technological work are attending to administrative duties, though under them are certain officers who are occupied partially or wholly with research.

198. They should not at all be entrusted with research work if real research is to be done.

199. The expert officers should be freed from administrative work. A perusal of the annual reports will show how technical officers, e.g., the Director, were unable to do much owing to pressure of administrative work. Even in the subordinate ranks clerical and other work have to be done by the experts to the detriment of their legitimate work. All this work ought to be taken out of their hands.

200. No.

202. No.

203. No. The administrative staff needs no additions in the higher ranks though additional ministerial staff may be needed. In addition to the small research staff scattered in various sections the officers suggested in answer to Question No. 147 are necessary.

204. No. For the gazetted ranks a uniform pay of Rs. 250—750 is necessary and for the research assistants (inspectors) the start should be more than at present, at least Rs. 125 if the pay should be attractive enough for, say, Honours men.

205. The specialists proposed should be permanent officers of the department on the same pay as the Assistant Directors.

Oral Evidence.

The Chairman: How long have you been in service?—I joined in 1914.

You are a Biology M.A.?—Yes, Sir. I passed my B.A. in Biology from the Madras Christian College; then I studied for M.A. and after passing it I joined service. I have been all along a zoological assistant and doing zoological research. From 1914 to 1918 I was at Tuticorin, from 1919 to 1923 in Madras Aquarium and from 1924 to 1927 at Calicut. This January I was posted to Krusadai.

What work were you doing at Tuticorin?—I was doing research work under Mr. Hornell. In the first instance, I had to study the Tuticorin fishes and do collection and identification of fishes in connexion with Tuticorin fish statistics. Mr. Hornell has published a bulletin on this subject. I did the anatomy of the chanks; I dissected the dead chanks; I had nothing to do with the live ones.

Are there not books on that subject?—No. This work has never been done till now.

Do you know in what other countries chanks are found?—The sacred chank is found only here. I have not heard of this genus occurring elsewhere.

What is the class of this species?—Welk. Then the spawning grounds will have to be found.

It is a very limited work; and this work you did in that place. Did you study the life-history of any other fish in Tuticorin, or your time was mainly confined to chanks?—I have made some study of the double oyster.

Was it considered a delicacy?—Yes.

This has nothing to do with the pearl oyster or chank oyster?—They are a different species altogether.

Is it put on the market there?—In Tuticorin, the Europeans eat them.

Is it collected in marketable quantities in Tuticorin?—I don't think.

You have some of that kind in Ennore?—Yes; the department is running a farm.

Are sufficient quantities caught for market purposes?—Yes.

But nothing of the kind in Tuticorin?—No.

What is the kind of study you made at Ennore?—Anatomical; we collected also plankton. Plankton is a microscopic organism found on the outside of the sea oyster.

It means fish food in the shape of moss and things of that kind?—Not necessarily; may be both animal and vegetable.

Dr. Gravely: Plankton is associated with spawning ground?—Yes. Pearl is a constituent part of the plankton.

The Chairman: What kind of work did you do at Madras?—I was in charge of the Aquarium; I was also in charge of the oyster farm at Pulicat. At the Aquarium I studied the habits of the fishes that were there.

What is the utility of the Aquarium according to you?—It gives us facilities for finding out the habits of certain kinds of fish. It affords nature study for students.

Did you read the report of the Ceylon Committee concerning the enlargement of their Aquarium?—I did not.

They are going to spend about Rs. 1,25,000 on the building of the Aquarium alone?—Mr. Hornell has drawn up a scheme for enlarging the scope of our Aquarium.

Is it to increase the present stock or to allow your officers to do research work there?—For both. With the present staff I do not think that any research work can be done.

Have you any experience of inland water fishes?—No; there is the Director and he gives training to the assistant inspectors. I undertook to teach them zoology. The present Director was Assistant Director then and he taught pisciculture. While I was in Madras I was in charge of the statistical work.

You have prepared statistical accounts of the fish supply of Madras. Do you think any useful purpose would be served if a similar statistical account is made of the whole coast?—Yes.

How would it help the department or the people?—We are now collecting statistics for Malabar and South Kanara, and the figures for one year have thrown a flood of light on various points.

How?—You can know the seasons when a particular fish appears; you can know the locality where particular fishes breed and other things.

Would it entail any extra staff if this work is to be carried on?—Yes.

What would be the cost?—Would the cost be proportionate to the advantage?—We don't know much about those things.

What extra cost would be required, in your opinion?—The teachers of the fisheries schools may help.

How many schools have you got on the West Coast?—I have no idea.

(*Dr. Sundara Raj:* There are 37 schools.)

The Chairman: The time when and the shore where it is caught and also the name of the fish in Latin is recorded?—Yes. I advocate that system.

You think your needs will be satisfied from a biological point of view?—It would be more correct than now.

All that the schoolmasters can do is to go to the fish-curing yard, ascertain for the day how much fish has been caught and what kind of fish has been caught. Beyond that they will not be able to say anything. They will give a data and from that you ascertain the season?—Yes.

Will that information suffice for you from a biological point of view?—We like to have more information. In the absence of more information we will have this.

What was the nature of the work entrusted to you?—Sardine research.

In 1922 Mr. Ramaswami Nayudu was here?—Yes. Since that period we have collected more data running for a number of years. We examine the stomach contents of the fish to know what kind of food it takes. We also examine the scales. We get sardines from the sea and we examine the fish the very day it is caught.

And then you analyse it, open it and examine its stomach contents? How does it help you? Chemical changes must have taken place?—We can identify many of the organisms found there. We co-relate these with the study of the plankton.

Who gets the plankton?—We had a boat of which the peon, himself a fisherman, was the boatman. He goes out with a net and catches.

Plankton, we are told, does not lie on the surface?—It lies on the surface. These are floating organisms on water. There are similar things at all levels. We analyse the plankton. We identify the stomach contents and co-relate it with the plankton.

What do you mean by it?—In a particular catch a particular organism will be in abundance and if that particular organism is found in abundance we deduce that they must live on a particular thing.

Has the record you keep been corroborated?—It is impossible.

How far have you progressed beyond the days of Mr. Ramaswami Nayudu?—We merely continue the collection of data. No conclusions are drawn.

If the data collected these four years are the same, what is the advantage of continuing it?—The data collected during the four years were not the same. 1925 and 1926 were very unproductive years for sardine while they were all right for mackerel. The previous years were bad for mackerel, but all right for sardine.

You said that sardines were not found. Has any attempt been made to ascertain the cause?—It is to ascertain the cause that all this data is being gathered.

Have you ascertained why sardines were not available in particular years?—We are sitting on the shore and collecting statistics.

You have not got facilities to go to sea and find out?—The research so far done is limited to doing something sitting on the shore. I agree that instead of doing nothing it is better that something is done.

Is the information you have collected capable of some deduction?—The inferences have been drawn on the basis of one year's data. They are found in the bulletin. My deduction is that it is a question of food supply.

You cannot say how far it is affected by the currents?—I thought it is mainly a question of food supply.

A particular kind of food is not found in their stomach?—That is the reason. There was cyclonic disturbance in 1926 and it scattered the fish food. The fish did not therefore appear at that time.

Somebody was telling us that they go from the Indian Ocean to the Canadian coast?—I have no information.

You have no conception of what becomes of the fish when they do not appear?—No.

What is the full life of a sardine?—We guess it to be three years. We deduce the age from the number of scales in a fish. The age of the fish brought to the market may be anything. I have not examined it. Unless you make a microscopic examination you cannot say what their age is.

You have no idea of their spawning grounds?—No.

You do not know where the eggs are laid?—All that remains to be found out.

That can only be done by means of trawler experiments?—Yes. We will have to follow the shoals. It is worth doing it. The trawler did not do this kind of work all these years. This work was confined to the Cape Comorin side.

So, from a practical point of view you cannot tell us that any research work has been done?—I have said what we have done. With the facilities given we have done our best. Much remains to be done and we require a trawler for the purpose.

Did you study any book on the sardines of other countries?—I have studied the available literature and that has helped me to some extent.

That finishes your work at Calicut?—Yes.

What is the fourth period you mentioned?—The work at the time in Krusadai Island. We have just fitted up a laboratory on a smaller scale than the one at Madras.

What for?—We want some information mainly about pearl oysters.

Do you expect that the oysters will be here at all?—We were able to get some oysters living in about six feet of water for nearly three months till one day during the spring tide the whole bag was lost. That was a misfortune, otherwise we could have kept them living for a month.

I take it that the tank where you kept them has no connexion with the sea?—That is the aquarium tank. These oysters are put in the sea itself in Krusadai Island. Baskets of oysters were hung to a float kept suspended in water.

But where are the natural conditions there?—They stick one to the other and they were all quite active till we lost them by a mischance.

There is nothing wrong in experimenting. But three months' growth will not be much. What about food?—Planktons are naturally found there.

Is it not likely that these things go to these places because plankton is available there?—These are unable to go about. Once they stick on something, they remain there.

They choose a particular place because the kind of plankton they want is available at that place?—Yes.

In your place what is the guarantee that you have provided the same conditions as are available in the beds?—They were living there for three months. That is the guarantee.

Dr. Sundara Raj: What sort of experiments you tried?—All sorts of breeding; increasing the number of oysters and seeing what food they take and under what conditions they live underneath the water.

For that purpose a younger oyster would be more useful?—Yes.

Mr. R. S. Nayudu: You told us that you have been marking the history of some fish. For how many kinds of fish you have noted like this?—For sardines and mackerel.

How far have you proceeded as regards mackerel?—I was in charge of the investigation only when the permanent incumbent was on leave and a report has been drawn up. I merely continued the conclusions reached by my predecessor. I have reported to the Director certain items of information in regard to mackerel.

What are those items?—Our work was like this. Twice a week we select some fish from the market and then we examine the stomach contents.

Did you go on examining the stomach contents all these four years or you finished off a certain portion and proceeded to the next stage?—We go on collecting data.

What did you do then?—About the growth also we collect data in addition to the examination of stomach contents and the scales.

These are the three things?—And we find out whether a fish is male or female.

Why do you repeat that sort of work?—Much depends upon the season.

The Chairman: Cannot you now tell which fish is female and which male?—I cannot.

About the hilsa, I can tell you whether it is a male or female, Janapulas and Gudupulas.

Have you completed any investigation with reference to any fish?—The investigation of the rate of growth we have completed.

These scales give you the index of the growth?—Yes, and the age of the fish.

You say you have no facilities for making further research. What do you require for further research on mackerel?—We were sitting on the shore. If we had followed the shoals we may have been able to get more information.

Mr. R. S. Nayudu: You want a trawler and what more?—A laboratory aboard the ship where you can carry on the research and follow the ship.

The Chairman: Supposing you are allowed to go on the trawler, do you think you can direct the trawler to follow the shoals?—I am not a sailor.

As a biologist you can say where they are going?—No.

Do you think it is possible for us to obtain a biologist who can follow the track of the fish? Even for this some knowledge of biology and previous experience is necessary?—We have not tried so far. We can at least try.

How can you say where they are going? You will be going in the trawler one way and they will be going underneath the water another way?—I have no idea of how it will be like.

So that the suggestion about following the shoals has yet to be developed?—We knew when the shoals leave the inshore, but we do not know where they go.

Dr. Gravelly: Can you tell us how they do this sort of work elsewhere?—They have trawlers.

Do you know what is being done in other countries? Naturally you will be benefited by the experience of other workers. Have you never studied it and found out what is done elsewhere with a view to following the same thing here as a guide in our own research?—As regards following the shoals I have no idea.

I don't say definitely following up the shoals; but can you say in what way this is carried further in England?—I do not know whether this has been done in England.

Mr. R. S. Nayudu: In order to make out a case for more facilities, you must be able to say what is meant by following the shoal. You do not know what you ask for?—A properly equipped laboratory is quite enough and a good trawler will go a good deal towards the research work.

(The witness withdrew.)

The Committee then adjourned till 11 a.m. on Wednesday, the 18th July 1928.

Wednesday, July 18th, 1928.

CALICUT.

PRESENT:

M.R.Ry. Rai Bahadur Sir K. VENKATA REDDI NAYUDU Garu, Kt. (Chairman).

„ Diwan Bahadur S. KUMARASWAMI, REDDIYAR Avargal, B.A., B.L.
M.L.C.

Dr. F. H. GRAVELY.

Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, M.L.C.

M.R.Ry. P. V. MANICKA NAYAKAR Avargal, B.E.

„ R. S. NAYUDU Avargal.

Mr. A. McG. C. TAMPOE, I.C.S., M.L.C.

Dr. B. SUNDARA RAJ was also present.

M.R.Ry. SOMA MARAKALA Avargal, a member of the fishermen community and owner of a fish-curing yard at Calicut.

Memorandum.

1. If the aim of the department as its name suggests is the upliftment of the fisherfolk morally and professionally, it should be its bounden duty to give a thorough elementary education for all the boys and girls of the various sections of the fisherfolk. In my opinion, the importance of this elementary education is so much that it should be made not only free but also compulsory. The number of the fisheries schools now existing in South Kanara are not at all enough to educate even 10 per cent of the boys and girls. So making provision in the ensuing budget for at least two dozen more fisheries elementary schools for South Kanara is very very desirable.

2. And then the starting of a fisheries technical school one for each district along the coast is also quite essential. The boys after finishing their elementary education must attend the technical school of their district for a year or two. In the technical school all the ways so far known in the world with regard to the art of catching fish, curing fish and fish business, should be taught by teachers who have specialized the above three branches in the fish craft.

Moreover at present higher education is not given free to the fishermen students. This is a great impediment in the way of these microscopic minority of the fisher students who intend to continue their studies. So the Government by all means must permit the fishermen students to carry on their studies as far as they want, free of school-fees in all the schools of the Presidency.

3. The fisherfolk are so far backward and downward for want of this enlightening education that they are quite ignorant of this reformed world activities. If you tell anything now to them either in their ways of catching fish or curing fish or in their behaviour, they simply do not want to understand it. So I have not much hope in the antiquated type of fisherman

I Chapter

but I am sure the younger generation tutored and trained by the department will respond most satisfactorily to the call of the new world movement.

4. I am not much interested in the other branches of the questionnaire. Of course the Fisheries Department at present is doing its work in a much better way than the former department was doing its work with regard to the maintenance of fish-curing yards. The fishermen have been benefited by the department in many other respects also, and the department has to do a great deal more for the people. A reduction in price of salt issued in the yards is quite welcome. And more smaller fish-curing yards may be opened in the villages thickly populated by fishermen.

5. And lastly I should like to add that in order that the department may win the love and confidence of the fisherfolk it must make it a policy to recruit as servants, teachers and officers as much as possible from the fisherfolk only; as then any improved methods or ideas suggested by their own kith and kin have naturally a chance of responding readily and without any suspicion by the community and this coupled with compulsory elementary education in my opinion will be the easiest method of improving the fishermen morally and professionally in the shortest time.

Oral Evidence.

The Chairman: To what community do you belong, Mr. Marakala?—To the fisherman community.

'Marakala' means fisherman?—Yes.

You come from what place?—I come from Malpe in South Kanara.

Is it on the West Coast?—Yes.

How many fishermen houses are there in your place?—There are about 1,000 houses with a population of more than 5,000.

Do they all live in one locality or in different villages?—They live in different villages. All of them do not belong to Malpe.

How many fishermen houses are there in Malpe?—There will be about 500 houses and the population will be about 3,000.

Do they all live on shore?—Yes.

They all live in one locality or in scattered areas?—They live in clusters of fifty or sixty houses.

How many boats are there for all these 500 houses?—There are about 2,000 boats.

How many nets have they?—They have about 1,500 nets of different size.

When do they go out for fishing generally?—They generally fish in the season from September to April.

When do they start?—They go out fishing both in the morning and in the night.

How long do they remain at sea?—If they go in the night they stay in the sea the whole night and come back in the morning. Those who go in the morning return in two or three hours.

Those who go in the evening fish all the night?—Yes.

How many boats go together?—For catching a certain kind of fish some 25 boats go together and sometimes four or five go together.

Why do they go 25 at a time?—They join together in the sea and jointly fish.

Is it for mere companionship that they go together or is it to pull the catch? Is the catch of such a kind that unless they all work together they cannot get it?—For some catches all the ten boats have to work together. There are also some varieties which can be taken by a single boat.

Is it because they want a bigger net that they join together?—They put several nets in different angles and besiege the fish as it were.

Do they divide the catches?—They share the catch.

So that one man cannot say that he is lucky and that the fish caught in his net is his own?—No such thing.

What is the name of the fish?—Korah and Ettah.

Do these people engage in other occupations also?—Fishing is their only occupation.

As soon as the fish reaches the shore what do they do with it?—Some salt it by taking it to the fish-curing yard.

Don't they salt the whole stuff?—Only small quantities they salt. As the salted fish is costly, they do not find ready sales.

Do not *kavadi* men come and purchase the fish?—No.

How far is your place from the nearest town?—The nearest town is Udipi, about three miles from my place.

If you take the fish to Udipi it will sell?—Small fish is taken to Udipi and sold there.

How far is the railway station from your place?—Thirty-six miles.

Are there fish-curing yards in your place?—There are three yards in Malpe and two in the neighbouring villages.

Are the yards built on the new model?—Built on the new model, but without any advance from the Government.

How is salt sold there?—At 2½ rupees.

Are you satisfied with that price?—We are paying that price for the last two years. If you reduce it we will be very glad.

Do you want any more improvements on the shore?—No more sanitary arrangements are needed. The present system is quite all right.

How long has this new system been in operation?—For about nine or ten years.

I want to know whether any difficulty has been felt during these ten years in selling, a difficulty which was not experienced previously?—We had more difficulty previously. Now we have no great difficulty. There are more people coming to purchase than before. Previously salted fish was being used for manure as it was bad.

Now it is better and people are purchasing it in larger quantities?—There are now more purchasers.

So that the improvements effected and the consequent increase in price did not affect the market?—No. Since the introduction of better methods of curing there are more purchasers.

Have you got any school for your boys there?—In Malpe there is one school.

Is it specially devoted to educate the fisherfolk?—Yes.

Do they teach in that school anything about net or boat repairing?—Nothing of the kind is taught.

How do they repair their nets?—They know how to make and repair their nets.

Who makes the boats?—The carpenter. Fishermen do not know how to make boats.

Could they not learn boat-making if they are taught?—Oh yes, they can and there are people who want such a training.

Have you got a co-operative society in your midst?—No.

Do the fishermen borrow moneys from others?—They take small loans.

In Malpe are there Mappilla fishermen also?—No.

Do these fishermen drink?—Yes. Without drinking they are unable to do their work.

You were saying something about small loans? Who gives loans?—The sowcar.

What is the rate of interest charged?—Nine per cent and 12 per cent.

Do you lend money yourself?—Yes.

How much of your money is outstanding?—About Rs. 15,000 among fishermen.

Why do they want so much money?—To purchase nets and for food in the off-season.

Do you get any share of the catch?—The whole thing is purchased by me.

Do you get any share of the catches on account of the loans you have advanced?—We pay for the fish according to the bazaar rate and then make adjustment against the advance.

Why do you purchase all the fish?—All for curing.

Have you got anything else to say?—I wish to say something about education. Our fisherfolk want more schools. For Malpe the existing one will do. But our neighbouring places have no school. There ought to be a school wherever there is a fishermen village.

Up to what class you expect education to be provided?—Lower elementary schools will do. But among the people who study in these schools there will be some who would like to appear for higher elementary classes without payment of fees.

They will have to go to some other place for higher elementary school?—Yes.

If they go there with a small scholarship, what about their food?—For food they will have something. Among the fishermen community there is a fund started in Bombay for helping such boys and if they apply they will get relief without difficulty. The Government pays scholarship only to people who are able to produce a poverty certificate, but it is very difficult to get such certificates.

It ought to be easy to get such certificates from the Fisheries officer?—Certificates have to be got from the magistrates.

Mr. Tampoe: For granting a poverty certificate the Collector has to make enquiries through the tahsildar of the place.

The Chairman: Why should not Assistant Directors of Fisheries grant such certificates?—

Mr. Tampoe: They would not be able to make the necessary enquiries.

The Chairman: What is the harm in the fisheries schools being placed under the taluk board?—They will not be looked after with the same care as they are now.

Diwan Bahadur Kumaraswami Reddiyar: Do the fishermen of the place borrow all the money from you or from other money-lenders also?—Besides myself there are others who advance money to them. My rate of interest is 9 to 12 per cent.

What do the other money-lenders charge?—They also charge 12 per cent.

There are lands under cultivation in your neighbourhood?—Yes; both nanja and punja. There are other communities which attend to cultivation, the Bunta, Thiyas, Christians, Billavas and Muhammadans. They also borrow like the fishermen.

At what rates of interest?—They purchase rice at the bazaar rate and at the end of three months 12 per cent is added on to the amount advanced.

Don't they borrow money?—They don't.

Is the state of indebtedness worse among fishermen than among farmers?—The fishermen are more indebted; for everything they have to depend on fish. Unless they sell fish they have no money.

Do the farmers drink?—Yes; but not to the same extent as fishermen.

Do the fishermen gamble?—No.

In the Malabar district they do gamble?—I do not know.

The farmers also do not gamble?—Only they bet on cock-fighting.

Mr. R. S. Nayudu: Is the condition of the fisherfolk better than before?—Yes. Their standard of living has improved.

If their standard has improved, why should they go on borrowing?—By their work they have improved, but not very appreciably. Those who borrow have not appreciably improved.

Why should they be against the work of a co-operative society?—There was a society previously. That was not working properly, because those who took advances did not repay and those responsible for the management were not treating those who borrowed properly; they were harassing them.

Can't you manage it better?—I tried. The members do not understand the value of co-operation. They have no education. One man cannot do much.

Is there any difficulty in finding out a market for your finished goods?—Fresh fish is sold only in the village; but dried fish is exported to Colombo if the market is suitable.

You want a wider market for your fresh fish?—Fresh fish will have to be carried to a distance; before it reaches a place where it can be sold it becomes tainted.

If the Fisheries Department manages to get some markets will you welcome it?—Yes.

If a sales society is organized you will be prepared to work it?—I can't say anything now.

Dr. Gravely: How long will your cured fish keep in good condition before it can be sold?—Ordinary cured fish will last for 1½ months, Colombo cured fish for 6 months.

Is your process better or the Colombo process?—That depends on the market.

The Chairman: Do they cure more for the purpose of exporting to Ceylon or do they cure only for local consumption, or half and half?—

Under which method do they cure it?—By ordinary method. There are people who purchase and send it to Vellore, Trichinopoly, etc.

All of it is consumed in India?—Yes.

If you are able to refrigerate fresh fish for export you will get a wider market or a better price?—I was sending fresh fish 60 or 80 miles away in a Ford car, without ice. It got tainted by the time it reached its destination. Therefore I wanted an ice plant. If the fish is put in ice it will last about 36 hours. For long distances we want a refrigerating plant.

Dr. Gravely: Does not fresh fish open up markets that are not touched by the ordinary cured fish?—Yes; some people will not eat cured fish.

Mr. Tampoe: What is the salted value of five rupees worth of fish?—Rupees 7 or Rs. 8.

Dr. Gravely: What do you spend on salting?—Rupees 2 for salt and 8 annas for wages. For Rs. 5 I will get 3,000 mackerel, and for this I will require 2 maunds of salt.

The Chairman: What will be the size of the mackerel which you get at Rs. 5 for 3,000?—Nine or ten inches.

(The witness withdrew.)

M.R.Ry. M. P. KRISHNAN Avargal, Merchant, Calicut.

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

1. The Fisheries Department was inaugurated with the main objects of (1) improving the dietary of fish among the people and thereby establishing an increased demand for fish as food; (2) converting certain species of fish into fertilizers for agricultural purposes; and (3) improving the general condition of the fisherfolk, by chiefly relieving them of their poverty.

2 & 3. In my opinion a fruitful idea of co-operation and elementary education has been created among the fisherfolk; but higher education has not been encouraged to an appreciable extent. As regards the method of curing fish, which was formerly quite crude, a tangible change has been effected. On the whole, however, considering the amount that has been spent for the maintenance of the Fisheries Department, the benefit so far derived is very small.

4. The reasons are: (a) Want of sufficient instructions, theoretical or practical, to the real working classes; (b) failure on the part of the department to take into confidence and patronize the leading men of the fishing communities who could influence the illiterate classes to take to any new methods inaugurated; (c) not affording facilities to the really working people to acquire boats and nets and other equipments, with the result that they continue to be in the clutches of the money-lenders and middlemen.

5. I would suggest the following:—

(a) Lend money or materials to the working people, under proper guarantee.

(b) As regards fishing, practical demonstrations on this coast of the indigenous methods in vogue at Malpe and Ratnagiri, and the introduction elsewhere of the Malabar boats and nets in the place of catamarans.

(c) Either to reduce the price of salt or permit people to use salt earth as before, sufficient demonstrations being given in the latter case to use it in a cleaner manner.

6 & 7. Vide Question No. 5.

Note.—The steam trawler system is unsuitable for the West Coast, where fish for food is daily required. My experience is that much noise or disturbance of water, as in the trawler, drives away fish, as a result of which very little catch can be had. Further the introduction of steam trawlers will bring about the serious trouble of unemployment, only technically qualified men being required for work in the trawlers. A very large number of the actual fishermen now employed in the sea may find themselves out of employment.

II. FISH FOOD SUPPLY.

8. No.

9. Yes.

10. Yes, to a very large extent in the interior parts, provided they are supplied cheap.

11. Yes.

12. Of course.

III. IMPROVED METHODS OF FISHING.

13. Yes, but it requires improvement as suggested.

14. Nothing practically.

16. Indigenous methods of fishing as obtain at Ratnagiri and Malpe can be introduced in other places. The noise made by using *Chala Vala* and *Kalli* in certain seasons must be stopped, and as this noise frightens away the shoals out of this water it should be made penal. Similarly drift netting

at night should be stopped during certain months, as such night fishing with drift nets prevents the shoals of fish such as Kora, cat-fish, sardines and mackerels from coming to the shore side from deep sea (roughly from the middle of September to the early part of November).

V. FISH-CURING YARDS.

43. The transfer was with an idea of introducing more sanitary and improved method of curing.

44. The only improvement so far is in the construction of pukka sheds with better floor. No new methods of curing have been as yet demonstrated to the fish-curers.

45. I would suggest the following:—

(a) Pukka curing sheds like the few introduced of late should be insisted on everywhere. Where the ticket of a ticket-holder is in any case cancelled, he should be paid the value of his shed.

(b) With a view to carry away the old brine directly into the sea, a proper drain construction should be devised.

(c) There should be a better supply of water within the fish-curing yards.

(d) Tickets should be given more to actual fishermen as against the middlemen.

(e) Fish-drying rooms should be provided at all the important fishing centres.

46 & 47. Must be reduced. This reduction can be achieved not including the establishment charges in the price of salt supplied. Only transport charges should be taken into account. The co-operative system of supply of salt may be introduced. It will also be good if the yards can be managed directly under the Government of India in which case certain high appointments of Fishery officers can be done away with.

48. The Government of India.

49. The actual fishermen are benefited. The present doubled price of salt is generally made the reason by the buyer for reducing the price of raw fish caught by the actual fishermen.

51. About 50 per cent of the normal catch is salted.

52. Yes. There is always demand for cured fish.

53. Indicated already.

54. Yes, by the management of the yards under the Government of India or under the Co-operative Department.

VI. FISHERIES CANNERY, CHALIVAM.

61. Yes.

62. It was serving its purpose properly during the regime of Sir F. A. Nicholson. Later on, the management fell into the hands of inexperienced men with no special interest and as such its purpose was defeated.

63. No.

64. No.

65. No.

66. Yes. It is a fact.

67. Indian foodstuffs, even if better made than imported ones, are tabooed on European table.

68. Reduce the price and advertise better. Above all, make the stuff to Indian taste, which can be done only by engaging experienced local men in the manufacture.

69. I cannot quote the exact quantity. Whatever quantity is imported is consumed by Europeans and high-class Indians.

VII. EXPERIMENTAL STATION, TANUR.

70. Yes.

71. To find out improved methods in curing fish and for the manufacture on proper lines of fish oil and guano and fish meal.

72. Very little. Though in the beginning it had served useful purposes, it later on failed in its objects since it became a purely commercial concern.

73. The following suggestions are submitted:—

(a) All successful experiments should be demonstrated and brought into practice in all fish-curing yards.

(b) Proper training should be given to fisherfolk.

(c) The department must do away with the commercial aspect in the working of the station.

74. The results have not been availed of at all, since the public have not been given the benefit of them.

XII. RESEARCH.

127 to 132. The researches so far have resulted in little. No additional knowledge has been created of the particular seasons for the appearance or non-appearance of particular kinds of fish at particular places. This knowledge alone matters for the fisherfolk as that would enable them to be equipped with the necessary kinds of nets required for different catches at different seasons. The fisherfolk will further be benefited if as a result of researches a cheap method of preserving raw fish in large quantities at times of large catches is found, as against the cold-storage system.

133. Shoals of sardines decreased immensely during the last three or four years. Mackerel after disappearing for four or five years reappeared this year.

134. Yes.

135. Mackerel alone appeared in large shoals recently.

136. Yes.

137. Nothing.

138. Yes.

139. Cat-fish and Kora.

140. Yes, if they pay more attention.

141. No increase in the staff is necessary at present, but they should carry on their researches on board the vessels within the sea and with more zeal.

XIV. SOCIO-ECONOMIC WORK.

(a) Co-operation.

173. The co-operative movement did good work at one time, but now most of the fishermen's societies are almost defunct or in a very miserable condition.

174. The societies have suffered on account of the slack supervision of the department. To improve these societies I would suggest the appointment with a small scale of pay of fairly educated men of the fishing communities to supervise them. Where available, services of honorary workers from among the community should also be enlisted.

The co-operative movement can as well be used for the spread of temperance—coffee shops can be opened on co-operative basis to combat the evil of liquor shops, which should be removed from fishermen areas.

More of credit societies for advancing money to fishermen for the purchase of boats and nets are also necessary. There should further be a co-operative organization for the purchase and disposal of fish and its products.

180. Yes. Long-term advances are necessary. Otherwise these societies are not of much service to the poor fishermen.

(b) Education.

183. It has had a beneficial influence in the fisherfolk in general, since the Fisheries Department is in charge of such education relating to the fishermen classes.

184. Yes. Vocational education should be given prominence. The curriculum for the village elementary school should include such subjects as fishery technics and co-operation. The teaching staff should be recruited from the fisher community itself unlike the present system of recruiting mostly from non-fisher class ignorant of fishing industries and with no sympathy for the fishermen's aspirations.

More of night schools for adult education should also be advocated.

Oral Evidence.

The Chairman: What is your native place?—I am at Calicut now. I belong to the Mukkua community.

You live in the quarters where the fishermen live?—Not exactly.

What business are you doing?—My main business is fish oil and guano. I have got my own factories. Last year there was no production of oil, because there were no sardines. In 1923 we had a good crop, in 1926 we had nothing, and for 1928, the season has not yet begun.

What about mackerels?—Mackerels are only to be cured.

What about guano?—Guano is the residue of sardine after it is treated. You can't get oil out of other fish. The cost of guano is very little, the oil is the only paying thing. I have got seven factories of my own. I produce 50 to 100 tons of oil if the season is favourable. I send the oil to Europe through some firms in Cochin. The lowest price was Rs. 100 per ton of oil; this year it has gone up to Rs. 525 because there are no sardines. This oil is used for soap-making, tanning leather and other things. There are 600 to 800 factories on the coast. I have seen the Tanur factory. I was working there. I had all my training under the Fisheries Department.

Is your oil equal to the oil prepared at the Tanur station?—Yes; my oil is selling in the place of cod-liver oil in all chemical shops. It is sold in 8 oz. bottles at 12 annas each. It is called sardine-liver oil. In Madras I have got my agents. The guano is sent mainly to Colombo. I send about 200 tons a year. I purchase also from other factories up to 800 tons and sell.

You don't sell it to our own countrymen?—They want it, but the railway freight does not permit them to utilize it. In the Tanjore district they want more guano, but the railway freight is prohibitive; it comes to more than the value of the guano sometimes. I have got a machinery for extracting oil; it is of the same kind as at Tanur. It is somewhat cheaper.

Have you got anything else to say?—The fishermen get abundance of catches of fish sometimes; they cannot preserve what is left unsold. For that the department must find out some cheap manner of preserving it for a day or two. The factory owners cannot take all the fish, as they have to take off the oil on the very day. We cannot keep it for more than six or ten hours. A factory can deal with 5 tons of raw fish. If there is more it must be converted into manure. A refrigerating plant would be costly which most of them cannot afford. So I want the department to find out something cheap.

What about ice?—Ice also is costly, 4 pies per pound when fish itself sometimes costs only 2 pies a pound.

Have you heard of the system of cooling by means of carbon dioxide?—It is very costly.

You say that all those methods are very costly; we are yet to know whether there is any cheaper method.

You cannot take oil out of salted fish?—No.

Diwan Bahadur Kumaraswami Reddiyar: You were trained at the experimental station at Tanur?—I was there for eight or nine years; I was a servant of the Fisheries Department. I was entertained as a mechanic. I was acting Special Assistant at Tanur when I resigned.

From what year to what year?—From 1910 to 1920.

You think that the present sheds are an improvement over the old ones?—They should be converted into pukka sheds. There must be drainage from the curing yard to the sea to carry the old brine. At present it is collected in a small pit and each ticket holder will have to carry it to the sea. It will not cost much to drain it into the sea as the sheds are situated near the sea.

How many sheds are there?—About 12 in Tanur. The department does nothing in the way of drainage.

What did each shed cost?—From Rs. 400 to Rs. 600 according to size.

You have seen the Cannanore curing yard?—Yes; they are very small sheds. One long shed is divided into small sheds; it is not tiled.

Who collects the cess?—The sub-inspector who issues the salt.

Is the experimental station at Tanur doing any useful work?—It was doing some work. I do not find any new improvements. Nothing has been done since Sir Frederick Nicholson left. Light cured fish, smoke fish and fish meal were prepared, but these were not demonstrated to the fisherfolk. I knew something of it, but others are not aware of it.

Was there demonstration in Sir Frederick's time?—Yes. He wanted to demonstrate new methods of curing in the yards. Meanwhile he retired. He wanted to introduce tattis for dried fish instead of putting it on the sand and other arrangements for filtering the brine. Meanwhile he retired.

Was any research work done at any time in Tanur?—They tried to improve the quality of the oil. There was no laboratory at the time. The Fisheries Department should have an eye on the condition of the factories. They are very insanitary. It is very essential to appoint an inspector to go and inspect the condition of the factories. There was control before. After the Fisheries Department took charge of these, there has been no inspection. The taluk board collects only the licence fee, and with that their duty has stopped.

Mr. R. S. Nayudu: You want that the Tanur station should continue the experimental work?—Yes; I want that the experiments should be demonstrated to the fishermen. Formerly it was an experimental station; now it is working on a commercial scale.

I think you know something about the construction of fish-curing sheds?—Yes, I know.

You know almost all the sheds have collapsed. Can you suggest any improvements to be made in their construction so that they may be made durable?—Salt will spoil ordinary walls.

You think the sheds will collapse in whatever way we build them?—Yes.

In how many years will they collapse?—In eight or ten years.

You put up those sheds in what year?—In the year 1920-21.

You were in service then?—No I was not. I was doing my business.

As a contractor you built those sheds?—Yes.

You finished most of the sheds in 1921 and they collapsed in 1923-24?—I do not know.

You did not care to see how the sheds were standing and all that?—I heard that they were going to collapse in the year 1925 or 1926.

Each shed cost how much?—From 400 to 600 rupees.

Can you suggest a cheaper and better way of constructing sheds?—I know.

Is the present standard type suitable or should we go in for another type?—Tiled roofs are not fit for curing sheds. When we heap the fish inside the shed, the tiles get heated and the fish gets tainted quickly.

So you are not for tiled sheds?—I am for thatched sheds and cement floor. Cement floor is absolutely necessary to absorb the bad water, etc.

Perhaps the collapse was due to the tiles?—The tiles were heavy and underneath they always put salt and the salt penetrated the walls and the tiles.

These sheds may last for how many years?—These may last for four years.

We find that the sheds in Tanur have lasted longer?—They might not have done much operation.

What would be the cost of a thatched shed with cement floor?—It will cost about Rs. 150 to Rs. 200; but in certain localities it might cost less.

Mr. Manikka Nayakar: You say you have a number of oil extracting factories?—Yes.

How many factories have you got?—I have six factories. In some I have partners in business while in others I am the sole owner.

What is the total capital value of them?—Each factory costs about Rs. 2,000 to Rs. 3,000 including plants.

Who are your partners?—The fishermen of the locality.

What is the strength of the establishment?—I keep only a purchasing clerk. I engage men only for six months in a year. In some cases fishermen are employed. They are not available.

What do you pay each man?—Rs. 15.

For working the plant for extracting oil?—There is a maistri on Rs. 20. We engage coolies also.

What coolies?—Cherumas and other backward classes.

What is the sort of work they do in the factories?—They carry the fish to the boilers, etc.

Why don't you get fishermen?—They will be engaged in fishing which is the work done by their ancestors. Sometimes when I require extra hands in dark nights, I invite them.

What do you pay to the Cherumas?—I pay each man As. 8 to Rs. 2 per day. I will have to pay higher wages when I ask them to work at night. They are daily coolies. No advance is paid to them. I give them no bonus. But at the end of each season I give them bakshis, say, about Rs. 5 out of the profit I make.

Do you employ in the factories other depressed classes people?—Yes.

The fishermen co-operate with you as partners in the concern?—Yes.

Those who can write you employ as clerks?—Yes.

From what places do you collect fish for extracting oil?—I buy from the neighbourhood of each factory. I have got factories only in places where particular kinds of fish are available and I purchase in lots from fishermen.

Have you advanced money to fishermen?—No.

Are there other people purchasing fish for the purpose of extracting oil?—There are.

What is the rate at which you pay?—It depends on the catches. For sardine I pay from Rs. 10 to Rs. 20 per ton. I do not weigh them, but the weight is judged by sight. If I pay a higher price the factory cannot be run. But sometimes I pay 3 pies per pound of sardine.

Are other methods of using sardine more paying?—It will not serve any other purpose than oil extraction.

It now serves no other purpose than coming to your press?—Yes.

After the oil is extracted what use do you make of it?—There is the guano.

Dr. Gravely: The six months you spoke of correspond to the six months when the fishermen are busy?—Yes.

The fishermen have nothing to do in the other six months?—They catch other kinds of fish.

Your people I understand are not fishermen?—They are not fishermen.

During six months the fishermen are practically idle?—They have nothing to do.

Have your men got any side employment?—I dispense with their services.

Can they find other employment?—Some clerks I re-employ or continue in the coir industry.

Is that a large proportion of the people?—A small proportion. In season, I bring them from the coir factory to the oil factory and for that period I reduce the work in the coir factory.

(The witness withdrew.)

**M.R.Ry. K. SUBBAYYA BHAT, Excise Sub-Inspector,
Kasaragod,**

Memorandum.

In 1920, I was for some time in Tanur Fisheries Experimental Station. The methods demonstrated there were scientific and improved method of curing fish, viz., smoking of mackerels and other fish, sun-drying of prawns, light curing of fish, extraction of superior oil from sardines and preparation of fish guano. The fish cured there were, in my opinion, far better in quality than those in ordinary fish-curing yards. Though there was some arrangement for fishing, it was not effective and fish was purchased from private fishermen for operation at the station.

When the Fisheries Department first took management of some of the fish-curing yards in 1919, they wanted the curers to construct model fish-curing sheds with masonry tubs and cemented floor for curing fish in the place of old dug-outs unserviceable for fishing used for the purpose of curing fish under the Salt Department. Raised bamboo flakes for drying big fish after salted, were also introduced in the place of coir-mats hitherto used for the purpose. With a view to economize salt light and brine curing of fish was also shown to the curers. But they were not keen in adopting these methods demonstrated to them on the ground that it involved extra expenditure and labour and did not repay the trouble taken as the fish so cured would not find ready market and fetch better prices.

When I had occasion to visit some of the fish-curing yards subsequently, none of these methods were adopted by the curers. Some more modelled sheds with masonry tubs and cemented floor were however constructed in most of them.

In Tanur and Mangalore, I had occasion to visit night-schools opened for fisherfolk at the instance of the Fisheries Department. More such schools may be started as the fisherfolk can attend the classes without interference with their daily fishing operations.

Oral Evidence.

The Chairman: What office do you hold?—I am Excise Inspector.

What have you to do with fisheries?—I was in the Fisheries Department until salt and excise were separated.

That is prior to 1924?—Yes.

Were you in charge of any fish-curing yard?—Yes. I was in charge of the Mangalore fish-curing yard in 1919. I was one of the six sub-inspectors who were lent to the Fisheries Department.

Was there any difficulty about the issue of salt during that period?—Prior to 1919 sometimes the stock of salt used to run short on account of the heavy catches and therefore the fishermen used to complain.

Then in 1919 it was handed over to the Fisheries Department and you served at Mangalore?—Both before and after it was handed over.

How many yards are there now?—I do not know the exact number now. Roughly there will be about five belonging to the other classes and ten to the fishermen.

What kind of fish were they curing?—Cat-fish (Jella) in the months of September and October and in April also they used to get it in plenty. They used to get mackerel in the months of November and December and sardines in the last season, that is, in March and April. They used to salt all these.

Were they selling any portion of the fresh fish?—Out of the catches about 75 to 80 per cent used to be purchased by five ticket-holders who are non-fishermen, a portion of the remainder was sold in the market and the rest only was taken in the evening to the yards for curing.

Why do they sell the raw fish?—They go out fishing twice a day. They take to the market the first catch as the females who take them to the market do not want to be inconvenienced by having to take them to the yards.

So, as a matter of convenience they were selling it before curing?—Yes. They retain whatever is necessary for the market. What remains after selling in the market they take to the curing yard.

Do you think that after the yards were transferred to the Fisheries Department, the sanitary condition has improved?—The sanitary condition of the yards where there are masonry tubs and cemented floors has improved, but in some cases they remain as before.

So you don't think there is much difference between the old administration and the present one?—Not any material difference.

Does the fish cured in the improved sheds fetch a higher price?—There is no improvement in the methods. There is only that cleanliness now. According to the old method they did not incur any extra cost for curing. The boats which were unserviceable were being used as dug-outs for curing fish and they did not incur any extra cost. The present method is comparatively costly and so they began to complain.

Why?—Because it is costly. In 1920 in Tanur there was actually some complaint from the fishermen who found that unless they erected these improved sheds and carried out the instructions of the Fisheries Department salt would not be issued to them. I was in Tanur for a short time and I was trained in that section. I was in Tanur in November and December 1920.

Were the 13 sheds built at that time?—They were being built.

The sheds at Mangalore are adjacent to the sea?—The curing yards in Mangalore are in a strip of sand-belt between the town and the port.

Is there a sufficient demand for fresh fish?—There is.

Does half of the catch go to the market?—Sometimes the full catch goes to the market.

Therefore, on those occasions very little goes to the curing yards?—Fifty per cent of the cat-fish goes to the market. Good fish such as barimeen, mackerel, etc., are taken to the market. I think sardine is used for manure in Kasargod. The Fisheries Department have not developed it.

Are they put in any pit for some time and then taken out?—Yes.

Not guano?—These are fish. They bury them in sand for two or three days and then use them for cultivation in a large scale. The Fisheries Department may conduct research in this direction.

(The witness withdrew.)

M.R.Ry. R. SURYANARAYANA RAO Garu, Member of the Servants of India Society, Calicut.

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

As I understand the aims of the department are primarily or at any rate should be—

(1) to develop the fish industry as a source of food supply as fish is considered to contain certain elements which are necessary for the upkeep of the body;

(2) to provide better and more remunerative occupation for the fisher-folk;

(3) to prepare and popularize the use of products of fish that cannot be converted into human food, such as oils, manure, etc. ;

(4) to improve the moral and economic condition of the fishermen engaged in the fish industry by undertaking welfare work.

It is difficult to assert with any certainty that any or all these objects are being achieved. Success or failure depends on various factors. Personal element in regard to certain objects plays a great part. On the whole it may be said that a serious attempt is being made to achieve the objects. Suggestions made in the following sections, if adopted, may be helpful in achieving further progress. One suggestion may here be noticed while detailed reference to it will be made later on. Whether the combination of research work with administrative duties in the head of the department has been a hindrance, is a point for consideration. If the objects above mentioned are to be achieved, considerations of net profit to which prominent attention is being given even in the reviews of Government should not be allowed to interfere in the working of the department.

II. FISH FOOD SUPPLY.

Though there may be adequate supply of fish at present, increase in supply is sure to increase the demand as fish food is cheaper than any other non-vegetarian or vegetarian food. At any rate that will be the case on the West Coast where the people are very poor and are content with very cheap food.

V. FISH-CURING YARDS.

From what I gather the object of the transfer of fish-curing yards is to provide facilities for curing fish on hygienic and sanitary lines so that the consumer may get good fish. To a great extent this object has been achieved by the establishment of public curing yards. But it is possible to do much more to popularize hygienic method of curing if the following suggestions are considered and given effect to:—

(1) construction of platforms at Government expense for drying salted fish;

(2) regular and adequate supply of salt;

(3) supply of salt at cheaper rates as it was some years ago by (a) providing better and cheaper transport facilities; (b) by not including in the price of salt the cost of establishment and cost of sheds constructed either for curing or storage of salt;

(4) constructing demonstration sheds in all yards;

(5) allowing wastage of salt;

(6) not collecting overtime charges from the curers.

If the issue price of salt is reduced both the fisherman and the consumer will be benefited. More fish will be converted into human food.

VI. FISHERIES CANNERY AT CHALIYAM.

The question of transfer of the Cannery to the Industries Department may be seriously considered. Further research relating to canning may be carried on at any Research station. To run it as a successful business concern the Fisheries Department is not fit. A thorough examination of the working of the factory is sure to reveal the fact that its failure is to a great extent due to its working being placed in the hands of persons who are least competent to run a business concern. Everyone cannot be a businessman. The person placed in charge of the Cannery, subject to conditions that may be laid down, should be free to purchase stores required for the industry in the cheapest market. Provision for regular training of apprentices should also be made. One other point I may venture to mention. The responsibility of running business concerns has I believe in a way interfered with the legitimate objects of the Department such as research work.

VII. EXPERIMENTAL STATION, TANUR.

I am fairly acquainted with the working of the station as I have been a frequent visitor to the place. From what I was able to gather the object of the station is to find out the best means of curing fish, to extract oil, to prepare fish meal and manure and carry on research work connected with these preparations. But in fact it is being run more as a commercial concern. The manufacturing side seems to be receiving more attention. I am afraid its utility is not being judged from a scientific point of view. I suggest that the manufacturing side should be separated from the research work. In fact that may be ignored altogether. It should be modelled into a real research and teaching station equipped with a laboratory necessary for the purpose. The following items of work may be carried on:—

- (1) Research into the food values of different fish, such as its oil contents, etc.
- (2) Finding new use for oils and other by-products.
- (3) Refrigeration as a means of preservation of fish for human food and any other means of cheap preservation.
- (4) Training sub-inspectors and others interested in fish-curing methods, etc.
- (5) Study of the migration of fish, their habits, etc., that is now being done in the Research station at the West Hill.
- (6) Converting the station into an institute for teaching fisheries, etc., by admitting apprentices preferably from the fishermen community.

XIV. SOCIO-ECONOMIC WORK.

(a) Co-operation.

It is a well-known fact that fishermen earn better and more than what is necessary for their needs during the fishing season. But being improvident they waste their earnings. When the fishing season is a failure or during non-fishing months their plight is miserable. Co-operative societies to encourage in them habits of thrift will be useful. So far these societies have been a failure. There are various causes. One of the reasons is, in my opinion, the lack of what is known as human touch. The officers of the department who have been entrusted with the organization and supervision of these societies have other duties to attend to. This is only a side activity. I understand that the by-laws of most of the societies do not permit granting of loans more than the share capital paid or the amount of deposit. The societies cannot also obtain loans from the district co-operative bank as they are not in a position to offer sufficient security. So practically the societies have not been of any help to the members either to clear their prior debts and thus extricate themselves from the clutches of the money-lenders, or for maintenance during the bad seasons or for the purchase of their craft such as boats, nets, etc. It is no wonder that the societies have not worked. If co-operative societies are to be really helpful to fishermen, the Government should come forward to advance loans to societies on easy terms. To some extent the Government have already accepted this policy and have advanced loans to two societies for the purchase of boats and nets. I suggest that further loans may be given also for

the clearance of prior debts of members, for maintenance during the non-fishing season and for the purchase of nets and boats. Fish-curing may also be undertaken by the societies. The question of finding sale for the cured fish is not a difficult problem as the department can easily arrange for its sale in markets where the curers at present find sale. By adopting the methods which the middlemen fish-curers are using the problem of sale can be solved.

In order to work the societies successfully on the lines suggested a separate socio-economic section of the department should be organized under the Assistant Directors. The officers of this section will be in sole charge of these societies and not treat it as at present a mere hobby. The teachers employed in the fisheries schools who are taught co-operation during their period of training in the Fisheries Training Institute should be placed in charge of these societies located in the areas where the schools are situated. They may be paid some additional remuneration for this extra work. Their work may now and then be checked by the sub-inspectors in charge of yards reporting any irregularities noticed to the officers of the socio-economic section. Wherever the work of the societies develops necessitating the employment of whole-time workers, this may be done, the Government bearing half the cost of establishment and the other half being a charge on the societies. Necessary by-laws in the societies permitting grant of loans for the purposes mentioned on the same terms as in other co-operative societies will have to be made. A by-law insisting on compulsory deposit of the earnings, more than the living wage, may be adopted in the two societies now worked with the help of Government loan. Such a by-law should be introduced in the by-laws of all societies that receive Government aid.

(b) Education.

It is acknowledged by all that a system of education should be correlated to the life of the pupils. From this point of view the general system of education where there will not be what I may call "fisheries bias" is not suited to the fisherfolk. In addition to the knowledge of the 3 R's the system of education devised for the fishermen should possess a distinct "fisheries bias" and prepare the pupils for their calling. So in the lower elementary schools conducted by the Fisheries Department, in addition to the general education in the 3 R's, some general knowledge of fisheries by means of pictures, etc., may be imparted. But the policy of the department should be to raise as many lower elementary schools as possible into higher elementary schools where more about fisheries can be taught as vocational education and practical work also can be done by the pupils. Here emphasis may be laid more on the vocational aspect of their training. Improved methods of preparing and using nets may be taught by taking the pupils in a boat. Each higher elementary school should be supplied with all the appliances necessary for teaching the craft. Any of the boys passing out of the higher elementary schools, if found fit, may be sent to the proposed teaching institute to be started in Tanur where he may be trained as an apprentice. Every inducement should be offered to make the boys take advantage of these courses.

I have already indicated in general the curriculum to be followed in lower elementary and higher elementary schools. Besides creating and maintaining what may be called a fisheries atmosphere, no definite instruction in fisheries, either theoretical or practical, should be given in lower elementary schools. Such instruction should be reserved for higher elementary schools after the pupils pass out of the V standard.

The staff employed in the schools may be considered fairly well qualified in the subjects mentioned in the curriculum of the Training Institute. But I learn the subject of fisheries is taught by one who has to gather his knowledge by reading books. One who has undergone regular course in fisheries should be in charge of that subject. Without proceeding on the basis of one teacher for forty boys, the department should not grudge to appoint more teachers, even one for each class. As regards equipment the higher elementary schools should be equipped with the necessary apparatus and appliances required to teach the subject of fisheries. As better qualified persons are seeking admission into the Training Institute, I think it is time that provision for training S.S.L.C.'s is made by opening a model higher elementary school. For the teachers already employed in the fisheries schools, continuation classes which may be otherwise called "refresher"

classes may be organized by the Training Institute during the vacation. Salaries of all teachers employed either in the village schools or the Training Institute should be the same as those given in other Government educational institutions. The training given in the Fisheries Institute is much more strenuous than in an ordinary training institution as the object is not merely to turn out teachers but social servants.

If the ideal of the department is to be achieved, the teachers sent out of the Training Institute must be real welfare workers. The training received during their stay in the Training Institute must fit them for their task. The school must be converted into a community centre and the teacher must prove himself to be the friend, philosopher and guide of the fishermen. In this connexion I would strongly urge the necessity to give some kind of training for a period of three or six months in first aid, use of simple mixtures, etc., so that when the teachers take charge of their schools they may also serve the medical needs of the community. What I am proposing is not new. It has been tried and proved successful in the Bombay Presidency. The scheme is known as the Village Medical Aid scheme and the teacher who has to perform this additional duty is known as the upacharak. He is paid additional remuneration for this work. Why such a scheme should not be introduced and the fishermen enabled to secure some medical help, may be seriously considered by the Committee. The cost of medicines supplied will not be much when the amount of relief given is taken into account.

These suggestions relating to co-operation, education and medical relief necessitate the need for creating a socio-economic section in the Fisheries Department. The present system of Inspectors of Fisheries being required to look after this work is highly unsatisfactory. They have other and far more important duties to attend to. Moreover those who may be considered good for running fishing yards need not necessarily be good social workers. Socio-economic work is also a science by itself. Only those who by temperament and training are fitted to do this work should be entrusted with this work. These workers must also be men with good education who can read and keep themselves up to date acquainting themselves with the various movements for uplift going on in the different parts of the world. The persons selected for these posts may be asked to undergo training in some institutions where organized social work is being done. I would even suggest that one or two educated young men of the community may be sent to other countries to study the various social movements and institutions. A visit to the Tuskegee Institute is worth the money spent in going there.

The socio-economic workers may be started on the same salary as the B.A.L.T.'s are started in Government institutions with an additional allowance and the usual travelling allowance. They may be required to work directly under the Assistant Director. At least three are required for the work on the West Coast, two for Malabar and one for South Kanara.

XVI. STAFF.

I do not think the success of the research work is in any way dependent on the administrative duties performed by the department. On the other hand wherever the administrative duties are combined with research work, the latter must have suffered considerably. I would suggest that administrative officers should have nothing to do with research work and vice versa also. I think the administrative head of the department should have no responsibility for research work. A scientist can be in charge of research work; but I doubt very much if he as the head of a department will do equally well. Any person who has no knowledge of fisheries but is good in administration may do well as an administrator. In the interests of research work at least these functions should not be combined in one person.

The appointment of socio-economic officers to work under the Assistant Directors has already been suggested. Intensive welfare work which the adoption of my scheme must necessarily bring about, will need careful attention. In view of the fact that the number of fish-curing yards, the number of societies and schools is large on this coast and the programme of socio-economic work will in future need greater attention, I would strongly suggest the appointment of another Assistant Director for South Kanara. Language also plays a great part in socio-economic work. A Kanarese-knowing Assistant Director will be able to develop better the socio-economic work in South Kanara.

The present practice of placing certain fish-curing yards in charge of petty yard officers and peons is very bad as the work done in the yards is a very responsible one and affects the interests of fishermen. These sub-inspectors should all be given at least three months' training before they are placed in charge of yards. There should be a reserve of sub-inspectors always available to provide for leave vacancies and for providing training for new recruits.

In view of the responsible work done by the various officers of the department, their salaries should be increased to prevent corruption and also attract better type of yard officers. I mean no reflection on the present yard officers. So I would advocate the following scale of pay and no arguments are needed in support of them as such salaries are already given in other departments of Government:—

Sub-Inspectors	.. .. .	Rupees 60—4—100—5—125.
Inspectors	.. .. .	.. 150—10—250.
Assistant Directors	.. .. .	.. 300—40—500—50—850.

Oral Evidence.

The Chairman: You are a member of the Servants of India Society?—Yes.

How long have you been working in this district?—I was here during the rebellion for a year in 1921.

You were then interesting yourself in co-operation?—We were doing relief work. Later on I came here in 1925.

What was the nature of the work entrusted to you?—We are doing near Tanur, of course not for the fishermen, what we call rural reconstruction work.

I want to know whether your activities are limited to a particular kind of rural reconstruction or you also undertake other kinds of work which your society sometimes undertakes?—In Mangalore I am in charge of the work Mr. Ranga Rao was doing.

Your activities are limited so far as this reconstruction work is concerned to the Tanur village?—There is another place near Quilandi. There we are doing work for Ori-Dravidas. We propose to form a colony near Quilandi and the Government have acquired lands for us.

You said fishermen do not come within the scope of your activities?—We know that the department is doing some socio-economic work for them and therefore we thought that if we also interest ourselves in them our work will overlap each other.

Your work at Tanur is limited to communities other than fishermen?—We include within our scope Mappillas as well as Hindus. Our object in starting that work is to bring together Mappillas and Hindus in a common meeting ground, such as a school, etc. We have a higher elementary school with a farm attached. For this we get a grant from the Government. But the teaching part is done by us alone. Then we have five night schools in the surrounding villages where we carry on what we call adult education work. The suggestion I have made in my written answers is the result of experience gained in this work.

You say that the platforms should be constructed at Government expense. Is that your idea that they (fishermen) should not be asked to contribute anything to it?—Yes. I make the suggestion in order to induce the curers to come to the curing yards.

Do you think it right—I suppose your society has got very many good experts in economic science and political science—that the tax-payers' money should be spent on a section of the people without repayment at all?—But it goes back to the consumers, because if good cured fish is available to them they stand to gain.

Don't you think that if more expenditure is incurred on fish it should fetch a better price?—I do not know.

Fishermen themselves say that they get no profit commensurate with the extra expenditure and extra trouble involved in curing?—Unless the extra expenditure involved is compensated by a higher price, I do not see why so many fishermen take to curing all along the coast. It may be that it does not give them very large profits of Rs. 200 or so. Otherwise they would not flock to it.

You suggest that there should be a regular and adequate supply of salt. Why?—What I was able to learn is that the salt stock sometimes is not enough for the whole area as you will notice even from the Government report. Firstly perhaps they have not enough sheds to store and secondly perhaps they have transport difficulties which have to be overcome.

If salt is to be supplied at rates which were prevailing some years ago by providing better and cheaper transport facilities, what price do you think would be proper?—I think we should revert to the price to which people were accustomed in 1924, 10 annas.

If you are convinced that transport and other charges should be added to its price without at the same time including anything for establishment or profit to the Government, don't you think that we cannot now sell it at that rate?—Of course.

But somehow they are accustomed to annas 10 and they harp upon it?—Yes.

About the demonstration sheds, you think that there should be at least one for each yard?—Yes.

How do you expect the other things to be done—the department to purchase some fish, demonstrate it and then sell it?—Yes.

Do you think that the work and the establishment involved would be commensurate with the result? Further you want to have it done continuously?—The idea is that people must have a place to see for themselves what can be done or what is being done.

Would not an occasional demonstration do for the purpose?—No Sir. No additional establishment would be necessary at all for the continuous demonstration.

Will it not also be a bit competing with the others?—After all, you may restrict the hour of demonstration and restrict it to new ticket-holders to come and see. If, as a result of your research you find out something else which you may show them, that will be another advantage.

But you agree that it should not be on any commercial scale?—It should not be. With regard to the sale of salt I want to say something. The people at the yard I understand do not weigh the bags. They do not allow for wastage. Supposing a bag weighs 1½ maunds the curers have to pay for two maunds (full weight of the bag). That is what I am told. Again, they collect overtime charges from curers. After all what is it? A certain hour is fixed for certain fish-curing yards and if a curer catches some fish out of that time he cannot get it into the yard without paying overtime. This has been fixed by the department.

Overtime for what?—A certain payment for services rendered by the yard people overtime. The sub-inspector must come and give the salt and allow him to use the fish-curing yard. For that some charge is made according to a scheduled rate. In the interests of the fish-curing industry this overtime charge should not be sanctioned. As it is a fish-curer because of his anxiety to make good use of his catches finds himself confronted with an extra cost.

Dr. Gravelly: You spoke of the drying platforms?—Yes.

I think you are not referring to what is seen in the yards?—Raised platforms. I think it is mentioned in the report. In some yards they have it.

As regards overtime charge, suppose we take away that charge, don't you think that the fishermen would be inclined to go to the yards even unnecessarily at nights especially when there are heavy catches? Moreover, the existing staff would have to be doubled. They cannot stand the strain night and day. Don't you think therefore that overtime charge is absolutely necessary?—You may pay overtime charges to your sub-inspectors, etc. I do not object to it. But your charging the curer I object.

I am thinking not of the inspector's pocket, but his health. This charge will prevent the fishermen going to the yard unnecessarily at night?—I do not think they will go unnecessarily. When they go to sea after six or seven in the evening and catch and come to the shore they would not like to trouble unnecessarily.

But the curers are not fishermen?—Somebody else from the family would go and give trouble?—But if the facility is not given them, the fish caught in the night would become unfit for curing the next morning.

I think we should have a double staff?—I don't think this happens always. Only during certain seasons this night curing is resorted to. If you examine what all overtime charges are collected in all the yards you will have an idea.

What do you think the Industrial Department would be able to do?—It is the next best department which is doing some industries.

Don't you think the Fisheries Department should have it in hand?—When you combine research and manufacture, research work would suffer as in the soap factory. The Government transferred it as soon as it was a success.

But expert officers have said that there is much yet to be done in canning and that the sardine preparation now sent out is not fit for the market?—For research work, I may say that it can go on. Then you should not issue any audit report and say that it is a failure.

Assuming for a minute that our canned fish is not sold as freely as the foreign imported canned fish, assuming also that the fish coming from outside are better canned than ours and supposing that there is work yet to be done in the cannery to bring it up to the required level, would you not allow it?—Don't put your things in the market until you are able to compete with the market.

Would you like to have it as a research institute?—Yes. Even in the soap factory which has a school, there is a laboratory.

In order to bring down the cost of the institution, would you agree to the canned preparations being sent to the market for such price as they might fetch?—You may do it, but you need not do it on a commercial scale. Such fish as you can send you may send. You need not expect much in return because your object is research.

Mr. R. S. Nayudu: So you would require for all research purposes that the manufactured goods must find a market elsewhere. There must be also some commercial side to be attached to the research?—But the emphasis is not on the commercial aspect of the concern.

So there is no necessity for you to transfer it to the Industrial Department. This could remain with the Fisheries Department and the same thing can be done?—You are treating it as a commercial concern issuing audit reports. If you want it to be treated as a commercial concern you may hand it over to the Industrial Department.

Research work as well as the commercial side of it may be looked into by the Fisheries Department without coming under the cudgels of the Audit Department?—The Audit Department will come in only when you make it a commercial concern.

Supposing you conduct it as a research department?—I have no objection. You may go on.

Then it may be under the Fisheries Department?—Yes.

You want the commercial side to be separated from the research side?—Yes.

You don't want to place the expenses of the man on the research side with the expenses of the man on the commercial side?—Yes.

Because in such a case it will always appear to be working at a loss?—Quite so.

Research into the food values of different fish is more a doctor's work than that of a Fishery officer?—When you want to develop it as fish industry for food, you must find out the vitamins, etc. It is part of a doctor's work as well as of a research student's.

That possibly a chemist can find?—Yes, but the vitamin is taken for the purpose of food.

Don't you think that these articles ought to be sent to another department?—In order to find out what each kind of fish contains, its oil contents, etc., a man like Colonel MacPherson may be able to help you.

Supposing the department employs a big chemist, do you think he will be able to tell the department what the food value of the different kinds of fish is?—That may be a doctor's work, but he may be able to tell us its oil contents.

Oil contents need not necessarily enter into the factors that make up the food value?—A certain amount of fat is necessary for all food. To the extent necessary for your departmental purpose let your chemist find out.

What kind of doctor do you think would help us? Take two kinds of fish, mackerel and sardine. Who is to ascertain which has got a better food value?—I think a chemist who has also some knowledge of medicine can do it. I do not know what chemist you call him. It will come into the realm of a bio-chemist.

In your written evidence you speak of the training of sub-inspectors in fish-curing methods. This is evidently intended to serve the department?—Administration is not the same as learning all the actual processes of curing. These inspectors should be only such men as could be useful for that work. Any one who applies for the post of a fish-curing yard inspector need not be posted to it without adequate training.

Then you speak of the study of the migration of fish, etc.?—I am told that it is being done at West Hill. I think two stations may be combined for this purpose.

The Chairman: You will have different fish in different stations. The migration of fish can only be studied on the sea. Sometimes fish go away from Indian Ocean or Arabian Sea to Canadian waters and they will have to follow the track. This migration of fish has to be studied in the sea; sometimes they go from India to Canada?—I do not know.

They are going to do the experiments because they have got the trawler?—It can be done anywhere. I suggest this thing as more economic than having a number of research stations.

XIV. SOCIO-ECONOMIC WORK.

(a) Co-operation.

The Chairman: Can you tell us why co-operative societies, such of them as have been established, have failed so far as the fishermen are concerned?—I have given different reasons. Firstly, the society cannot get loans from the district bank because the fishermen have not sufficient security for the loans they want; secondly, I am told that in certain by-laws of the society the loan a member can take from the society is up to one-eighth of the net assets.

Don't they consider that these nets and boats are assets enough?—Most of them may not have nets or boats, or they might have already been pledged to the middleman.

We are told by some witnesses that in a village of 500 or 600 houses, nearly 300 or 400 of them have got nets and boats?—The co-operative society does not think that these are security enough, because the boats may capsize and all that thing may happen. The policy is wrong. It may not be wrong from the point of view of shareholders. Co-operation is meant to help the rich and poor alike.

There is such a thing as personal credit in co-operation?—Yes, and the earning capacity of the man.

The Chairman: It appears that in most of the societies the by-laws lay down that no member is entitled to a loan of more than the amount of share capital paid or the amount deposited. Practically they get no benefit. Whereas if a man is a member of an ordinary co-operative society, if he pays Re. 1-4-0 (4 annas is for admission) he is entitled to a loan of Rs. 20.

Then what about education?—My suggestion is that in the lower elementary schools, apart from giving a fishery bias or vocational bias, nothing relating to fisheries should be taught. One of the rules of the department is—that is a good rule—that no child below the fourth standard should be taught any vocation. Most of the fisheries schools are lower elementary schools. I suggest that all the schools should be raised to the higher elementary schools as soon as possible, so that the subject of fisheries can be taught in the higher schools, with the necessary equipment, such as boats and nets and other implements for demonstration purposes. The boys should be taken to the riverside and taught how to use these things. Their earlier education should not be burdened with vocational stuff. After they passed through the higher elementary school, if some of the boys want to pursue their study in fishery they may be sent to Tanur.

Medical Relief.

The witness: This idea is familiar to the members of the Legislative Council because it is found in an answer to the question about the Bombay Village Aid scheme. These teachers are retained for three years. It may be possible within these three years or later on to give them instructions in simple first aid, so that when they go back and settle down in a village, they may dispense to the people of the village who generally do not go to the hospital. If once a teacher becomes a doctor his hold on the people will increase. I would like in future that the S.S.L.C.'s should be trained

in this first aid. They will be real community workers. Otherwise there is no object in educating the fishermen. I want the creation of a separate section called the socio-economic section, if they want to work out on the lines I have sketched. The men who supervise the work must be men mainly intended for this work and not those Inspectors of Fisheries who have other duties to attend to. There are so many graduates among fishermen. Choose the best man and give him the opportunity to go round and study social work, such as is done by Christian missionaries. They must be social workers rather than mere teachers.

The Chairman: You say that Government should advance money. Don't you think that other communities like the depressed classes also have an equal claim?—Yes; in Tanjore and other places Government have been helping. I want them to extend it for other purposes.

In the case of many co-operative societies, so far as the depressed classes and Christians are concerned, money is forthcoming?—I don't know whether to fishermen societies, the Christian bank will give money as they to Adi-Dravida societies. The Christian Central Bank consists of people who have put money into it. For fishermen if you can get some people to start a bank like that it will be better, but it is difficult.

The conditions you will admit are the same. The earning capacity of the fishermen is greater than that of the Adi-Dravida. That ought to be a greater reason for giving loans?—They want tangible security.

Diwan Bahadur Kumaraswami Reddiyar: In the case of labour unions, is not money lent without security?—It is lent because there is the contract money already.

The Chairman: Do you think it good for the fisherfolk to be given that bias? Is it not keeping them down as fishermen from generation to generation?—Any education that does not relate to the life that they lead is not considered to be sound.

Agriculturist's profession is not so bad as that of fisherman?—I don't think.

What is the real objective of the Education Department that until they reach the fourth standard they are not to be taught anything about fishery?—I think it is due to a psychological reason. The boys below that standard will not be able to understand all that.

Would it not be right to tell them about the different kinds of fish rather than teach them silly stories?—I have said you must teach by means of pictures and other things. But what they call fisheries technique need not be taught.

Diwan Bahadur Kumaraswami Reddiyar: You know the Adi-Dravidas in the East Coast are mostly cultivators?—Yes.

Do you think that educationally and economically the condition of the fishermen is worse than that of the Adi-Dravidas?—Economically they are not worse except when the fishing season fails. They earn well during the season but there is lack of proper guidance and so they spend away their money. The scheme I have suggested may help them to save something.

Why should you think that more facilities should be given to borrow money?—I don't think that Government is doing much by giving waste lands which will never be cultivated unless help is given financially. I have told this to the Labour Commissioner, that the waste lands assigned to them are all lying waste. I would advocate the same facilities as are given to the Adi-Dravidas.

In the case of fishermen, you said they are not so bad as Adi-Dravidas. Why should there be a co-operative society and why should Government help them?—He wants to be helped a little in the earlier stages. Those who deserve help should be helped.

I believe the Mappilla fishermen of the West Coast are not in such a state of indebtedness?—Their lot is worse. They are not treated as the equal of the ordinary Muhammadan; they cannot go to their mosques. It may be due to their being fishermen converts.

Mr. R. S. Nayudu: You want a society with different branches, sales branch, credit branch, etc.?—Yes. I want a society to be organized for giving help for the purchase of boats and nets and at the same time finding a market for their goods.

Then you would like special education to be given to the fisherfolk, and that students who have aptitude for higher education should be given scholarships and sent up for high education?—Yes.

Would you like an elementary school with special teaching in fishery subjects above the fourth class?—My idea is nothing need be taught about fisheries till the fourth standard.

Would you like these schools to be under the management of the Fisheries Department?—Yes.

(The witness withdrew.)

Mr. J. A. SALDANHA, M.L.C.

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

The main aim should be *educative* combined with research.

II. FOOD SUPPLY.

Fish, cheaper than other non-vegetarian food, is far below the demand of the middle and lower classes. But unless the higher classes of Hindus (Brahmans and Vaisyas) take to fish-eating there cannot be cultivated a taste for preserved fish or fresh fish as a grand table dish on a large scale. With greater facilities created for transport, fish could be sold, however, in larger quantities in the interior.

III. IMPROVED METHODS OF FISHING.

Improved methods with larger nets (Rampini) with the aid of fishermen from Goa or Konkan were introduced some years ago (about 25) on South Kanara Coast mainly due to the enterprise of some Catholics of the district (Vaser-Alvas), but on account of want of capital, experience, and extravagance most of the first enterprises failed. A few are now learning by the failures. The industry may be pushed on by organizing joint stock companies or co-operative societies.

IV. DEEP SEA FISHING.

Very little of this on West Coast. Trawlers may be employed to educate the more enterprising. The process will be slow and gradual, as large capitalists are needed with more experience in joint stock and co-operative business.

V. FISH-CURING.

Other process than curing by use of salt should be taught. Salt should be sold much cheaper (at 10 or 12 annas per maund). Salt may be transported much cheaper from North Kanara (Sane-kattu) than from south or east to South Kanara. It would be advisable to transfer fish-curing yards to the Salt Department for curing by means of salt.

VI. FISH CANNERY.

This should be revived and taught in more centres than one. Chaliyam is not a convenient place for apprentices to board and lodge. If the department had trained 100 apprentices in canning a large fish canning industry would have been established in India.

VIII. INLAND FISHERIES.

These should be developed largely. Mettur Reservoir could be largely utilized for this purpose. Larvicidal fish should be fostered in all lakes.

XIV. EDUCATION.

There should be a fisheries school at every important coast town as well as at Calicut, e.g., Mangalore, Malpe. The present school at Calicut is useless to Kanara fishermen, on account of the distance and language difficulties. These schools should be open to others than fishermen's caste.

P.S.—I would encourage the use of purified and classified fish oil from sardines for medicinal and health-vigorating purposes and foster this industry by aid, etc.

Oral Evidence.

The Chairman: You think the fish food supply is quite sufficient for the present, unless a further taste is created in some quarters?—Fish that is now obtainable is below the demand. I want more supply. I find there is a demand for fish in the interior which is largely supplied by means of motor buses. There is a great demand for fresh fish in the interior.

You expect Government to devise means to assist the people in increasing the catches?—That is a factor by itself. At present in the Madras Presidency, when compared with Bombay, the fishing boats and nets are of a very primitive character. The best of the fishing nets and boats come from Goa or Ratnagiri. I know of some firms that started fishing operations on a large scale; and for that they got the Goa fishermen with their large nets called the Rampini nets.

You want them to be introduced in these parts?—Rampini nets are already introduced. They are used in South Kanara. Our people should be trained in manufacturing them.

Where do you want them to be trained?—At Malpe, Mangalore. You should have schools there.

You say “Unless the higher classes of Hindus, Brahmans and Vaisyas take to fish-eating, there cannot be cultivated a taste for preserved fish or for fish as a table dish on a large scale.” Will you please explain it?—The Gowda Saraswat Brahmans eat a good deal; Northern Indian Brahmans eat fish; a number of Brahmans in South Kanara eat fish. What I mean is that unless a larger number than now take to fish diet we cannot have demand for preserved fish, sardines and other things.

You advocate the trawler to be used on this side and deep sea fishing carried on and shown to the people, and you say that it would be a profitable concern?—Fishing by trawlers should first be demonstrated by Government, and then companies will come into existence, take up these trawlers themselves and supply fish. I may add a rider to it that we must introduce the methods employed by the Bombay fishermen in deep sea fishing, with what are called valve nets. They go as far as ten miles into deep sea.

As regards fish-curing you speak of other processes than by salt?—I remember having seen some years ago some exhibition held at Mangalore of smoked fish. I have been enquiring about smoked fish but it cannot be found. I prefer smoked fish to salted fish.

Can smoked fish remain as long as salted fish?—I have no idea. In my parts smoked fish is never preserved for more than a week or two whereas salted fish can be kept for a year.

Dr. Sundara Raj: This is done in Tanur on an experimental scale.

The Chairman: As regards salt, you would have it sold at lesser price?—Yes. I have carried on a persistent debate in the Council about lessening the price. The Minister said that he had to meet the cost of the establishment and so the price cannot be cheapened. I asked “Does the department exist for the people or the people for the department?” You are creating a department for the benefit of the people. If that department adds to the difficulties of the people, what is the good of it?

Do you think that the Salt Department would exist more for the people than the Fisheries Department?—The Salt Department did this thing; they charged as in Bombay 12 annas. In North Kanara and a few miles beyond South Kanara where fish is cured they can get salt at 12 annas.

Don't you think that the Fisheries Department will be more sympathetic towards the fishermen than the Salt? You admit that the Salt Department is only for revenue purposes?—Yes. But the fisherfolk have not felt that you are more sympathetic than the Salt Department.

Witness after witness told us that not only the fish-curing yards but even the schools should be under the Fisheries Department. We saw some of the fish-curing yards ourselves and our impression was that they were very ‘chummy’ with the officers?—I have heard any amount of curses.

Diwan Bahadur Kumaraswami Reddiyar: If the issue price is reduced you won't care to have it transferred?—If it is not going to be reduced to 10 annas better transfer it. As regards Chaliyam, I have put a number of questions in the Legislative Council about what is called the educative side of these industries. I was told that six or seven persons have been trained in cannery, and from our Presidency not more than four men have been trained. If you have not trained men, why not transfer it altogether to the Salt Department. Cannery is of great importance to India. I would therefore have one school in Malabar and another in South Kanara.

You speak about inland fisheries and you want the lakes to be filled with larvicidal fish?—Yes. I have found in Bombay that when these fish were introduced in tanks and stagnant waters, the people living round about were immune from malaria. Mettur tank is a large area and it can be filled with this fish.

As regards education, I want the schools to be under the Fisheries Department. As long as India is caste-ridden, education of the fishermen should be in an atmosphere of caste traditions. I don't agree with Mr. Suryanarayana Rao, the previous witness, that the subject of fisheries should be taught above a certain standard. The school should be along the coast and not in the interior. The boy should be trained from the very beginning in fishing. If he is divorced from this for about five years his inclinations will go in other directions. I want to add one thing. There is nothing heard now of sardines or any of your other products. You should get some shops to sell them. We know nothing of sardines in South Kanara. Advertisement is what is wanted. The Madras Museum should be a place for the exhibition of all industrial products of the country and there must be also district museums all over the country.

(The witness then withdrew.)

The Committee then adjourned till 11 a.m. on Thursday, the 19th July 1928.

Thursday, July 19th, 1928.

CALICUT.

PRESENT :

M.R.Ry. Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, *Kt. (Chairman).*
 „ Diwan Bahadur S. KUMARASWAMI REDDIYAR Avargal, B.A., B.L.,
 M.L.C.
 Dr. F. H. GRAVELY, D.SC.
 Khan Bahadur S. K. ABDUL RAZACK SAHIB BAHADUR, M.L.C.
 M.R.Ry. P. V. MANIKKA NAYAKAR Avargal.
 „ R. S. NAYUDU Avargal.
 Mr. A. McG. C. TAMPOE, I.C.S., M.L.C.
 (Dr. B. SUNDARA RAJ was also present.)

M.R.Ry. Rao Bahadur V. GOVINDAN Avargal, B.A.,
 F.R.S, Retired Assistant Director of Fisheries.

Replies to the Questionnaire.

I. AIMS OF THE DEPARTMENT.

1. The main object was to add to the food supply of the country by tapping the marine and inland fisheries resources.
2. These were successful to some extent.
3. The failure was due to the shortness of time which was given to certain experiments, and also to the change of policy adopted by the successors of Sir Frederick Nicholson in office.
4. Improved methods of curing fish was one of the most important means for introducing fish in areas where only badly cured fish was available. This proved a failure because people who have been long accustomed to eat bad fish, would not change their taste, and the curers and merchants did not care to adopt these new methods.
5. The only hope is the creation of a taste for better class of foodstuffs in the people.
6. Efforts should be made to popularize the use of better class of fish.

II. FISH FOOD SUPPLY.

8. Under normal conditions the quantity of fish caught is not only sufficient for consumption of people living within a radius of eight or ten miles, but usually there is a surplus which is salted or dried and sent into the interior parts of the country or exported to Ceylon.
9. Yes.
10. Yes.
11. Taste differs in different areas, and there is always a demand for fish suited to the taste, provided the price is reasonable. This would mean that till the consumers change their taste, it will not be a business proposition to send fish, however cleanly they may be cured, all over the country, disregarding the taste of the consumers. For instance, the pit-cured fish of

the Ramnad, Tanjore, and Tinnevely coasts, though nothing but a putrid mass with maggots wriggling about, is preferred by people in the southern districts, and they will not care for any better cured fish.

12. It may be possible to create a demand for a better class of fish from people who have till now avoided salted fish, on account of the poor quality, but such demand will be a very small one. There is always a demand for fresh fish from all parts of the country, and the best way to meet this demand is the introduction of freezing methods by means of which fish can be sent to far distant places. Experiments actually conducted by the department have proved that it is possible to send fish over long distances covering a journey of 72 hours, without spoiling their freshness. If cold storage is provided in addition to freezing, it is possible to keep such fish in the best condition for a few months. This method is well known, but it requires a large capital outlay and proper organization. At present fresh fish is packed in ice and despatched to some of the big cities, but this is an expensive and comparatively crude method.

III. IMPROVED METHODS OF FISHING.

13. In some areas the existing methods are effective making allowance for weather and other local conditions.

14. (a) & (b) During the last forty years or more there have been improved crafts and tackle introduced by the fishermen themselves on the West Coast. Some of these are improvements on the indigenous methods, e.g., the enlarged odam nets and the kolli nets; others are foreign methods, e.g., the Rampuni and the long line.

(c) It is absolutely impossible to improve the fishing grounds in the open sea, and even in the case of confined waters like irrigation tanks it has not been thought of.

The department on the suggestion of Mr. Hornell built two small boats of European models for deep sea fishing (thirty or forty miles from the shore), but these were not a success. He next brought out a motor launch with Danish seine nets, but the results were much worse. Two years ago the present Director of Fisheries brought out a trawler, but so far it has not produced any results worth noting. There are several reasons why these European methods proved failures such as climatic and other unfavourable conditions, want of speedy transport facilities to distribute the catches, and above all the low purchasing power of the vast majority of the fish-consuming public.

15. There was an attempt to introduce West Coast canoes and nets on the East Coast. Mr. Hornell was against this proposal, and after he became the Director he condemned the experiment. The real reason of the failure was that it was not given sufficient time to enable the local fishermen to understand the operations, and also because of the carelessness and indifference on the part of the subordinates who were put in charge of the work.

16. Like the Indian ryots and the artisans, the Indian fisherman will have to be taken step by step, from his present methods to improved methods whether foreign or indigenous. It cannot be said that these men as a class are against innovations, but what they require is proof that the new methods suggested are within their means and that they would increase their income.

There are certain intermediate methods which are not expensive that should be tried. I made a special study of these when on deputation to Europe, but was not given an opportunity to try them in our waters.

IV. DEEP SEA FISHING.

17. The following are the vessels in the possession of the department :—

(1) The "Lady Nicholson," a moderate size schooner with oil or motor engines. This was built at Calcutta at a cost of nearly a lakh of rupees, and another half a lakh or so was spent on her on account of certain defects. It was built specially for pearl and chank fishing and scientific work. After the defects were removed she has become a very serviceable vessel fit to undertake ocean voyages such as to Laccadive Islands.

(2) The "Lady Goschen," a second-hand trawler costing more than a lakh. From the reports published it is seen that she has already cost a lot of money for repairs and alterations.

(3) The "Sutherland" built after the Scottish model. She was originally intended for deep sea fishing, but as her efforts proved a failure she was added to the Tuticorin fleet.

(4) The "Leverett." This is a motor launch built at Cochin for the use of the cannery but was taken to Tuticorin.

(5) The "Sea Scout" is the motor launch that was brought out for Danish net fishing, but as that proved a failure she was also taken to Tuticorin.

(6) The "Pearl" is a small motor launch brought out for pearl and chank fisheries.

18 & 19. There is absolutely no need for all these vessels.

From the account given above it is clear how they came to swell the fleet at Tuticorin. Originally Mr. Hornell wanted only the schooner the "Lady Nicholson" and the small launch "Pearl" for all the work connected with chank and pearl fishing and scientific research work. Before the chank and pearl fisheries were transferred to the Fisheries Department, there was only a small paddle steamer called the "Margaretta" with which the Port Officer who was in charge of these fisheries did all the work of inspection. But Mr. Hornell condemned this vessel, and drew up the design for the "Lady Nicholson" which he said would satisfy all the requirements of the department. Its original cost was nearly a lakh of rupees, but on account of certain defects in the design, another half a lakh had to be spent on her to make her sea-worthy. In addition to her, another smaller craft may be required for short trips. It is not necessary to have a fast-going vessel for scientific work. Mr. Hornell himself, when employed under the Ceylon Fisheries Company, had been using ordinary cargo boats for his work on the sea. Most of these vessels are said to be used for towing canoes of chank-divers when the weather is unfavourable for them to go out. Such help was not given to them when the fisheries were under the control of the Port Officer. Nor is there any loss if the divers are not able to go out on any particular day. The chanks are stationary in their habits, and if they are not fished on any day, they may be available on any other day when weather conditions are favourable.

It is stated that the newly brought trawler is being fitted up and altered for scientific work. There is no need for this as the "Lady Nicholson" was built specially for such work. A trawler is built for a particular kind of work, and she has hardly any spare room for the additions and alterations now being carried on. The result will be that she will not be able to carry on trawling operations properly if her structure is interfered with.

20. As their number can be considerably reduced there must be as a matter of course reduction in expenditure.

21. It will have to be worked out, but the reduction will be considerable.

22. More than two years ago.

23. The report of the Director says that she went out fishing on two or three occasions, took part in the pearl fishery, and towed some schooners loaded with salt from Tuticorin to the West Coast.

24. The original programme of her duties as stated in the Council was to transport salt, to conduct deep sea fishing, and to be used in scientific research work. She has not done anything creditable in any of these.

25. See the above remarks.

26. The trawler is a vessel constructed in a particular manner to serve a particular purpose, namely, trawling with a trawl net, and if she is used for any other work such as towing heavy loaded schooners, etc., it must tell upon her utility.

27. The trawler on account of some serious defects was idle for most of the time since her arrival in India, and much money and time has been spent to make her fit.

28. It is said that she had not brought out with her even the necessary tackle for fishing, and it is not known what her other equipments are for research work.

29. The public are waiting to hear what are the results of her efforts in this direction.

30. It is presumed that the vessel having been brought, the necessary staff must also have been engaged.

31. It is said that he was recruited in England and he himself brought out the vessel to India.

32. Ever since he took charge of the vessel in England.

33. The public will be glad to know of the good work, if any, which he has done for improving the fisheries of this Presidency.

34. The presumption is that he has been provided with all that he required to carry on his work, but if that has not been done those responsible for the failure to give such things should be held responsible for the loss and delay caused by their failure.

35. Not known.

36. To an interpellation in the Council it was stated that the monthly expenditure for her maintenance was about rupees ten thousand; besides her maintenance charges, she has cost a good deal of money for repairs and alterations.

37. It does not require the services of a Captain Cribb to tell us about the existence of fish in deep waters. The fishermen know it and in places on the coast where fishermen own vessels which can stay out at sea for several days, they do undertake such fishing. It is a well-known fact to them that during the hot season when the temperature of the water near the shore (in shallow water) rises, the fish go into deeper waters where it is cooler.

38. Malabar and South Kanara fishermen have no boats that have room for cooking and sleeping, and hence they are obliged to return to the shore before nightfall. The Ratnagiri men on the other hand have boats in which they can live for a number of days, and they are therefore able to go out and stay in the sea for a couple of weeks if they find it necessary to do so. The Malabar and South Kanara fishermen go not beyond ten miles, but the Ratnagiri men go to distances of nearly 100 miles; on the East Coast the catamaran men at times go as far as 25 miles.

39 & 40. See reasons stated above.

41. A trawler is an ocean going vessel and should be able to go to any distance.

42. It is presumed that she has the capacity for deep sea fishing as she had been engaged in such fishery in Europe.

V. FISH-CURING YARDS.

43. The fish-curing yards were established as the direct result of the introduction of the salt tax. Till then the fish-curiers were using salt earth which they gathered from saline fields, or bazaar salt which was cheap in those days. The Salt Department prohibited the gathering and storing of salt earth and thereby interfered with the curing industry. With a view to remove the hardships thus caused to the fisherfolk, Government issued duty free salt in the fish-curing yards, provided the fish was brought to these enclosures and kept there till all the salt was dissolved before removal of the fish. The salt officers were as a matter of course in charge of these yards, and naturally they were more concerned with the protection of the revenue by preventing any illicit use of the salt, and did not care for improving the technical side of the industry. The Fisheries Department, after experimenting in improved methods of curing, wanted to popularize such methods among the fish-curiers, and thought the best way to get into touch with them was through the fish-curing yards, and hence the yards were transferred to the Fisheries Department.

44. The first and foremost essential condition required for improved methods was clean premises where the curing operations are conducted. The curiers were till then and are even now, in very many places, carrying on these operations in dirty sheds made of tatts without any pukka floor, and in dirty utensils. The Fisheries Department therefore insisted that they should put up masonry sheds which could be washed and cleaned, and also discard their dirty utensils in favour of masonry troughs for keeping the fish which are being cured. The curiers were opposed to such innovations, and

raised all sorts of arguments against the introduction of improved methods. At Tanur which is the largest curing yard, they even went on strike. The proposals involved an amount of outlay which was beyond the means of many of the curiers, but in opposing the proposals the richer curiers also joined, but gradually some of them yielded and pukka sheds were put up, but in the majority of cases they are still carrying on the work in the old-fashioned sheds. Their opposition was mainly based on the fact that there was no demand for the products of the improved methods, as the vast majority of the fish consumers were accustomed to eat fish that was tainted and cured in the dirty manner (e.g., pit-cured fish), and they could not therefore dispose of their fish easily at a profit to them. There are other reasons also which prevent the introduction of such methods on a large scale. Hence it cannot be said that the results have justified the transfer.

45. From the above remarks it is clear that the chances of creating a demand for improved products are almost nil at present, and hence no changes in the administration will improve the situation.

46. The issue price of salt should be reduced to at least 10 annas per maund, which was the price fixed by the Salt Department itself before the yards were transferred to the Fisheries Department. That department was at that time paying nearly forty thousand rupees per annum on account of the maintenance of the yards, because they knew that it was for the protection of the salt tax that they had to open these yards.

47. It will be possible for the Government of India who take the salt revenue, to make the necessary arrangements to supply salt at a much cheaper rate. Cheaper salt would mean a more liberal use of it in curing and thereby improve the quality of the cured article.

When the salt tax was provincial there used to be some inter-provincial jealousy in respect of the distribution of salt, but as it is now a subject of the Central Government, it does not matter from what source the salt is supplied. So far as the West Coast is concerned, salt can be more cheaply and quickly supplied from the factories in the Bombay Presidency. As a matter of fact, all the salt used for domestic consumption on this coast is brought from Bombay, and there is no reason why the same step should not be adopted as regards the salt required for the fish-curing yards. It has been said that the Bombay salt now imported into this coast is of dark colour and is not suitable for curing purposes. This is a wrong idea, because there are several kinds of salt manufactured in the Bombay Presidency, some of which are of very white colour and will give better results than the Tuticorin salt which, though white in appearance, contains more than 17 per cent of impurities, and as it did not give satisfactory results at the Tanur experimental station, we had to wash and clean it for all improved methods of curing. Samples of Bombay salt suitable for fish-curing will be submitted for examination of the Committee if required.

The present Director of Fisheries says that the transport of salt from Tuticorin to the West Coast with the help of the trawler would reduce the charges and also the time taken for such transport. This is very doubtful. The weather conditions are favourable only for a short period as regards the communication of Tuticorin with the West Coast, whereas with Bombay there is safe communication for eight months in the year by means of native sailing crafts, and by steamers practically throughout the year. The charges for carrying cargo by sailing vessels in the fair weather are very moderate, much less than what it is for carrying cargo from Tuticorin. It may be worth mentioning that not only British Malabar but Travancore, also gets its supply of salt from Bombay, because of the facility with which it could be transported by sea. Considering the cheapness of freight, the better quality of the salt, and the facility with which it can be transported to the yards situated on the West Coast, the Bombay salt should be preferred to the Tuticorin salt.

48. As already stated, the fish-curing yards came into existence as the direct result of the introduction of the salt tax, and therefore all expenses connected with the maintenance of these yards were borne by the Salt Department, though as a matter of fact for many years in the beginning there used to be a profit to the department over and above all expenditure. Later on, when the establishment and other charges increased, the price of salt was raised slightly. At last Sir Frederick Nicholson pointed out the

necessity of reducing the price and making it uniform all over the Presidency, and this was agreed to by the Salt Department, though they knew that there would be a deficit of more than Rs. 40,000 per annum, but they paid for it without any grumbling.

On the separation of the Salt from the Excise, on its becoming a subject of the Central Government, these yards also should have been transferred to the Central Government, but the Madras Government apparently for the reason that they would be able to manage them with the Fisheries Department detained them. The result is that the slender resources of the Fisheries Department, or for the matter of that of the Madras Government, are not able to bear this heavy burden, and they had the easy but questionable recourse of doubling the issue price of salt in the yards. Since the doubling of the price of salt the fishermen of the two West Coast districts alone have been paying more than a lakh of rupees per annum over and above what they had been paying till then, for the salt which they purchased from the yards.

The only reasonable remedy is for the Central Government to take back the yards and manage them with their own staff.

49. The fishermen and the consumers will be benefited by the reduction in the price of salt. When the price of salt goes up, the curers, who are mostly capitalists or middlemen, reduce the price which they pay to the fishermen for the fresh fish which they bring. It should also be remembered that most fishermen are bound to supply all the fish they catch to the middlemen curers, and hence they have no choice except to give away their fish at the reduced price fixed by the curers.

50. For the reasons already stated, namely, that the restriction on the industry was the direct result of the levying of the salt tax, and that this fact had long been admitted by the department itself, the reduction is very necessary to help the fishermen to secure fair prices for their catches, and also to reduce the price of the cured fish in the interior parts of the country, where it is the food of the poor villagers.

51. The quantity is very large in normal seasons. The figures of the quantity exported can be ascertained from the Customs returns, and railway companies may be able to furnish figures for the quantity carried by rail.

52. Fish is always in demand.

53. Make the price of salt cheap. Reduce the rail freight. Exempt the poor fisherfolk from payment of licence and other fees which the local boards are levying from them.

54. By reorganization of the staff and other economy.

55. There are no fish-curing yards working under restraints placed by Government in any other part of the world. There are similar yards in the Bombay Presidency, but they are under the direct management of the Central Government. As they are worked in conjunction with the Customs Department the working expenses are much less than those of the Madras Presidency. Most of the yards are in the neighbourhood of Sea Customs offices and they can be easily supervised and looked after by the officers of that department instead of having to maintain a separate staff of officers for inspection as in the Madras Presidency. The fact that in Bombay these yards are maintained by the Central Government is a very good argument to induce the Central Government to take up the yards in this Presidency also. There is no reason for different treatment in the two Presidencies. As a matter of fact I understand that the Central Government have accepted a resolution moved by the Hon'ble Mr. V. Ramadas Pantulu last year in the Council of State to have the yards taken up by that Government. Hence, if the Madras Government will press for it, they will be taken by the Central Government without the least delay.

56. There is some slight scope for improvement on the lines of the Bombay yards.

57. The surroundings of most of the yards are not in a sanitary condition. This is a matter which should be taken up by the local bodies.

The methods of curing are also not satisfactory from the view-point of the reformer, but considering the various difficulties which the curers have to face, more satisfactory arrangements cannot be expected in the near future.

58. All the fish to be cured are gutted and cleaned before they are brought to the yards, and this cleaning is done on the premises of the curers, who throw away the guts and other useless parts of the fish on the beach. This makes the sanitary condition of the locality unsatisfactory. Within municipal limits the conservancy staff may now and then clean up the place, but in non-municipal areas nothing is done in this matter.

59 & 60. The cost will not be much and most of it could be recovered from the curers as a tax.

VI. FISHERIES CANNERY AT CHALIYAM.

61. I was connected with the canning experiments done by the department from the very commencement long before the cannery was transferred to Chaliyam.

62. The object of starting the cannery was to preserve fish in a particular manner which could be kept good for some time, and transported easily to distant places. This was a new industry so far as British India was concerned, though there was a cannery at Mahe which was started by a Frenchman some fifty years ago. The cannery was a success so long as it was under the management of Sir Frederick Nicholson. After Mr. Hornell became the Director, he placed it in charge of a Salt Inspector who had no training in the art of canning. He was succeeded by another young man who had also no training. Under these circumstances the quality of the output could not have been all that was required, and the result was an accumulation of stock which could not be sold readily. When this came to the notice of Government, explanation was called for, and the Director apparently to justify the accumulation reported that he had conducted experiments to find out the keeping qualities of the sardine tins, and came to the conclusion that these tins could be kept for six or seven years without any deterioration of quality. This fact was announced in the Council and the public came to know that the Fisheries Department are dealing in old sardine tins, which fact was sufficient to frighten the consumers to avoid the stuff prepared at the Chaliyam Cannery. It is quite possible to prove the wholesomeness of a few tins by laboratory experiments, but that does not mean that the public who have been accustomed to avoid old tinned fish and other provisions would accept them. The Director himself admits that the "contents of the tins had a faint smell of tin," and what may appear to him as faint need not necessarily be so to the consumers. From the consumers' point of view it is a well-known fact that no one will buy a tin of fish knowingly that it is even two years old, but when it is stated that the tins are six or seven years old, it must have created a terrible fright in them. The cause for the accumulation of unsold tins should be something else, and it may be presumed that the quality was not all that was expected. There may be other reasons also, but this is a potent factor which has ruined the reputation which the Chaliyam Cannery products gained at one time. Indian-made goods are not usually in favour with people who consume such things as tinned sardines, to which is added the fact that the tins manufactured at the Government factory are not readily saleable and are therefore kept in stock for years. Thus it may be easily presumed that not only the products of the Chaliyam Cannery, but those of other Indian Canneries also, have lost their reputation.

There is yet another reason which would tell against the keeping of such manufactured goods for years. For example, the selling price of a tin of sardine soon after it is manufactured, is, say, 8 annas, and it is not readily saleable and has to be kept for a number of years. In that case the interest on the cost price, the warehousing and care-taking charges, etc., will have to be added to the original price, and the selling price of it at the end of six or seven years will therefore be double its original cost. The question is how it is possible to sell a thing at an enhanced price, when it was not possible to sell it readily at the original cost soon after it was manufactured.

Hence both from the technological and business point of view the cannery has proved a failure.

63. There were a few persons sent by the Indian States of Travancore and Baroda for general fisheries training, and some of them spent a few months at the cannery also. So far as my information goes only one of them—a Parsi—from Baroda seems to have started a cannery, and it is not known whether he is still working it. The training these men received was not sufficient to make them practical cannery men. To a lay man the different stages of canning may appear to be easy, but it requires many years of practice to enable one to turn out a reliable and uniform quality of products. It is for want of such experienced and qualified hands that the Chaliyam Cannery came to grief. Even the only mechanic who was trained in the manipulation of the canning plant, especially the delicate dies, was sent away on some pretext, and I am sure the Director has not yet realized the loss the cannery has been put to, on account of his absence from it.

I beg to be pardoned for referring to a personal matter in connection with the management of the cannery. I was the only person who was trained by Sir Frederick Nicholson in the technique of canning, and when on deputation to Europe I had the opportunity to see the working of canneries in France, Belgium, Holland, Germany, Norway and Great Britain and Ireland. It was not an easy matter to get admission into these factories, but I was lucky to do so. It was not proper to put questions to these cannery managers, as to the various work carried on, but because I had practised canning before going to Europe, I was able to learn several important matters which had been giving us trouble in our cannery. In spite of all these, Mr. Hornell reported to Government the placing of the cannery in charge of men who knew nothing of the art of canning. His object was to keep me out of it, and in trying to do so, he undid the work on which Sir Frederick Nicholson spent his best time, for improving and developing it for a period of more than ten years.

When he proposed to appoint raw hands to be in charge of the cannery, he said that he would train them, but the records of the cannery will show that he had visited Chaliyam not more than half a dozen times during the whole period he held the Director's post, and it is not known how he trained these new men. Certainly the art of canning is not a subject that can be taught by postal correspondence.

64. I know of none except the Baroda man who tried to start a cannery on the Kathiawar Coast.

65. No cannery has been opened after the model of the Chaliyam Cannery, but there was a cannery opened by a Frenchman in Malabar some fifty years before the Chaliyam Cannery was started. After his death this cannery was purchased by an English firm who carried on the business for a few years, and then closed it as the Indian-made goods had become unpopular. This cannery was also not in charge of a manager who had much experience.

Mr. Hornell and the present Director of Fisheries have not realized the importance of the practical training of men in the art of canning. Had it not been so, they would not have encouraged two or three village schoolmasters from the Kistna district to be brought to the Chaliyam Cannery, to be trained in canning. They thought that it was an industry that could be carried on by such men who did not possess even an elementary knowledge of science. The fact that in Europe and America the Cannery owners do not admit apprentices into their factories, shows that there is something secret about the industry which they are not willing to show to others.

There is hardly any literature on this subject, and the Chaliyam Cannery was brought to successful working on account of the carefully carried out experiments spread over a number of years. It is not a fact to say that the cannery was started "with one superintendent and a maistri." The superintendent, maistri and the mechanic were all combined in one person, namely, Sir Frederick Nicholson. Though these are facts well known to the whole of Malabar, Mr. Hornell in one of his reports went to the length of saying that the working of the cannery under Sir Nicholson was not satisfactory, and that he would improve it by putting it in charge of some outsider. Had Government forwarded this report to Sir Frederick for his remarks, they would have been in a position to hear the other side of the story, and in that case the story of the Chaliyam Cannery would have been something other than what it is now.

66. For the reasons already stated, and because of the fact that the imported goods are much cheaper, being the result of mass production under most favourable climatic conditions. But in certain lines which are special to Chaliyam, there were opportunities for the Indian-canned goods, but unfortunately as the reputation of the cannery is gone, it may not be possible to revive them and regain the confidence of the public.

67. The reasons are, as already stated, the deterioration in quality, the increased cost of production owing to the creation of posts carrying high pay, and also its inability under those conditions to compete with the imported goods which are sold at a comparatively cheap price.

68. The fame of the Indian-canned goods is gone once for all, and he will be a brave man who will again set up a canning factory in this Presidency in the near future.

69. The quantity of imported canned goods is increasing year by year. This is mostly consumed by Europeans, Anglo-Indians, and others who have acquired a taste for such food.

VII. EXPERIMENTAL STATION, TANUR.

70. Yes. I was responsible for organizing it from the very commencement.

71. The object was to carry on experiments in various methods of treating fish for edible and industrial purposes, and to give demonstrations of these to the public.

72. Most of these objects have been achieved, but the public have not adopted all of them, and to that extent it has been a failure. There remain certain experiments to be tried with fishery products to ascertain their use in industrial processes. These experiments can be carried out only by an experienced industrial chemist in a properly equipped laboratory. Tanur or the Fisheries Department as a whole is not provided with a technically qualified staff or properly equipped laboratory, and hence all such work which remain to be done should be transferred to the industrial laboratory at Washermanpet which, if need be, should be improved to carry on these and other chemical research work pertaining to industries. It is not possible or desirable that a department which has some raw materials, should go on treating such materials to find out all their industrial or other uses. For instance, the Fisheries reports speak of experiments with fish oil to find out its use in the preparation of Turkey red, but though it is several years nothing has come out of these experiments, apparently for the reason that the department does not possess the necessary staff and equipment to carry on such work.

73. See above.

74. The fish-curers and fish merchants have not yet availed of the results of the successful experiments demonstrated at Tanur for the reasons already stated. Tanur is the biggest fishing village in the whole of India, and though much business in various kinds of cured fish is carried on there, none of the curers takes any interest in the experiments conducted there, and even a few who have undergone training there, do not carry on the improved methods of curing on a commercial scale.

(b) & (c) The oil and guano industry has already taken root, but here also the public do not care to adopt the methods for producing a better class of stuff, because these methods demand great care and some amount of trouble. They are satisfied with the ordinary quality of goods which they can readily dispose of as it is always in demand. They therefore do not require any guidance from the Tanur station any longer.

(d) Fish meal is a new article introduced by the Fisheries Department soon after my return from Europe. This requires more care and attention than the manufacture of guano, and is one that can be taken up by people who have a scientific training and who can command some capital and skilled labour. The present demand is also very limited: hence it is not likely that this will become a popular industry in the near future, even though there are people who know how to prepare the stuff.

The only suggestion that can be made as a last resort is the entertainment of one or two well-trained subordinates, who should be deputed to visit important fishing centres and give demonstrations on some of the improved methods of fish-curing, and see whether their efforts would be successful. When the oil and guano industry was newly introduced, I went to important fishing centres and gave demonstrations in the use of the plant in the preparation of these products. People interested in the industry do not go to Tanur to see what is going on there, and hence it may be necessary to carry knowledge to their doors. Similar line of action has been adopted by the Industries Department as regards the introduction of improved methods of weaving.

The work that remains to be done in this line should be carried on as suggested above, and the Tanur station abolished as it has already served its purpose—*Vide* report of the Retrenchment Committee.

VIII. INLAND FISHERIES.

75. The present line of action seems to be to stock tanks and rivers with young fish which is grown in the fish farms.

76. The policy of Government was to add to the food supply of the people and not to derive any profit.

77. The sea fisheries are by far the more valuable both as a source of food supply and supply of raw materials for utilization in industries. Inland fisheries in an area like the Madras Presidency, which contains very few perennial sources of water-supply, can never be a source of cheap food supply. But some improvements may be effected by the introduction of new and rapidly growing fish in selected waters. In order to make this a success inland pisciculture should be taken up by the public, but this object has been lost sight of and the efforts of the department have been to show more revenue. Moreover the methods adopted by the department should be simple and inexpensive to create confidence in the public. For instance, the working of the Sunkesula fish farm will not appeal to the public considering the expensive way in which it is worked. Who will think of growing fish in a farm which requires water to be pumped into it by means of costly plant and staff?

78. The reports give the information.

79. Not likely.

80. As inland fishing is not a steady business which can be carried throughout the year the fishermen are engaged in it for a part of the time, and at other times they are engaged in agriculture or other avocations.

81. Something has been done in this direction by the late Mr. Wilson.

82. A very large number including some very small ones.

83 to 86. See reports. In the case of the smaller tanks the expenditure cannot be justified.

87. In the beginning, perhaps it was necessary to open a fish farm like the one at Sunkesula, but to continue to work it on the expensive scale is not justifiable.

The most important item is the arrangement made by the department to secure the highest price for the right of fishing in the Government irrigation tanks.

88. Fish farms should be started only in places where there is a perennial source of water-supply which can be utilized for growing fish without having recourse to expensive methods of steam pumping, etc.

90. Under an Inspector or Overseer of Fisheries.

91. Some of them have received an elementary training.

92. It is said that the present Director of Fisheries is a specialist in pisciculture, and, if so, he could very easily give the necessary instructions in these matters.

93 to 96. Larvicidal fish are being grown in almost all the farms. The demand for these from local bodies is not much. The best way to popularise their use is to instruct them to rear these fish in their own neighbourhood if there are facilities for doing so.

IX. KINDS OF FISH.

97 & 98. Every kind of fish has some economic value.

X. PEARL FISHERIES.

99. There are reports and other literature on this subject.

100. The most important problem connected with this industry is the great uncertainty of spat-fall and their subsequent growth till they are of commercial value.

Mr. Hornell who has many years of experience in pearl fishing in different parts of the world, tried to solve this problem, but failed in finding out a remedy. It may be that nature keeps the secret to herself, for fear that if pearls are fished in large quantities every year they will cease to be valuable as articles of ornament.

101. So far as the actual pearl-fishing operations are concerned they may be said to be satisfactory, but things are now done on a more expensive scale than it used to be when the fisheries were under the management of the Port officers.

102. The most important reason for the transfer of the pearl and chank fisheries from the Port officer to the Fisheries Department was that it required the services of a Marine Biologist to develop them, and as Mr. Hornell was said to have such qualifications, Government ordered the transfer. But during the long period of nearly fifteen years during which he was in charge of these fisheries, it cannot be said that anything of scientific value was done to increase the output of these fisheries. So much so that later on he even suggested the abolition of the Marine Biologist's post, and the officer who is in charge of these fisheries now, is one who does not possess any scientific qualifications, but is only a matric who rose from the ranks of a clerk. This shows what value is to be attached to the post of a Marine Biologist as a factor in developing this industry.

103. The cost of working these fisheries can be reduced only by retransferring them to the Port Officer who with an allowance for the additional work he has to do, will be able to manage them at a less cost than the Fisheries Department which with a separate officer and establishment has been able to carry it on.

104. None.

105. None that I know of.

106. The purposes for which these fisheries were taken over by the Fisheries Department have not been realized, and as such there is no use of keeping it any longer under its control, and therefore it should be given back to the Port Department.

107. It may be tried, but it is very doubtful whether any one will come forward to undertake such a risky job. The Ceylon pearl fisheries were leased out to a private company, but it was financially a failure so far as the company was concerned.

108. Labour problem is always troublesome, but if the fishing is remunerative, people from different parts of India and Persian Gulf will take part in it.

109. The Arab divers of the Persian Gulf are the best divers, but they do not care to go to South India, as the pearls are of poorer quality and they cannot make much out of it.

110. There was much talk about it, but nothing of practical utility has been done. As the spat-fall was very uncertain for long periods extending over 25 or 30 years, Mr. Hornell suggested that it would be profitable to undertake the cultivation of what is known as induced pearls. For this purpose Government acquired the island of *Krusadai* near Rameswaram belonging to the Raja of Ramnad, and the necessary buildings were constructed at some cost, but it must be said to the discredit of all concerned, that not even an attempt was made to start the work. The public have every right to demand an explanation why this much-advertised scheme was a failure.

111. Where Mr. Hornell who had much experience of pearl fishing, and on account of whose presence in the department, the pearl and chank fisheries were transferred to this department, has failed, it is absolutely impossible for any research work to be undertaken by any of the present staff in the department. It is not worth the while to import an expert for this purpose.

XI. CHANK FISHERIES.

112. See Mr. Hornell's reports.

113. Here again the important problem is the difficulty to get a sufficient number of divers. Diving is a hard work and it is not liked by many of the rising generation of the fisherfolk. Even the older generation avoid it as much as possible.

114. Under the existing conditions the operations may be considered as satisfactory, excepting the so-called scientific research.

115. None.

116. Yes. By retransferring it to the Port officer.

117. There were talks of some such methods, including the use of even submarines. What is stated above regarding the pearl fisheries is applicable to this also.

118. Dredging was tried but it failed because the chanks live on uneven grounds where it is impossible for the dredge to work.

119. No. It should be retransferred to the Port Department.

120. It is easier to lease out the chank beds than the pearl beds. Already smaller areas on the Tanjore coast have been leased out by the department to private parties.

121 & 122. It is not at all a legitimate function of the department to lease out fisheries from private parties. The Ramnad chank beds were leased by the department because Mr. Hornell wanted to have a control over the diving population and also to create a monopoly in the chank business which no doubt brought some profit to the Government but it was at the cost of the poor chank-cutters of Bengal.

123. It is almost the same as those connected with the pearl fishing.

124. Attempts were made to bring the chank-divers under the control of the department but without success.

125. Here also much used to be said about research work, but hardly anything which has a direct bearing on the industry has been done. The department has not succeeded even in stopping the capture of under-size immature chanks. The reason for this is that the divers are poor men who value the flesh of the chank as food, and they extract the flesh of all chanks they capture.

126. Life history of the chanks is well known, but in spite of such knowledge, nothing has been done to increase the production.

XII. RESEARCH.

127. That depends on the nature of the research work undertaken.

128 to 131. Some kind of work has been undertaken, and the results published.

132. The schooner the "Lady Nicholson" was specially built to carry on scientific research work, but her part in this line of work has been almost nil. It was not for want of equipment, but the staff was not of the quality required for research work.

133. It is not a fact that the sardines and mackerels have disappeared from the West Coast. They may appear in small or large shoals, but they have not altogether deserted the coast. Last fishing season, there were huge catches of mackerels all along the coast.

134. Yes. Large shoals appear only at particular seasons.

135. During the last three years sardines have not appeared in large shoals, but mackerels were plentiful at times.

36. It is a well-known fact that sardines may be plentiful in one year following year it may go on decreasing till in the third or fourth year may become very scarce. Then again they begin to come in in larger s. There is nothing abnormal about this.

37. Some research is said to have been carried on at Calicut to find the cause of this.

38. It may be possible to find out the natural conditions which would get the sardines to inshore waters, but it is absolutely impossible to artificially those favourable conditions and attract the fish. It may be possible for the expert to locate the shoals at a particular spot, but there is no certainty that the shoals would remain there till he sends word to fishermen to go and fish there. These shoals move about with great rapidity, and the knowledge gained by these scientific researches may not be of any practical use to the fishermen. The results of such enquiry are not of scientific interest. But the Fisheries Department is for developing the industry, and is not a scientific department.

39. There are many other kinds of fish which may give results of scientific interest.

40. The present method of carrying on research work at Calicut cannot get much valuable data. Work of this nature should be conducted on the spot but at present it is all done on land.

41. The investigation of marine fisheries is a matter that ought to be taken up by the Imperial Government, because fishes under observation do not remain in the waters of the Madras Presidency, and the results of investigations are for the benefit of the whole of India. Compare the work carried on at the Pusa Research Institute for the agricultural development of the whole country. Take, for instance, the sardine fish itself which has become one of very economic importance during the last twenty years. It is distributed in a very peculiar manner in different parts of the Indian Ocean. It is plentiful on the Baluchistan coast as far down as the Arabian Sea; then they do not appear on the coast of the Bombay Presidency till they get down to Ratnagiri. Thence southwards they may appear in large shoals till the northern parts of Travancore are reached. Further south they will not be seen except occasionally on the coast of Ceylon. Turning to the Cape Comorin as far as the Ganjam coast they do not appear. In order to study this single fish it will be necessary to investigate these areas. Is it possible for a Provincial Government to find the men and money to carry on this investigation?

As a matter of fact, all such investigations were hitherto carried on by India Survey Steamer "Investigator-," and very valuable scientific results have been obtained. Moreover the Central Government has under the Zoological Survey Department, and this is a work which comes within the scope of that department.

42. Hardly any settled policy or programme.

43. When Mr. Hornell and Captain Cribb were employed under the Fisheries Company, it is said that they discovered a very fertile fishing ground off Cape Comorin extending over 4,000 square miles. There has been much talk about this ground, and regret was expressed that for want of a trawler nothing could be done to exploit this area. One would naturally thought that a trawler having been now supplied, this area should have been the first to be explored by the department, but nothing has been heard of till now.

44. The problem of exploring fishing grounds beyond the 100 or even 200 fathom limit off the West Coast, will not arise for the reason that even if it is available, the expense for capturing them with such costly methods as trawling, will not encourage people to undertake it as a business proposition. The fish captured by such expensive methods will have to be sold at an exorbitant price which will be beyond the poor purchasing capacity of the vast majority of the fish consumers in this country. It is stated by the Director of Fisheries that he has proposed to salt the catches of the trawler in case he is not able to dispose of them in the fresh condition. This is also not a profitable undertaking, because it is only the surplus fish which cannot be sold in the fresh condition, that is salted and cured. The salted fish will fetch only less price than fresh fish.

145. Not at all.

146. It is not worth the while because even if new fishing grounds are discovered it will require enormous amount of capital to provide deep sea fishing craft and gear. Fishermen as a class are poor to invest such an outlay, and the capitalists will not be bold enough to put money in a concern which to their knowledge, from the experience gained in Bengal and Bombay, is not a business proposition.

As regards craft and gear, they are well known and the department need not take the trouble to find out what they are.

147. So far as the deep sea fishing is concerned it will be waste of money and energy for the Fisheries Department to undertake it.

148. From the published reports one is obliged to come to the conclusion that the efforts of the "Lady Goschen" have been a failure.

149. She was engaged in fishing on two or three occasions and her catches were very poor.

150. Not known. An ordinary trawler has hardly any spare room for additional equipment by way of laboratory, quarters for the scientific staff, etc. Hence if she is to be altered and added to, she may not be fit to operate the trawl.

151. It is a mistake to burden her with any research equipment.

152. Not much.

153. (a) Some research has been carried on at Calicut for the last several years in connexion with the study of sardines and mackerels. The material for investigation is collected by an ordinary lascar who goes out to sea in some fishing boat, and the examination is conducted on land.

(b) & (c) When Mr. Hornell took charge of the chank and pearl fisheries, it was said that he would undertake various investigations but it cannot be said that he has succeeded in his efforts to increase or develop these fisheries. Later on he is said to have recommended the abolition of the post of the Marine Biologist, and his conferring the post of the Superintendent of Pearl and Chank Fisheries on a subordinate who has no scientific qualification, shows that he was not hopeful of improving these fisheries by biological investigations.

154. The Local Government should ask the Central Government to undertake marine research and biological work as it is a matter of interest to the whole country.

(a) Research on Inland Fisheries.

156. Some useful work has been done in this direction by the late Mr. Wilson.

157. The most important item of work in this section ought to be the popularization of fish rearing in private waters, as is done in Bengal. Unless the department adopts simpler methods in pisciculture, it will not be possible to expect the public to take it up as a business.

158 & 159. The officer who is in charge of the inland fisheries is like the officer in charge of the pearl and chank fisheries, one who has hardly any scientific qualifications. The value of research work under such conditions may be easily imagined.

Note.—Mr. Hornell and Dr. Sundara Raj who have been advocating the necessity for carrying on scientific research and other investigations are themselves responsible for appointing these two subordinates to these responsible posts which they hold. Their action in this matter clearly exposes the hollowness of their ideas.

(b) Technological Research.

160. Technological research is more important than biological research.

161. There is hardly any subordinate with the necessary qualifications to carry on technological work, except the one at Tanur, but unfortunately he is entrusted with work beyond his capacity and equipment.

162. There are certain items of work of a chemical nature which can be carried on only in a properly equipped and well-staffed laboratory, and not at the Tanur Station. Please see the reasons given already.

163. Attempts were made but without success. In certain parts of the coast the fisherfolk themselves have copied and introduced new methods of capturing fish.

164. Indigenous methods which have proved a success in some parts should be introduced in places where they do not exist at present. It has been said that from the catamaran to the trawler is a jump in the dark, but it is possible to take the fisherfolk step by step from their primitive methods to more remunerative methods of capturing fish. As already stated, they themselves have adopted such methods when they saw that such methods give more remunerative results.

165. Fish should be treated with great care from the time it is caught till it reaches the consumer, but under the existing conditions, it is impossible to bring about these changes.

The Salt Department had been encouraging the fishermen in certain areas to carry salt in their boats to sea and cure the fish soon after they are caught, and hence it is a matter of surprise when the Director of Fisheries says that the fish caught by the trawler will be cured when the catches are landed. Unlike the trawler which the Bombay Government brought out, this trawler has not even been provided with a refrigerator.

166. (a) There are only two kinds of fish which yield oil on a commercial scale, namely, sardines and sharks. The oil contents of these vary according to the season and age of the fish. This calls for no research.

Shark oil is derived from the livers of sharks, and its extraction is an easy matter, provided the fish is cut open and the liver removed before taint has set in. About seventy years ago there was an establishment at Calicut for preparing shark oil for use of hospitals in the Presidency. The factory seems to have been closed when the Suez Canal was opened and freight became cheap. The remains of this factory can be seen in the Calicut north fish-curing yard. Sardine oil, on the other hand, is extracted not only from the sardine livers, but also from the tissues of its body, as at certain seasons the whole fish becomes permeated with fat. According to the methods introduced by the department from 1911 to 1915 several grades of oil are extracted, but the extraction of medicinal oil or superior grades of oil, depends on the freshness of the fish, and also on the cleanliness and care with which it is extracted. Most of the private factory owners do not take the trouble to prepare this grade of oil, as they are satisfied with the crude oil which has a ready market, and which requires no extra care. I have seen oil of very superior quality produced by some private factory owners, and it is clear they know the art of preparing this grade of oil. Hence they do not require any guidance or instructions from the officers of the Fisheries Department.

(b) Refinement of oil.—When Sir Frederick Nicholson and myself went to England, we took with us samples of various grades of fish oil which were submitted to the Imperial Institute in London. After trying various processes at refining, the Chief Chemist of that Institute told us that it was possible to refine oil, but, considering the cost involved, it was better that attention should be paid to extracting a pure grade of oil from the fish when it was under treatment. Refinement should be done by chemical processes which destroyed the vitamin contents to some extent, and thereby made it less effective as a medicinal oil. Since that time a process known as the hydrogenation has been found out and this is largely adopted in refining oil. Hence there is no need for the Fisheries Department to undertake any research in this matter.

Medicinal oil.—There have been some remarks made in the reports of the Fisheries Department to the effect that the sardine oil is very inferior in vitamin contents as compared with cod liver oil. But it should be remembered that the price of sardine oil is only a fourth of that of the pure cod liver oil. Moreover, all the oil that is imported is not cod liver oil. I have seen how the more palatable fish oil is prepared by making a mixture of vegetable oil and fish oil. From personal knowledge I know that sardine oil is more easily digested than pure cod liver oil. The difficulty in introducing the sardine oil is that medical men prescribe only cod liver oil, and

the chemist is obliged to supply it to his customers, as he cannot pass off sardine oil for cod liver oil.

It was in connexion with the proposal to extract best oil from sardines that the services of the oil expert Mr. A. K. Menon were engaged by the Fisheries Department, but he was not able to do much in this direction and he gradually drifted into soap making. It is useless for this work to be taken up again by the ill-equipped and ill-staffed Fisheries Department.

(c) *Fish meal*.—There is scope for introducing this stuff as an article of cattle and poultry feed in this country itself. The stuff made at the Tanur station is said to contain too much fat, more than what is good for the cattle. This can be easily dealt with in a properly equipped laboratory by an experienced chemist, and not by the Tanur staff.

(d) *Guano*.—All that is required for the preparation of the best grade of guano has been demonstrated to the public, but, as already stated, they do not care to produce a better grade of stuff involving some little more care and attention, for the reason that even the inferior quality which they make has a market. Even European firms are willing to purchase guano containing up to 15 per cent of sand. Unless the consumers insist on a superior article the manufacturers will not care to produce it. Hence here also there is nothing which the Fisheries Department can demonstrate to the private factory owners to their advantage.

(e) It is impossible to insist on the hygienic method of curing fish for the following reasons:—

(1) Fish is caught from morning till noon, and when they are landed they are in all stages of taint. This kind of fish will not give any good results under improved methods.

(2) The Tuticorin salt which is supplied to the fish-curing yards contains much impurities. At the Tanur Experimental Station this salt used to be washed before it was used for curing. It is impossible to get satisfactory results with this impure salt.

(3) The demand for better cured fish is very small, and, as long as the taste of the people is what it is, the curers will not take the trouble of adopting improved methods of curing. It does not pay him. I have seen even in places like Madras, Vellore, etc., well-dried and salted fish soaked in water the whole night, before it is sold in the market the next day. It may be said that the people of Southern India have very bad taste, but it is not so bad as that of the Burmese or Chinese whose *Ngapi* and *Balchouny* are notorious for their putrid smell. Compare also the smell of Garganzole cheese that is considered a luxury among the so-called civilized nations of the West.

(f) Canning has, as already shown, been ruined once for all, and the most important cause of it was the announcement made in the Council that the Fisheries Department had been keeping canned goods for a number of years as they were not sold readily.

(g) *Refrigeration*.—This has a great future before it, provided it is taken up by people who have the necessary capital and power of organisation. It will have to be carried on on a large scale, as it will not pay if worked on a small scale.

(c) *Aquarium*.

167. Yes, but it need not necessarily be on such a large scale as the one in Madras. In Cullercote and at Dundee I have seen small aquaria where even foreign research students carry on their work.

168. An aquarium to the vast majority of visitors is a place of some recreation, and its educative value is confined to a small number.

169. The Madras Aquarium should serve a better purpose than what it has hitherto been doing, namely, as a zoological research station where graduates of the University should be encouraged to work. It can do the work better, if it is made an University institution under a committee consisting of the Natural History Professors of the various colleges in Madras.

170. Small aquaria may be opened at Cochin, Tuticorin or Mandapam, and at Vizagapatam for research work for the students of the University.

XIII. TRANSPORT.

172. Most fishing villages are situated far away from towns and markets and, as there are no roads or even footpaths, it is impossible for fish to be carried quickly for sale to those places. The local bodies should remove these defects by constructing metalled roads and footpaths. In Ireland this is one of the most important items of work undertaken by the Irish Congested District Board in their efforts to improve the fishing industry. Provision of special vehicles on the railways in which fish can be carried with the minimum amount of exposure will also help the trade. I understand that some of the railway companies are willing to provide such accommodation if there is sufficient traffic to justify the running of such carriages.

XIV. SOCIO-ECONOMIC WORK.

(a) *Co-operation*.

173. About seventy co-operative societies were organized among the fisherfolk by me, and they were worked on special by-laws drawn up by me. These are thrift societies not only to serve as an incentive to save something out of their hard-earned money, but also to serve as institutions which would educate them as to the value of co-operation. These societies were organized as the result of special investigations made into the economic condition and habits of the people. The share value of the societies was fixed high, 25 to 50 rupees, which the members were required to pay in convenient instalments spread over four or five years. They were not encouraged to borrow from the central banks or outsiders, and for all practical purposes the working capital was sufficient to meet all their requirements in normal seasons. There are societies which instead of borrowing have been depositing their surplus funds in the banks. These societies worked very well in villages where they are only humble men, but in other places where they came into the hands of the so-called big men, the results were not satisfactory.

174. A few non-credit societies were also formed but they did not work well as they were apparently too much in advance of the time. They ought to have more training in the management of credit societies, before undertaking non-credit work. But even these credit societies have done good work in the joint purchase of articles required for food and for their industry. There is no use in extending the scope or modifying the present rules. The people should understand the value of co-operation before they can take another forward step.

175. Much benefit has accrued in places where the societies were managed by people who are honest and not selfish, and who had no personal like or dislike to the individual members. But in the case of societies which fell into the hands of the so-called leaders, most of them came to grief.

The statutory control of these societies should be in the hands of the Co-operative Department and they should be held responsible for the proper working of these societies. The Fisheries officers, such of them as take a special interest in the welfare of the fisherfolk, may be appointed as honorary visitors of these societies.

176. As most of the fisherfolk are illiterate, it is necessary to provide clerks to write up their accounts and assist them in holding meetings, etc. It is impossible for local unions to give such help for want of finance, and hence it is for the Government to appoint such clerks for groups of societies and place them under the direct control of the Assistant Registrars of the Co-operative Department. These clerks should be preferably men belonging to the fisher communities. This is necessary because we want these men to live in the villages they visit, so that they may have many opportunities for talking with the fisherfolk whenever they get the opportunity to do.

My original idea was that the teachers who are trained specially at the Fisheries Training Institute, will be able to assist in the working of these societies, but as the plan of their training has been altered under the present administration, they may not be fit for this work.

177. (a) I understand two societies have been organized recently for catching fish, and with a view to help the fishermen out of the clutches of the middlemen, but the report says that they were started under the auspices of two big men of the locality. It remains to be seen what the results will be, because of the presence of these two big men.

(b) A few societies were organized for the joint sale of cured fish, but, as stated above, they have not worked properly. They were too much in advance of the time.

178. None.

179. My idea is that these thrift societies should be worked properly, and when the men have gained sufficient training in their management and understand the benefits, they may be expected to make further progress in the way of non-credit work.

180. It will be a great mistake to grant bounties, but loans on easier terms may be granted to societies that have been working satisfactorily. As already stated, these societies were not allowed to borrow, and in well-managed societies the paid up share capital was sufficient to meet all the ordinary requirements of the members. Societies for catching fish will be difficult to manage, but joint sale societies can be worked in areas where the men have got a grasp of the principles of co-operation. The best and most necessary help is the provision of group clerks who will not only write up the accounts, but also give advice to the members who have fallen into arrears of payment.

181. Most of the work in this direction was done on the West Coast, but successful efforts were made on the East Coast also by me, but unfortunately Mr. Hornell after he assumed charge of the Directorate, ordered that I need not go to the East Coast as he would arrange for this work to be carried on by other agency. I have organized several societies in the South Arcot district and Madras City, and was on the point of organizing one at Uppada near Cocanada. The most important society was the one organized at the Lower Anicut for the benefit of the inland fishermen who are now given the lease of the right of fishing in irrigation tanks, etc.

182. Certainly, as the East Coast being more backward requires greater attention being paid to it.

The original idea with which the socio-economic work among the fisherfolk, was started, was to carry it on all over the Presidency both inland and sea coast. I was accordingly instructed by Sir Nicholson to study the economic and other conditions of the fisherfolk, and as information was gathered a few societies were organized, and a few schools were also started in selected areas. The scheme required much thought and investigation, but before it was put on a working basis it was upset by the action of Mr. Hornell.

My enquiries showed that the lot of the fishermen on the East Coast was much worse than that of the West Coast men, and every effort should be made to improve their condition by the organization of co-operative societies, schools, and other social welfare work. This requires experienced and patient workers, whom at the present time the Fisheries Department does not possess, and hence it will be necessary to urge on the Labour Department to take up this work.

(b) Education.

183. The general elementary education as imparted in the ordinary schools was not suited to them, especially for the reason that the youngsters of this community who attended such schools, imbibed wrong notions regarding their hereditary industry, and took a dislike to it. It is inevitable that the vast majority of these youngsters should take up fishing as their profession; it is therefore necessary that they should get a general idea as to the importance and value of this industry even when they are at school. In other words, the idea was to bring them up in a fishery atmosphere, making every allowance for the more intelligent boys to prosecute their study to higher courses if they were inclined to do so. For this purpose recommendations were made to the Education Department to grant scholarships to the deserving boys.

That the scheme has influenced them is proved by the fact that the fisherfolk have been petitioning for the opening of more schools in their villages.

184. So far as the elementary education is concerned, there is no need to any modifications in the ordinary subject, but in the manual training and object lessons, it is desirable to introduce such subjects as would enable them to make use of the knowledge in their profession. No opportunity should be lost in introducing matters relating to the fishing industry even in their arithmetic, geography, and story-telling.

185. The socio-economic work among the fisherfolk was undertaken by the Fisheries Department because of my presence in it. The scheme had not fully developed before I was asked to retire, and hence I had not the opportunity to train the subordinates in this work. The present officers who control this work have not even grasped the principle underlying the scheme, and it is impossible for them to carry on the work satisfactorily, or to train up their subordinates in this item of work. The only desirable course to be adopted in the matter is therefore to transfer the management of the schools to the Education Department, the officers of which department may be expected to carry on the work more satisfactorily than the present Fisheries staff.

186. About forty, most of them being in Malabar.

187. There has been a real desire on the part of the fisherfolk to get their children educated, and wherever facilities existed they are sending their children for higher education. The fishing villages and hamlets are situated in isolated areas, three or four miles distant from the nearest local board schools, and it was too much for the little children of the fisherfolk to walk this distance up and down every day. Hence they grew up without any education, or being brought up under any civilising influences. As the fisheries schools are opened in the very heart of their villages, they have been given an opportunity to educate their children, and they are taking full advantage of it.

188. The system should be continued, but as there are no qualified men in the department, these schools and those to be started hereafter, should be transferred to the Education Department who may be reasonably expected to continue and develop the work with the original object in view.

189. Certainly. Schools for elementary education should be opened in the fishing villages of the East Coast also without the least delay.

190 (a). The curriculum may be the same as originally laid down.

(b) The staff should be trained as much as possible in the subjects to be taught, but as technical knowledge may not be easily available, it is necessary to give them as much information as is possible, in matters relating to the industry as is carried on in different parts of the world. This is necessary to capture the imagination of their pupils, and thereby make them understand the value of their hereditary profession.

The teachers should preferably be drawn from the fisher communities, because it is necessary that they should live in the village in the midst of the folk, so that they may be not only teachers of the young, but also friends and advisers to the grown-up folk in their difficulties.

The Headmaster of the Fisheries Training Institute who teaches some of the technical subjects, and the Assistant Director of Fisheries who controls and even conducts the final examination of the students in these subjects, do not know even the names of the common fishes, and the nets and tackle used in fishing. It may not be exaggeration to say that the fishermen's education as it is now carried on by the Fisheries Department is a farce.

Even if suitable teachers are not available, let the schools be opened in the villages, so that the children may have the benefits of primary education without losing touch with their ancestral industry.

At the commencement, there were not a sufficient number of young men of the fisher communities to serve as teachers in the village schools, and it was found necessary to appoint purely as a temporary measure men of non-fisher communities as teachers on the distinct understanding that they would have to vacate their places, when the men under training in the Fisheries Training Institute pass out. It is now said that these temporary teachers of non-fisher communities are being made permanent, and placed over the Fisheries trained men. This is practically undoing the work of the Training Institute. There is also a constant shifting of these teachers, though the favoured ones may not be disturbed for years together.

(c) The equipment.—This should be as far as possible similar to the schools already started by the department.

(d) The best course under the existing conditions seems to be, to select young men with the necessary educational qualification, and get them trained in the ordinary normal training schools, and after passing out in

the ordinary subjects taught there, place them under the officers of the Fisheries Department for six months, so that they may gather some ideas about the fishing industry in various branches.

191. It is not expected that the teachers employed in these village schools should be able to give technical instruction in fisheries to their pupils, but what is aimed at is to enable them to gather as much information as is possible, relating to the fishing industry as is carried on in different parts of the world, so that their imagination may be roused and through them their pupils may understand the value and importance of their hereditary profession. Fishing has been wrongly considered as *infra dig.*, and hence every effort should be made to remove such impressions from the rising generation.

It may be a good idea to train apprentices in fisheries technology in foreign countries, but the question is whether their services will be availed of by the people who are engaged in the industry. If there are candidates with the necessary means who will be able to put into practical use their knowledge and training, after they return to India, every encouragement should be given to them.

192. The Fisheries Training Institute now at Calicut was intended to serve both the coasts. After about 150 students were trained for service on the West Coast, the institute was to move on to the Tamil coast with Negapatam or Tuticorin for its location, and similarly when a number of teachers were trained for the Tamil area, to move it on further north into the Telugu coast with location at Cocanada or Masulipatam.

As a separate fisheries training school is out of the question for want of properly qualified teachers to train the pupil teachers in fisheries knowledge, it is necessary to put these selected pupils drawn from the fisher communities, in the ordinary normal training schools, and after they pass out, place them under the officers of the Fisheries Department so that they may see and understand the various branches of work carried on by that department.

XV. ZOOLOGICAL SPECIMEN SUPPLY.

193 to 195. There used to be a good demand for these specimens, but when the colleges, schools and museums have been supplied with them, the demand for them should naturally decrease.

There is no need to maintain this as a separate institution of the department, but it should be amalgamated with the Madras Aquarium and placed under the same roof.

XVI. STAFF.

196. There is no need any longer for the Fisheries Department to be an independent one. There was a proposal to place it under the Director of Industries a few years ago, and it should be given effect to. There is no harm in placing it under the Director of Agriculture, if that can be done without prejudice to his work. In either case the Fisheries will be benefited by the association with the scientific officers of these departments.

197 to 200. The administrative work should be separated from the expert staff. Experts for research work should be engaged for a term of years, and after they have carried out that particular work they should be sent away, unless there is some other work which may require their expert knowledge. Experts are not usually fit for administrative work.

201 to 202. The suggestion I have already made, namely, the placing of the Fisheries under the Industries or the Agriculture, will improve matters considerably, by reducing the cost of working the department, and by improving the quality of the work done by the experts. I hear that expenditure has been considerably increased, and hence retrenchment is very necessary. I may quote an instance. The present Assistant Director of Fisheries on the West Coast, has been provided with a shorthand-writer. This is a luxury which even Sir Frederick Nicholson did not enjoy, though it is a well-known fact that he used to write voluminous reports on various subjects, and if anybody deserved it, it was he. He did all his drafting with his own hands. If a careful scrutiny is made it will be seen that pay

and allowances had been increased in certain cases without the least regard to the qualifications of the individual concerned, or the quality of the work turned out by him.

The pay which I drew as the Assistant Director of West Coast, after a service of six years including fifteen months spent on deputation in Europe, was Rs. 250—25—400, which was raised to Rs. 500, and later on the maximum was raised to Rs. 750, though I did not reach it. Every increase which was made to my salary was on the proof of hard solid work done by me, and Sir Frederick Nicholson had to press on the Government to recognize such service by the grant of increase to my salary. Now the officer who succeeded me in office is a lay man, who was only an office manager, without any technical qualifications or experience or personal knowledge of the economic condition and the customs and habits of the fisherfolk. In spite of all that, he was appointed and immediately confirmed in that post, and he will as a matter of course draw the salary which I drew.

Another instance is that of the so-called "Superintendent" of the cannery. This was a young man who joined the Fisheries as an acting sub-assistant, and soon he was sent to the cannery where he was made the superintendent on the departure of Mr. Prager, the Salt Inspector. His pay was raised to Rs. 100 and that at a time when the cannery was, as it were, breathing its last.

These appointments were made by, or on the recommendation of, the present Director of Fisheries, though he has been at the same time emphasizing the value of scientific and technological work. Perhaps he followed the example set by Mr. Hornell, who had already appointed a subordinate with no scientific training to the post of Superintendent of Pearl and Chank Fisheries with the dignified designation of Assistant Director, and another subordinate who also does not possess any scientific or technological qualifications, as the Assistant Director of Inland Fisheries. It may be worth enquiry, as to how these several appointments came to be conferred on individuals who did not possess the necessary qualifications even as prescribed by Mr. Hornell and Dr. Sundara Raj.

203. Most of the technological investigations relating to marine fisheries products which are of practical use to the curers and others dealing in those materials, have been already made, and what remains to be investigated, are those which can be handled only by experienced chemists and specialists whose services for such work may be engaged from time to time as necessity arises. Some of these investigations can be made by experts in foreign countries on payment of a fee to them, for the work entrusted to them. These are matters which cannot be solved by the Tanur staff or the Director himself.

The need for a central Industrial Chemical laboratory with a well-qualified staff, and properly equipped, was brought to the notice of Sir Alexander Cardew who was then in charge of the portfolio relating to fisheries, when he paid a visit to the West Coast to see the working of the Fisheries Department. It is not possible for the various departments to maintain a laboratory and staff for themselves, but on the other hand, it is a work that ought to be undertaken in a central laboratory under the control of the Industries Department. The administrative work should be handed over to the Director of Industries or the Director of Agriculture, when the Fisheries Department is placed under one of those officers. The present Director of Fisheries himself has in his reports stated that as he was engaged in administrative work, he was not able to do any scientific research work.

204. The present pay and allowances are more than adequate for the majority of the staff, and if a proper scrutiny is made, it will be seen that in some cases the salary paid is far more than what is justified by the qualifications or experience of the individuals concerned.

205. Specialists or experts should be engaged for any particular item of work, and sent away when that work is completed. A really good expert will not care to stick on to a place for any length of time. He would demand a high fee, but would finish his work and clear out as soon as possible. The evils of engaging these experts on a permanent basis, have already been noticed by the present Minister for Development, and it is hoped that he will give up that policy.

As regards research work in bio-chemistry, there is already an officer attached to the Medical College for that work, and it is not necessary to have another bio-chemist for the little work which has to be done in connection with the fisheries. Just as the Chemical Examiner to the Government is doing work even for the public, it may be possible for the Bio-Chemist attached to the Medical College to carry on any additional work, if he is given some Assistants and an allowance. Let us strengthen the existing institutions, and make them more useful and worthy of the name of the province.

Young Indians with the preliminary qualifications could be trained in such central institutions.

It is noteworthy that there is a tendency on the part of some subordinates to carry on purely zoological research work, but if these have no direct bearing on the industry, they should not be encouraged to do such work to the neglect of other important work.

One of the items of work on which much emphasis has been recently laid, is the compilation of statistics relating to the quantity of fish landed on our coast. This is an idea copied wholesale from what is being done in Great Britain and some countries on the continent. In those countries these statistics have an immediate use, so far as the dealers in and consumers of fish are concerned. Moreover it is an easy matter to gather the figures as regards the quantity landed, and the price at which it is sold, all along the coast, because there are Fisheries officers or agents of the Fisheries Board, stationed at all the ports where fish is landed, who gather the information from the salesmen whose duty it is to auction the fish. They write down the figures on a board in the market, and the officers have simply to copy them. The sales are held only in the early morning, and even in case a fishing vessel arrives the previous evening, she will not land her catches till the next morning, when the salesmen and the buyers assemble on the wharf. These figures are wired to the Central Fisheries Office who pass on the information to the newspapers who publish it the very evening. The result is that the housewife in London and other parts of the country, is able to make up her mind whether she will have a fish breakfast the next morning, long before the fish from various parts of the coast reach the market. The fish-mongers also are benefited by the information thus furnished. Now take the conditions prevailing in India in this matter. First of all, fish is landed at all times of the day and night, and all along the coast not only in big villages, but also in the tiny little hamlets, and it is at once sold or salted or otherwise disposed of. Under those conditions it is absolutely impossible to get any reliable figures even by employing an army of men for this work. Again what purpose do these figures serve? The fish is disposed of long before the information is made public—Vide Introduction to Fisheries Bulletin No. 9, page 2 by Sir F. A. Nicholson. Mr. Hornell tried to gather the statistics relating to fish landed on the Tuticorin beach, which is only about a mile long and which he could survey from his very office window, but in spite of all that advantage he expressed disappointment at the results obtained. If that is so, how is it possible to gather the statistics relating to the whole coast line with any degree of accuracy, is a question which the author of this proposal should answer before Government approve of the scheme. Statistics relating to the export of fish and fisheries products by sea can be had from the sea customs returns, and those carried by rail can be got from the registers maintained by the railway companies. A small quantity is also carried by carts into the interior parts of the country for which figures may not be available.

The proposal for taking statistics relating to the quantity of fish landed on our coast is yet another instance of copying Western ideas without the least knowledge of their use, or regard to the conditions existing in India. Government have already suffered heavy loss in the Forest Department, for instance, by accepting the opinion of the so-called experts, who possess ideas which they have gathered in foreign countries, and which they wish to introduce in India without the least regard to the Indian conditions.

Statistics relating to cotton, oil seeds, jute, paddy, tea, coffee, etc., are taken because they are commodities which fluctuate according to world demand, and moreover being non-perishables, can be stored for many months during which the sellers and buyers have plenty of time to regulate their transactions. Our poor fish does not give scope for such considerations.

There is a wrong idea in certain quarters regarding the training of Indians in fisheries technique in Europe. There are as a matter of fact, no colleges or institutions where one can get the training, and when Dr. Sundara Raj says that "he has seen everything regarding fishery" during his short stay of fifteen or sixteen months in Europe, it may be taken for what it is worth.

XVII. FINANCE.

All information relating to finances of the department is available in the reports of the department.

No special allotment is made in the fisheries budget for work in connection with the co-operative societies.

A scrutiny of the figures will show how the expenditure has been going on increasing year after year. I have already pointed out instances in which salaries have been fixed or increased, without the least regard to the qualifications of, or the quality of the work turned out by, the officers concerned. If this state of matters is allowed to continue unchecked, the department will become an institution to enable people, especially of the so-called higher castes, to draw fat salaries in the name of the poor fisherfolk, who perhaps derive the minimum benefit from the liberal attitude of Government in the matter. I take the liberty of quoting the following opinion of one who knows something of our fisheries and fisherfolk:—

"When people do not know what to say about the industry, they begin to talk of 'research' (meaning pure scientific biological enquiries) but, what form or direction or what object should be taken by such research, they are vague about. We want to develop the existing industry technically and commercially, and the fisherfolk economically and educationally; all the research in the world won't alter the migrations or appearances or non-appearances of the sardine and mackerel shoals, or create more fish or fish food (plankton) than exist: it is the modes of catching the fish, the treatment of them when caught, whether in the boat or factory, and the putting them on the market as good wholesome food, that have to be considered together with the economic salvation and development of the people themselves."

Oral Evidence.

The Chairman: Mr. Govindan, you served in the Fisheries Department as an Assistant Director?—I did.

How long?—I was there for about fifteen years; it was in the first instance as Personal Assistant to the Director.

And then?—Later on, after my return from Europe, the appointment was made into an Assistant's grade.

How long were you in Europe?—I was there for fifteen months.

At that time you studied fisheries problems?—I did.

What countries have you visited?—Almost all the Western countries, including Germany, France, Holland, Norway, Sweden, Belgium and then Scotland, Great Britain and Ireland.

Can you suggest any improved methods of fishing?—Oh, yes, there are lots. Even in India there are improved methods. On the Bombay, Karachi and Sindh coasts, they have got better kinds of boats, which can stay out in the sea for a couple of weeks. In these parts they are known as Ratnagiri boats. We did introduce this method on the Malabar coast, as an experiment. We had to engage the crew on a fixed salary system and that went against the scheme. Sir Frederick Nicholson was satisfied, but when Mr. Hornell came he said it was all wrong and closed it. In other words, he did not give sufficient time to the experiment. You know, as a matter of fact, these fisherfolk and cultivators are slow to move in this country and we require a lot of time to bring them round and convince them. When they are convinced they take to these industries without trouble. The boats are still in the possession of the department. The boats were tried for two years on the fixed wages system. One of the boats was even taken to the Tuticorin coast. They were tried on the Malabar coast, at Tanur, etc. Their headquarters was Chaliyam.

Did you meet any of the fisherfolk who said that they were satisfied with such a boat as that and would have one for themselves?—All the fishermen are poor. They cannot purchase one. But the Mudalalis or capitalists even now have such boats.

Did any application reach you from Calicut either orally or in writing?—They were simply watching. Of course there was a man who wanted to purchase one of the boats, but we wanted him to give us its proper price which he could not.

Don't you think that it is evident that it is not so very useful in these waters?—It is just the other way; because some merchants keep these boats. The fact that they are doing business for two or three months shows that these boats have value so far as these waters are concerned. They get large catches of fish. These boats require skill in handling; the men must be trained sailors.

Don't you think our fishermen are good sailors?—No; in that respect they are not good sailors. They are not accustomed to stay out in the sea for long periods.

You speak about the European methods which you wanted to introduce but for which you were not given the opportunity?—There are those little trawlers on the West Coast of Scotland in which two or three men can go out. All these go out to the sea and catch enough fish. Of course European boats are different from the type of Indian boats. They are called trawlers. I was there in Europe between 1912 and 1913.

Did you mention this to Sir Frederick Nicholson?—I did. He encouraged me to do these things.

Why were you not given an opportunity?—Because Sir Frederick Nicholson went away, and the policy of the department changed.

Sir Frederick's word always carried weight with the Government?—Yes, it did.

I am just asking whether Sir Frederick wrote to Government saying that you have been to England and that you propose these trawlers to be introduced and the Government might try them; do you know if he has recommended them?—I don't know; in any case he accepted my suggestions to introduce these things.

Why did not Sir Frederick recommend them if he thought they were useful in these waters?—He did not want to rush everything. He had enough of work, and experimental fishing was not included in it. That I want to impress on you. We brought the Ratnagiri boats, we brought the Malabar canoes to Madras, and we were doing our very best.

This attempt to improve the fishing was going on as long as you were in service?—It was only after Mr. Hornell took charge that he condemned all these ideas. He wanted to go to the old methods. At that time he got sanction for the Danish nets; so he did not encourage these things.

In connexion with pearl fishing, what did the R.M.S. officers say about the vessel used for it?—They at first condemned it. It took three weeks to come from Calcutta to Madras. It had to be repaired in the Madras Harbour. Then it was war time. Later on she was re-engined. She went to Laccadives. She is now more serviceable.

I gather from some literature with the R.M.S. officers that it is not fit to sail on the high seas?—Indeed R.M.S. officers had to say many things against it, before the engines were replaced.

Even after that?—I have not heard of it.

Questions 18 & 19.—Do you think that these launches should not be used for the purpose of towing these boats containing chanks?—What I said was that when the weather is not favourable these people are allowed to tow their canoes into the sea. Of course that helps the divers; and on those days they are able to catch some chanks. What I thought was that these chanks being stationary, when the weather is clear, these divers might get 100 to 200. So, on the whole, Government does not lose.

You think that no advantage is gained by bringing them faster to the shore?—No.

You recognize the present catches are far in excess of former days?—At times it is, at times it is not.

Taking the average?—I have not studied the figures; I should think it is all accident.

Is there no advantage so far as the catches are concerned in taking off the bigger ones earlier and leaving the younger ones there so that there may be food enough for them? Don't you think if the fishes are left they may eat away all the plankton whereas if you catch them early there will be more food left for the younger ones and this will give them opportunity to grow?—I don't think; it is a very remote contingency and it has no direct bearing at all. After all, the delay is only of a few days which will not affect the position.

Seeing that time is money, one would naturally expect the faster they are brought to the shore, the more profitable would it be?—These creatures do not grow so fast; they take a lot of time to grow to the required size for commercial purposes.

So you think there is no advantage gained by using any of these launches?—No financial advantage.

Nor any other advantage?—Not that I know of.

I take it that you confined the operations of this trawler for the trawling work alone?—Yes; it was intended for that. Your touring car is built only for touring purposes.

Do you know anything about the particular trawler sent here?—No.

You know that during the war a number of trawlers were constructed for war purposes, to be converted for trawling work at a later date when they are not required for the war?—They were intended to be mine sweepers, and mine sweeping is something like operating a trawler.

You know a similar trawler was purchased by the Bombay Company?—Yes.

Do you know that that trawler was fitted with a lot of appliances for experimental research work?—No; she had only an ice refrigerating machine. Dr. Haffard told me that the accommodation was limited and that it could not be used for carrying goods. It could accommodate eleven English crew—four engine hands, six deck hands including the skipper and a boy for cooking. All this European crew were sent away except the skipper, and they were replaced by Indian crew. Instead of ten they had to put in twenty, because the Indian crew cannot work so well as the European crew; so these twenty crew had to occupy the room of the ten Europeans. Dr. Haffard was occupying a small cabin there.

My recollection was there were 34 people on the boat?—On particular occasions they might have taken that number.

You say that the trawler must not be used for research work?—It can be used. But trawling work is the primary thing and research is only subsidiary.

You think that the Government should use the trawlers for trawling. Do you expect the fishermen to gain anything by that?—No; this trawling is not at all suitable for the Indian seas.

If it is suitable at all, it may be suitable for the middlemen and not for the actual fishermen?—No middlemen, no consumer, no manufacturer will ever take to trawling fish in the Indian seas for the next one decade at any rate, because trawlers have been tried in other provinces and they have suffered heavy losses.

Do you still consider after that experience that the trawler should do fishing work?—The object of the department seems to be to show to the people the advantages of deep sea fishing finding out where these fish are, so that the fishermen may go and catch. What I say is this trawler will never be a commercial success in India.

You admit, so far as the fishermen are concerned, they are not likely to use the trawlers themselves. So, in these circumstances, don't you think it will be doing better service if it is used for research purposes such as mapping out the bottom, etc.—Research work of that nature should be conducted by the "Lady Nicholson" which was specially designed for it.

Don't they do it in England?—They do it in the North Sea; there is an international agreement between the nations on the borders of the North Sea to carry on some sort of scientific work. I know what the London Board of Fisheries do; they engage a yacht and send out a man for a few weeks. I asked the officer what he was going to do. He said 'We are obliged to show some work.'

Don't you think that if research work is carried on in this trawler they would be able to find out where the beds are rocky, and such things?—Before I answer that, I want a definition of what research work is.

You have been a Fisheries officer and you must have some idea of the work?—I know something of it. Research work may be partly scientific, research work may have direct bearing on the industry. For instance, as a result of the research experts might be able to locate the breeding grounds of the mackerels and sardines and tell the fishermen where the fishes are.

This can be done on a trawler?—Yes; it can be done on a trawler or on a country boat as Mr. Hornell did in Ceylon.

You think country boats can go into deeper waters?—Yes; there are country boats sailing from here to Penang and Singapore. They are much larger.

What will be the cost of such boats?—Each may cost Rs. 20,000 to Rs. 30,000. You may get even a schooner for the matter of that.

Which is fitter for research work?—A sailing vessel is good enough, with the necessary accommodation for staff and laboratory.

Will you please tell us what other kinds of research work you expect to do in it?—When you speak of this marine research work, there is a lot. In order to find the breeding ground you must find out the nature of the bottom. This kind of work can be carried on by sailing crafts also, if properly equipped.

Then as regards the finding of the water currents, that is also part of the research work?—It has a bearing on the fishing industry, I believe.

You think it can be carried on on a sailing vessel of Rs. 20,000 value?—Yes.

Also the finding of the salinity of the waters?—All these can be done on a boat.

How about plankton experiments?—Ditto; it is part of the fishery expert's work. At present plankton is collected for the Calicut Fisheries Laboratory by a lascar who goes out in a canoe.

As regards the migration of the fish, it is said that they do not appear in some years. What can be the cause?—There are several causes. The movements of fish just like those of other creatures, depend on food supply, sexual instinct, comfortable surroundings and so on. They also move about very quickly.

Do you think it is part of the research officer's duty to find out where they go and why they go?—Yes; there are so many other things to be included in it.

You think even this latter kind of work ought to be carried on by a schooner?—A sailing vessel with a laboratory fitted on. In fact that was Mr. Hornell's idea when he constructed the "Lady Nicholson" as a sailing vessel.

It is not a sailing boat?—It was originally intended to be a sailing boat. He wanted to put in a small engine for taking it here and there; that engine was too small and the sailing arrangements were all wrong. The result was the boat went three or four knots an hour. Afterwards they put a more powerful engine, and it is now good.

It is after these experiments you consider that this research work ought to be done on a sailing boat because it is less costly?—Yes; less costly.

Did you see this new trawler?—I didn't. I have seen similar trawlers. Most of the trawlers are built of the same type, whether large or small.

You are speaking in regard to this vessel from the experience gained from those other vessels?—Yes.

According to your information and your knowledge, I suppose in European countries this research work also is being done?—Just now I told you what research work was done by the Board of Fisheries in England and Wales. They have got an aquarium. They bring the young fish and let them loose in order to find out its growth, etc.

They do it mostly on the shore?—They have got a laboratory. There they stick to the fish a metal label, number it and let it go when it is one or two inches long. When these are caught by fishermen in places far away from the place where they are let loose, the fishermen see the label on them and send them to the fishery officer concerned. They have a table showing the particular fish labelled.

That is how they study the life-history?—Yes.

Have you come across a trawler on which research work is done in European waters?—I have not seen. So far as Great Britain is concerned, they have got no trawler. They have got large ships posted on the coast to prevent people coming within the three miles limit.

What may be the reason, is it because the information is already available to them, or is it because they avail themselves of information supplied by other nations?—They avail themselves of the information supplied by fishermen. The fishery experts go among the fishermen, they talk to them and find out these things with their analytical intelligence. They tabulate the information in scientific form.

He must go with them to the sea?—He goes with them, he mixes with them and he talks to them.

He goes in the ordinary fishing boat?—He talks to them even in the taverns; not only in the fishing boats.

They base their research on such information?—They go to the sea to verify and test that information.

If the information tallies, they come to the conclusion that there is some truth in it?—Yes. Of course you must make allowance to the fact that these fishermen are more intelligent than our people.

In answer to Question No. 26 you have told us that the trawler is a vessel constructed in a particular manner, etc. I suppose you were thinking of towing the schooners with salt?—Yes.

You think it ought not to be done?—Yes.

Your reasons are that it will tell upon her utility?—Yes.

Why?—You have heard already that the boiler tube has burst. The man must have tried to overload the vessel. A layman can come to that conclusion only. Take the case of a touring car. Will you allow country carts to be drawn by it? If you will not, this trawler should not be allowed to tow schooners. That is to say, the engine, the boiler and the mechanism will be spoiled by drawing these weights.

I suppose they know how much weight it can draw without injury to its machinery?—A trawler cannot generally draw more than twenty tons weight and that in deep sea. The schooner has more than half of her body above water and there is the atmospheric pressure above it when you are drawing it in the sea. These things were demonstrated long ago. During the war they were bringing all sorts of vessels to Mesopotamia and so many were lost by being broken when they were being towed. It is a well-known fact that you cannot use a vessel to any other purpose than to the purpose for which it is built. You cannot use it like that habitually.

Do you know how many times this trawler was being used for the transport of salt?—Two or three times.

You think even that does not come under exceptional cases?—I am making a general statement. From the reports I see that the trawler has been used for cheapening the price of salt on the West Coast. I say the trawler is not fit for that kind of work.

You don't say that even for three times in the year it should not be used?—I make a general statement. They may use it three times or five times according to their will and pleasure.

On the question of its capacity for doing this work, do you tell us that even its use for three times in the year would cause damage to its machinery?—I am no authority.

You cannot tell us?—No. I make a general statement. You gentlemen ought to have seen in Europe the mighty P. & O. boats in the harbour being towed by small tugs. Those boats are powered to bring these steamers into position. They are specially constructed for the purpose. In the same way, a pleasure steamer constructed in a particular way to go fast should not be used for towing. These fish trawlers are intended to fish in water and there is very little pressure in water. You are expecting her to tug vessels carrying 300 or 400 tons of cargo.

Have you any idea of the tonnage of this trawler?—No. I was told it has about 150 tons capacity.

What is the horse-power of the engine?—I am not in a position to tell you.

If the engine-power is sufficient to drag such weights as we are now considering, will you still object to its being used?—It will have a short-lived life.

Even if it is within its capacity?—Its capacity is limited.

And if it is within those limits?—Well, the purpose of towing loaded schooners is beyond her limits. Towing is not her business.

Whatever be its horse-power, whatever its capacity, no trawler should be used for towing purposes?—Well, if a trawler has been specially constructed for towing by all means, they may use it. This second-hand trawler could not have any of this special structure.

You are sure that no trawler was used for towing purposes during the war?—I know that trawlers were used for mine-sweeping purposes.

When were you in England?—Just before the war.

By that time these trawlers had been built?—I have seen them in Bombay—the mine-sweeping trawlers.

Are you sure that this vessel was a mine-sweeping one?—I do not know.

What is the ordinary distance up to which fishermen go?—In Malabar and South Kanara fishermen cannot go beyond eight or ten miles because they have to come back for the night. There is no accommodation for cooking in their boats. The average would not be more than five miles.

Is that the only reason for their not going greater distances in the sea? Are they afraid of going in their tiny boats?—They cannot go to any great distance in their small boats.

Ratnagiri men go to 100 miles. What will be the depth?—50, 60 or 70 fathoms.

What will be the depth round about Calicut?—About six or seven fathoms.

Supposing they go 100 miles from the shore?—The depth will be greater.

If you strike 70 fathoms deep sea at 100 miles from Calicut, it will be like Bombay?—I think Bombay is shallow. If you go to Travancore coast the depth is greater.

As you go to the south, the sea becomes deeper at places nearer the shore?—Yes.

On the East Coast the catamaran men go as far as 25 miles?—Yes.

What place were you thinking of?—I know at Madras.

In Godavari people have accommodation for cooking and yet they tell us that they never go beyond five miles?—In the morning if they have got good breeze they go about 25 miles.

Have you any experience of the Northern Circars coast?—No. They have a peculiarly shaped boat and water would not fall into it. They stay out for one or two days.

Do you think that with the crafts our people have, it is possible to go beyond ten miles?—With the present craft they cannot go more than five or six miles.

The boatmen here have no provision for cooking on the boat?—No. Not here. The catamaran people have not got provision.

FISH-CURING YARDS.

You are not in favour of the transfer of the Fisheries Department?—You mean the management of the yard being entrusted to the Fisheries Department. You must read the previous paragraph about it.

Do you appreciate that?—I appreciate it in fact. I was the man who recommended it up to a certain stage. Now I see from the results it is all wrong.

So, the original idea of yours has failed?—My idea has not failed. The results have failed.

The suggestions when carried out did not produce the result you expected?—Yes.

Would you like to have a change?—Yes. For certain reasons.

You have changed your mind to this extent?—I see from the working of the yard that the fishermen are put to great difficulties and that they do not receive any proportionate benefit. The price of salt has been doubled. From these two districts the department has been taking more than two lakhs. You take 1-18 lakhs per annum and then say that you are going to improve their economic condition.

Therefore, for all these reasons you think that hereafter the fish-curing yards should be transferred to the management of the Salt Department?—I do not care who manages it. I do not care who carries on the work provided the fishermen are not taxed.

We are not now on the question of taxation. If the salt is supplied at a smaller cost, you have no objection to the Fisheries Department managing the yards?—Yes, provided there is no duplication of officers for control and other things.

What do you mean by that?—In Bombay the Central Government is managing it. The Salt Department manages it. The Salt Department has got two other departments, Customs and Minor Ports. Now, same officer who comes to Ratnagiri inspects the custom-house and goes also to the fish-curing yard in the neighbourhood. There is no duplication here. You have the salt, the customs and the fisheries people all in one department. Here the case is different and so there is extra expenditure incurred. We want to reduce it as much as possible.

Therefore you say it should go to the Salt Department?—Take the practice in Bombay. That is the easiest and cheapest way of doing things. As regards improved methods, I do not lose sight of it. So far as the fishermen are concerned the men in charge of the fish-curing yards have never cared to take interest in the curing. Even the few men whom you have trained never cared to do it, because there is no inducement for improved methods. If you go to the interior you can see what kind of fish they are eating. The Malabar people send such fish as finds ready sale. If you send good fish there is hardly any sale for it. As soon as they know there is some money to be made from it, they will rush.

I am asking whether you are in favour of better fish-curing yards? You will, as an officer, insist upon better methods of curing?—I tried and this is the result. Therefore, the man who makes it a business proposition will fail.

Do you want the Fisheries Department to do anything with the fish-curing yards?—We have got one man in the Fisheries Department who I know is capable of doing something in the improved line. Send that man from yard to yard and let him hold demonstrations and ask people to copy it.

What is the good of copying if they are only to incur more expense? If the man goes and teaches and if these people learn and introduce new methods which will cost a little more by way of money and labour, if they do not get a better price, what is the good of that?—On a large scale it is no good. Here and there you may find a man who may take it.

Only for luxurious purposes it is useful?—Not only luxurious people, Europeans are now taking it. It is only for a limited circle; it will be useful.

If the people are sufficiently educated as regards the advantages of having better cured fish, they will go in for that and pay higher prices?—The consumers' taste is so bad that you cannot make it a business proposition. I have seen it in Vellore. In Madras, Chittoor and in the South there is demand for what is known as pit-cured fish.

Do you think pit-cured fish has more customers?—It is the poor man's fish.

Is it done in Malabar now?—No. It will be done stealthily by people in some other manner. Instead of pit-curing they cut open the fish and put salt and keep it for three days and with the maggots hanging about the fish, they sell it. It is not kept in the sun.

Pit-curing is done on the East Coast?—Yes. I have noticed in Bellary another kind of salt-fish. It is not dry. It is known as Ratnagiri cure. Salted fish is kept for many days without drying and transmitted to various centres.

Is it not the duty of the Fisheries Department to see that that kind of fish is not put on the market?—It is the duty of the Health Department. What voice have the Fisheries Department in it? We tried to introduce these by opening depots in Madras and Bangalore because we thought that there is a better class of people. We did not succeed. The experiment was not given sufficient time. It ought to have been persisted in.

You think therefore that it should have been continued for some time more?—Yes. I would go a little further and say that we should not only popularize the fish but should teach people in schools the best method of cooking fish. This is done in Ireland.

Do you advocate it in our schools?—No. I do not.

Even if it is taught, our people would like to have chillies, etc., put in?—Yes, they would not object to chillies.

What is wrong with the pit-cured fish?—It is putrid. You see maggots wriggling about the fish.

Do you think it would be cheaper to get salt from Bombay?—Yes.

The same kind of salt?—Better kind of salt, salt of the kind I am showing to the Committee.

At what rate can it be supplied here?—It can be sold at 6 annas per maund.

If the Bombay salt is bad you can get it for 6 annas from some other place?—Yes.

When 6 or 7 annas is the freight from there, what will it cost when it is given to the fishermen?—You can give it for 10 annas. And there is this difference. The Tuticorin salt contains 17 per cent dirt, mud, etc.

It has been so all these days?—When we started the experimental work, we found that in the fish cured with that salt there was a layer of dirt and we found that it was due to the impurity of the salt. The salt was then washed before use.

Was any complaint made to the Salt Department when you were in charge?—We complained and the result was that we got a better salt, called the Italian salt. Tuticorin salt was supplied to the fish-curing yards.

Is it that salt that is now supplied?—They have stopped the manufacture of that salt and so the whole thing continues in the old manner.

Did you examine the salinity of this salt?—Bad salt has got the same salinity as good salt.

Has the table salt the same salinity as this?—Indian salt has got the same salinity. Table salt has no impurity. In the Indian salt on account of impurity the salinity will be less.

Certain salts whether on account of impurities or from their very nature do not have the same salinity?—I do not know that.

You say that salt from Bombay can be supplied at cheaper rates. Did you take into account the necessity for having a special officer at Bombay for making the purchase? Did you also take into account the cost involved in that item?—Nobody need be stationed there. Now the Travancore Government have advertised for salt supply from Bombay. The same kind of arrangement can be made by us.

Tenders will have to be invited and contract given for delivery at our place?—Yes.

Don't you think the contractor will add his own profits to the price?—If he is a business-man he must add.

Even after paying him the cost will be cheaper?—Yes.

Then the question of conveyance by the schooner does not arise?—Yes; because it is the contractor that has to bring it and supply us.

When the salt was being carried here, did you encounter any difficulties in supplying to the yards in proper time in 1914 to 1920?—I never heard of it. They used to send salt from different parts and so the supply was more or less steady everywhere.

I suppose transport charge by railway is higher than that by ships?—Yes.

The railway freight will be sometimes two or three times that payable for transport by sea?—Sea transport is cheap. I cannot give any definite figure.

In the case of supply from Bombay you do not anticipate any difficulty in the supply of salt in proper time to the fish-curing yards?—So far as I know, the Bombay yards themselves have no difficulty. The contractors there are supplying salt to the agriculturists also.

Therefore you do not anticipate any difficulty about proper and timely supply?—If proper arrangements are made there can be no extraordinary difficulty.

The proper arrangement you suggest is that of engaging a contractor?—Yes.

Apart from that, you do not anticipate that the fish-curing yards will be put to any inconvenience on account of the ships not arriving in time?—Not as many difficulties as you have to encounter in the case of the East Coast. It will be less inconvenient than on the East Coast.

Don't you think that if salt is carried by a trawler, a motor launch or a steam boat, it will be more convenient because you can surely have it when you want?—It will be more costly. The whole of Travancore used to depend on Bombay salt.

Where are they getting it now?—Since the opening of the Quilon line, the southern parts get it by rail and the rest from Bombay.

The sea coast does not get it from Tuticorin?—No. I am speaking of the salt for domestic consumption. There are very few fish-curing yards there. As a matter of fact, there are salt pans in Travancore near Cape Comorin.

When the salt supply is to be given in contract, is it not necessary to insure the salt?—It is all the contractor's risk. Nobody cares to insure salt for six or seven months. Most insurance companies do not take the risk. Indian merchants take it in rainy weather.

Don't you think that the contractor will take into account all these things when he bids?—He ought to when he is entering into a business. As a matter of fact, big salt manufacturers of Bombay have got their depots and agents on the coast here. So it is easy for them to arrange the supply.

About the transfer of the fish-curing yard and the salt supply to the Government of Madras you are not in favour?—It is the business of the Government of India.

You know that the India Government have refused to have anything to do with it?—So far as I know, the Government of India have accepted the proposition moved by the Hon'ble Mr. Ramadas in the Council of State.

Are you sure the Government have accepted it?—They did not raise any objection.

Do you think that the Government of India actually passed orders calling upon the Government of Madras to take up the work?—I read in paper that the motion was adopted.

But motions adopted are not necessarily carried into effect?—You also know that you have got the means of making the Government put this motion into practice. If the Madras Government would press it, the Government of India are bound to agree. They are doing it in one Presidency. In Bhutkal three miles off the frontier of Madras they are doing it.

Therefore you think the Government of Madras ought to have pressed for the supply of salt?—Not only for supply of salt, but also for charges for maintaining the staff; because they are the people benefited by the salt tax.

The Fisheries Department is a local department and the fishing industry is a transferred subject. What reasons have we to urge upon the Government of India to take it up except for the reason that in the case of salt the source of supply is theirs?—Yes. The Government of India must agree if it is urged.

We want to know the reasons?—It is a mere accident that we have a Fisheries Department here. Salt is a department of the Government of India. Fish-curing is an industry in Bombay and it is looked after better there than in Madras. So the Madras Government have every reason to say that the Central Government should take up the fish-curing yards in the Madras Presidency also. We have curing experts. We will give their assistance and try to improve the quality that is being turned out of the yards. But as regards upkeep and management, it is the business of the Central Government.

Do you know that the Madras Government wanted to have this in their hands?—I never knew about it.

Supposing the Madras Government have actually wanted the India Government to take it out of their hands and failed?—I will address them again till we succeed.

CANNERY AT CHALIYAM.

You were speaking about a cannery at Mahe?—Yes.

How long it worked?—It worked for more than half a century. In the beginning by whom was it worked?—By a Frenchman. He carried on for 40 years and then died. His wife conducted the business for some time afterwards and then Messrs. Wilson & Co. took it up.

How long did they work?—They worked for three years and gave it up.

Can you give the reasons for their giving it up?—First of all their manager was not an expert. He knew something of the business, that is all. They put a lot of machinery which was not of practical use and then I do not know what other defects there were in the management. The quality must have deteriorated. Then there was also the question of the imported stuff which was selling at cheap rates. So they could not carry it on as a business proposition.

Mr. Gopala Menon was telling us that he gave it up because the manager became old and he could not get any other and that the manager was all right so long as he was doing work?—I am sure he would not have understood it. Messrs. Wilson & Co. had so much resources that they could have brought down a man from England. They lost more money than they made.

The cannery at Chaliyam was a success so long as it was under the management of Sir Frederick Nicholson?—Yes.

What was the last year that he was in charge of it?—1917 or 1918.

What do you mean by saying that it was a success?—It was profitably worked. We have issued a balance sheet showing Rs. 600 or 700 profit for the latter part of the year.

I suppose the profits were mostly during the war years?—That was war time too.

What time was he in charge?—From the beginning.

Do you think there was profit in the first year also?—It is an industry kept secret by every nation. How could there be profits before finding out the secrets of the industry?

Can you mention a year in which there was profit before the war?—There was profit though it was war time and we had to pay double price for all our raw materials.

During the war time importation of canned fish was stopped?—Very little.

So canned fish can be got here only?—We were supplying only a small area.

Does it mean that there were other areas also?—There were some imports also in those areas.

From what country?—From European countries and Japan.

European countries imported canned fish during war time?—That is my information. I think the importation was not stopped altogether.

You say that there was profit in 1919 also?—Throughout there was profit.

Some witnesses were telling us that the profits ceased when the armistice was declared?—No. After the armistice there was profit.

How many years after the armistice?—I must see the records.

Could it be more than a few months after the armistice?—It may be a couple of years.

Do you think that the subsequent failure of sale of this canned fish had anything to do with the imports having increased?—Imports increased of course and the prices went cheap.

You could not sell it at cheap price?—No.

What is the reason why you could not sell it at cheap prices?—Because they had a highly paid staff. A special man getting Rs. 400 or 500 was put in charge of it as they thought that it was a gold mine. It was reported that during Sir Nicholson's time it was not properly managed.

And so a man on Rs. 475 was appointed?—Rs. 475 plus a deputation allowance, etc.

He was there for two years I believe?—He was not there for more than two years.

He was entertained in what year?—After Mr. Hornell became Director, Sir Nicholson served under him for a year or so as Honorary Superintendent of West Coast Fisheries.

Do you know the exact date when Mr. Hornell was appointed?—You can ascertain it from the records.

Can you tell us when this happened?—Soon after Sir Nicholson handed over charge of the cannery to Mr. Hornell, he reported that he wanted a whole-time man and he recommended a European Captain from Mesopotamia with a salary of Rs. 600 or 700. The Government did not accept it.

Can you give us an idea of the year?—The reports will show.

You cannot tell us?—I cannot. It was in 1921 or 1922. He did work under Hornell for a year or so. He continued after the appointment of Mr. Hornell as a humble subordinate for some time and then retired. After he left, Mr. Hornell himself took charge for a few days and then he appointed an Inspector. Under these circumstances (mentioned in the written evidence), the quality of the output could not have been all that was desired.

You say that because the cannery was placed under officers who were not trained, the output was not all that was required?—It goes without saying. How can a raw hand know anything about it? It was a failure because the quality deteriorated. The public are the better judge. Sir Nicholson himself showed me a tin sent to him by the experts of the Fisheries Department and shook the tin.

What do you mean by shaking the tin?—It means it is poorly packed, etc.

The Superintendent himself does not attend to packing?—He is the man on whom everything depends. If he simply sits in his office room everything will go wrong.

The old staff was not changed?—Some of them were changed. The Superintendent should be on his legs at the time of packing and when other operations are going on.

You place the Salt Department officer on the footing of a coolie?—He is a supervisor. He has to be on his legs six or seven hours a day. Whatever he did the results show. I say that from the results, not from personal experience.

You do not personally know whether he was there or not?—He was there.

I thought you were saying that he was not on his legs at all?—He might have been in his office.

Not sleeping away his time?—I do not know. From what I heard he is a very able officer. But unfortunately he did not know the technique of canning and so it was a failure.

Not because there was more imported stuff in the country by the time he was appointed?—Well, there was. That is one of the reasons. The main reason being that the cannery staff deteriorated as will be seen from the fact that they were not able to sell their stuff readily.

You attribute that not for any other reason?—This is the most important reason that I can assign.

The people found after using that it was not good?—Mr. Hornell appointed Messrs. MacDougal & Co. as their agents at Madras. The rest of the story need not be told.

Will you please explain what you mean by that?—They sent wagon loads and they destroyed every week a number of tins.

They destroyed? Can you give us an idea?—I have no idea. One of their travelling agents told me that he took the tins to several people, but that nobody would look at them.

May we know his name?—I cannot tell you. He is a travelling agent employed by Messrs. MacDougal & Co. I met him in the train. He told me all this story.

You saw tins being destroyed?—It is a fact. You can see from the records.

Can you give us an idea of the number that was destroyed?—Mr. Hornell himself told me that they were sending bad stuff and that every week returns were being sent showing the tins destroyed.

One or two merchants gave evidence to the effect that our tins cost more because of the increased cost of the tins?—Foreign stuff could be sold in this market at cheaper rates. This cannery had gained a reputation for its goods. We used to receive after the war orders from Nainital, Kashmir and other distant places. We were not able to supply them for want of stock.

Was that during the war?—Even before the war.

Can you tell in what year before the war it was?—In 1912 and 1914 we received orders from Nainital. The war broke out and there was a lot of stock in the country; raw materials, oil tins, etc., and so we were carrying on the work. It is after 1915 or 1916 that the crisis came.

It was also said that the foreign tins are of a smaller weight than these tins?—Weight has nothing to do here. It was Sir Frederick Nicholson's object to cater to the masses and not to the classes.

Some merchant who had been to Bombay gave evidence before us and he said that because these tins were of larger size you could not find purchasers?—The manufacture of these small tins is not a thing that the Fisheries Department should engage in. You take the masses; you must give the poor man as much food as possible for the value. All along, the policy has been the masses and not the classes.

How many people do you think among the masses will purchase these tins?—I don't care to go into statistics; I know a lot of these labourers, lower middle classes and railway employees used to purchase these tins.

By masses you mean the people in the country. You won't say they will go in for these tins?—So far as Hindus are concerned they have not taken to these canned tins.

It is not likely they ever will?—I can't say that; the taste is improving, it is being modified every day.

The taste for canned fish when fresh fish is available?—Yes.

Here is a letter from a company which says that the smallest tin of the Government is seven ounce and people go in only for half and one-fourth size tins and that the greatest demand is for the latter. All over India what is known as quarter size tins are in demand. You don't think there is much in that?—The name of the company is Balthazaar, Ltd., Rangoon. Rangoon is a different thing. If you want three ounces or four ounces tins, it can be made in the cannery without any trouble.

Do you think that the thickness of the tin is the same as that of the imported ones?—Thickness varies according to the size of tins. There is machinery for making any kind of tins.

We have been told that canned fish exported from Chaliyam was costing more because of the tin that is supplied? At any rate they have not used a thinner quality?—The tin sheet is sold by weight. The particular machine used for cutting was adapted to give certain thickness and malleability. The ordinary tin cannot be used. During Sir Frederick's time, we got these tins through certain firm; we did not get it through the India Office or the Stores.

Was private enterprise forthcoming to take up this business?—Not after this catastrophe. Not for ten years to come. I have just come from Bombay; I consulted some people there and they all said, "No, no, canning is not a thing which will pay."

Because you cannot compete with European firms?—There are particular lines in which the cannery had established a name and fame. Even that had gone. On those lines they could have competed. We have got so many recipes according to which we could make preparations which the foreigners do not know. There used to be demand for that. But now nobody wants them.

Because people came to know the real facts through the discussions in the Legislative Council? I want to know whether the Orissa factory has such a name?—I do not know whether there is a factory at Orissa. People in Mahe who are interested in the business say "You have spoiled the business, you have kept tins for seven years."

In spite of this Mr. Hornell wrote to the Government for placing the cannery in charge of a man who knew nothing of the art of canning?—Yes. Mr. Hornell himself says he knows nothing of canning; he has not been inside a cannery in Europe.

You served under Mr. Hornell?—I served for three or four years.

How long did he hold the post of Director?—For five or six years.

You are sure that he visited this cannery only half a dozen times?—Yes; I know.

How long was Sir Frederick used to stop there at a time?—Ten days, fifteen days, one month. Before leaving cannery, I should like to say something as to how it worked. A mechanic is a very important factor in the canning factory. We have no mechanic at all now. Sir Frederick wanted to train some and he even took them to Madras and other places.

What became of the mechanic who was there already?—That man was sent away, for they said he was suffering from tuberculosis. But the doctor said he was not; this was proved by the fact that he was employed by the Fruit Canning Institute at Coonoor after these people sent him away. About these dies there is not even one in the Public Works Department Workshop to adjust these dies. This can be got only by experience. I do not think there is any in the Industries, Engineering or other department who can do this work.

What about this experimental station at Tanur? What was the nature of the work done during the first year?—The object was to try the various methods of curing, smoking and salting, and also to make industrial use of the various products, such as fish oil and other things. We tried it; nobody came and saw what we were doing. We persuaded some people to come and see, but they never did come. I mean private individuals, not Government officials; they never cared to take up the improved methods. There was no demand for fish cured under improved conditions.

When was the factory started at Tanur?—In 1911.

It is only there that the oil is extracted?—It was extracted even when we were in Ennore; and in Cannanore one man actually started it at my advice in 1909.

I suppose no oil extraction was undertaken at Chaliyam?—Oh, yes; all the waste of the fish used for canning was to be utilized for making extracts of oil.

When was this work commenced at Tanur?—In 1911. In three or four years' time we have demonstrated all about fish oil and guano; there was nothing more to be done.

By what time the people became acquainted with the methods?—Even in 1909, I persuaded a man in Cannanore to take it up, and we started work in 1911 at Tanur.

Were any further improvements attempted?—There was an assistant who knew something of chemistry; he was trying to extract oil of a superior kind, not on a large scale because there was no market.

Are you satisfied with the work at Tanur?—I am not, so far as the oil and guano work is concerned.

What other things were done?—There were improved methods of curing fish, fish meal, which was another process closely connected with oil extraction. What is known as fish guano is crude stuff. What is known as fish meal is used as cattle and poultry food.

Has it been taken up by the people?—There are people who know how to prepare it. But there is no market for it. If there is a market as in Ceylon or Japan, this industry of fish meal will also be taken up.

You are in favour of a laboratory being established?—Yes.

What do you think should be the qualification of the chemist to be appointed?—Any college man; I am proud we have got excellent men, provided they undergo some foreign training. The thing was brought to

Sir Alexander Cardew's notice years ago. He did nothing; in the meantime the Reforms Act came and the Ministers did nothing. Perhaps it was not brought to their notice. It is a mistake for each tiny department to have a chemist of its own. If you appoint a chemist his place must be in a central laboratory.

What kind of work do you expect to be done there?—The chemist must be in a central laboratory, where he can be useful to all departments, and deal with the several industrial problems, paper-making, soap-making, raw products of forestry and other things.

There was an Industrial Chemist at Bangalore?—The particular individual now in charge of the Tanur station was sent there for a year.

The Dye Expert?—He was only a Dye Chemist. He condemned all the Indian dyes. He was entertained on a permanent basis; the department had to provide him with some work. That is not the kind of work I am contemplating. He must be a first-class chemist; he must be trained in this particular industrial research work.

Both forest and other things?—Forestry, leather, soap, oil, whatever it is.

Do you think one chemist will do?—Let him have a number of assistants. In the Imperial Institute there is one chief chemist, with a number of assistants.

What would be his salary?—You may pay him even a fancy salary; I don't grudge it. Tata & Sons pay big salaries to such people. They come and finish the work and go away.

Do you think it will be possible to find a chemist who will be conversant with all subjects?—May not be; he will have assistants.

The assistants will be only there to act under his direction?—He will have to teach them; any young man who has passed Honours through our University is quite capable. I have great confidence in the present generation of science graduates.

If you have got a chemist of a particular kind, will he be able to direct others in other directions?—Yes. If he is in touch with other kinds of work, he will be able to take it up. We must have a first-class chemist and there must be several assistants under him.

As regards inland fisheries, were you in charge of it?—After Mr. Wilson, I was in charge for one year.

You think that the work carried on there was on proper lines?—It is proper, but rather expensive; to popularize it among the public you must adopt cheaper methods.

Are you not in favour of doing more work in inland fisheries?—It is one of the items, the means of adding to our food. But unfortunately we cannot go on opening farms and spending money on them; ultimately it must be taken up by the public. But the public will not take it up so long as the methods are expensive. It is not so difficult in European countries because they have natural sources and water is always flowing from a higher level.

Therefore you have neither the natural facilities nor the money to be spent on costly experiments?—There are certain items on which money should be spent, for instance, these larvicidal fish can be introduced in the waters near places where there is malaria. You should not mind the cost there. A proper survey should be made to find out the perennial sources of water, the facilities of communication, whether the fish-growing there can be sold at a moderate price in the towns or villages and so on.

As regards the kinds of fish, you say every fish has an economical value?—Not only fish; everything that comes out of the sea has got a value; there is nothing to be thrown out, not even the shells and sand.

I suppose, so far as any literature goes, no light is thrown on this question of spat falls and the modes of breeding?—So far as Tuticorin is concerned, I don't think there is any literature except what Mr. Hornell had tried to find out.

Were you also connected with that?—With the pearl and chank fisheries? There was then no pearl fishery at all. I was in charge of the chank fisheries for one season, five or six months in 1909-1910. That was the first time

the chank and pearl fisheries were taken charge of by the Fisheries Department, when Mr. Hornell went away to England; Sir Frederick also went away and I was in charge.

After that period you were not in charge of the chank fisheries?—No.

You are not in a position to tell us what changes have taken place in their production or in their treatment?—For production, Mr. Hornell organized it on a commercial basis.

You have no personal experience of the matter?—No; I was on the West Coast.

As regards the aquarium, you consider that it is too large for its purposes?—Not too large; I said it is capable of further development, so far as science is concerned. For scientific work it is not well equipped. There is no research work carried on.

Do you think that that place can be utilized for research work?—Very largely; not from an industrial point of view, but from the scientific point of view. Marine zoology can be considerably developed. The aquariums at Cullercote and Dundee are smaller than that of Madras.

Do any experts do research work there?—There was one student from America and another from somewhere else. It is in Aberdeen that the Fishery officer is doing any work. It was in 1912 or 1913 that I went there. The one I have seen there is bigger than what we have got here at Madras. Perhaps it has developed in recent years.

Now, do you think that it would be advantageous to the fisherfolk if facilities are afforded for the conveyance of this fish with ice?—Ice can be had only in small quantities; it cannot be had all along the coast. Then, we must have some footpaths and roads. During harvest time, the fisherman has to go by the embankments and fields and he cannot carry the fish to any distance. So it is necessary that the local bodies must take the initiative in opening up footpaths.

And also roads?—Yes; wheeled traffic would be better.

If there is sufficient supply of ice at a proper price, it will benefit these fisherfolk?—I won't advise taking to ice at all. It is a crude process in these days. Better process is refrigeration, but refrigeration means money.

You don't think that such a thing can be attempted?—It can be attempted if there are people coming forward with capital.

Has any attempt been made by the department?—We tried the experiment in cannery; we had a small refrigerating plant; we sent fish prepared in Chaliyam all the way to Waltair, i.e., 72 hours' journey, another parcel to Bellary and another to Palamcottah; they all reported the fish was excellent.

Then fish can be carried to longer distances by means of refrigerator?—Yes. These refrigerators came into popular use during war time. During war time necessity made them adopt this method. Now it is largely used in various parts of Europe. Nobody has as yet tried it in India.

They say that 300 or more tons of fish are imported into London every day from Denmark? Is it a fact?—Yes.

How is it carried?—First of all they have got the natural ice. There are special factories manufacturing ice for fishing boats. The factories are situated on the quay itself. Ice does not melt there at all.

Assuming that ice can be had cheap, though not as cheap as in England, at 1 pie per pound would you advocate it?—It is done in Bombay; here also it is being done. You cannot depend on a steady quality; either the train is a little late or the fish is not packed properly; and then the fish becomes tainted before it reaches its destination.

Diwan Bahadur Kumaraswami Reddiyar: You said that research work in England is based upon data furnished by the fishermen themselves?—Mostly. The experts go among fishermen and put questions to them.

Do you mean to say that these experts do not go out into the sea to make observations?—Sometimes; they just go out for a few weeks. I am speaking of the experience of London Fishery Board. When I was there they were deputing one or two assistants on an expedition. They asked me also to

join. The same thing is done by all the nations bordering on the North Sea. There is an international agreement. They do not have any special vessels for that.

They do not employ any trawlers?—No; any vessel may be hired for the purpose. The Board of Fisheries for England and Wales do not maintain any boat of their own. They have got a boat to prevent poaching. They do not allow trawlers to come within three-mile limit. They think if the trawlers fish very near the coast, all the smaller fish will be destroyed.

Can you act on the information given by the fishermen?—You have to verify them. So far as their knowledge is concerned, they will give you a correct account of what they know.

If the experts have to make observations of their own, it would be necessary for them to go out into the sea?—Yes; that was what I was saying; there must be a floating laboratory fitted into a sailing vessel.

Would it not take much more time than a trawler?—It does not matter. For four or five years they have been carrying on the work at Calicut; you depend always on the fisherman. Here is the fact. They send out a lascar in another man's boat and the expert acts on the information he brings. This kind of research is of no value. You must do it in a scientific way, whether in a trawler or a sailing vessel.

Your idea is that the scientific man should pursue the shoal of fish wherever it goes?—No; it is not necessary; he will have to do it in certain areas and at certain seasons. If your Government are prepared to send out proper men, it is all right. Now the distribution of sardine fish is very irregular. In certain parts of the coast you do not see it at all; they do not approach that coast; in other parts they are very regular; on the Baluchistan coast or on the Bombay coast they come, you do not see it. Coming south, you find it from Ratnagiri southwards.

How is the Madras Government going to have a scientific laboratory to do all this?—It is a question relating to the whole Empire; so it must be taken up by the Central Government.

For fishing in the deep sea, is trawler best fitted?—It is the most recognized vessel.

For research work deep sea fishing is essential?—Research means sometimes nothing, sometimes much.

The Fisheries Department has all these years never understood what is meant by research?—Each individual has understood it in his own way.

How did you understand it?—I won't look at research work unless it has a direct bearing on the industry. Taking pearl fisheries, it would be a very good thing if somebody finds out the causes of their appearance and disappearance.

For that, is not deep sea fishing necessary?—Let us finish neighbouring and in-shore fishing. Suppose 100 miles off the coast you have good fish, who is going to fish them?

That is one of the matters you have to investigate?—I grant there is plenty of fish 50 miles off this coast, but how are you going to fish it? Unless you are able to sell all the fish that you catch, all your machinery is useless. Therefore I said trawling is no business proposition in India. It is not business proposition to have expensive methods of catching fish and selling it in the market at a low price. There is a wholesale copying of European institutions in India. Poor India cannot afford it.

Were you ever officially connected with this cannery?—Yes. From the beginning as a maistri, as a coolie, something like the assistant of Sir Frederick Nicholson. My official connexion I do not care to mention. I am speaking about my work.

It might have been a labour of love?—No. Labour of duty.

Your designation?—I was Personal Assistant to the Director.

For how many years?—I was under him for four or five years and then I was Assistant Director for ten or eleven years.

From what year to what year?—From June 1908 to May 1924.

You were Personal Assistant?—Yes, for four years. After I returned from England I was called Assistant Director of Fisheries.

Then also you were connected with the canneries?—Yes, that was the time we worked most.

You think it impossible to restore public confidence?—Absolutely impossible.

Why are you sure of it?—Because I feel that the industry has been ruined.

Even if you bring Sir Frederick back?—I do not think even then you will succeed. He would not touch Chaliyam canned fish.

In one year after it was started it got a great reputation?—Yes. We had enormous demand. We were not able to cope with the demand. He said we need not meet the demand from Ganjam and other distant places.

The reputation acquired in one year cannot be acquired at all hereafter?—Cannot be. There are various reasons. Production is impossible.

The reputation is due to the personal interest of Sir Frederick Nicholson?—He did not know anything to begin with. We picked it up by a series of experiments.

He alone was responsible for it?—He was. I was working with him. There is no literature on canning. When the cannery was opened he thought it would be better to get the co-operation of the Frenchman at Mahe. The man at first agreed, but afterwards backed out. We had thousand and one obstacles to overcome. We introduced new recipes and they were appreciated.

Can it be done now with the materials we have at present?—It is possible to a small extent.

Can you explain it?—I am sorry I cannot.

How can you say that?—I know it. If you go to the cannery ask the manager to do it; or if he cannot I will give you any information.

Dr. Gravelly: You spoke of research being exceedingly bad and you spoke of fish going from here to Baluchistan and so on. Is it not possible that one may require in the study of any shore fish certain stages of investigations? They may not stop here but migrate farther from the shore. Must we not have fishing vessels to study those fish?—That is a matter of opinion.

You spoke of Dundee. Is that station attached to the Fisheries Department or Industries Department?—I do not know.

When were you in England?—Just before the war.

Were any fisheries vessels attached to places like Plymouth, etc.?—I do not know about Plymouth. Perhaps there were small vessels, but the Fisheries Board in England and Wales had no vessels of their own.

What about Liverpool?—At Liverpool there is a small fisheries school.

Do they use the guard ship for investigation purposes when necessary?—I do not know. It is possible.

I know that Dr. Kemp has been on cruise going out on them?—Research work is not done by a person going out for a particular work for a single hour. It is a systematic work carried on from year to year.

Then what is the investigator for?—The investigator is a survey steamer. The man in charge was doing research work scientifically.

What are the results of his investigation?—I do not know from an industrial point of view. He was an I.M.S. man. If you want to do any scientific work in that direction it is the duty of the Government of India to carry it on and not that of the Government of a Province with its slender means and ill-equipped laboratories.

Mr. R. S. Nayudu: All your complaint seems to be that because the laboratories here are ill-equipped and the Madras Government cannot afford to spend more money, the department should be transferred to the Government of India?—First of all I have no complaint.

Your answer was that the slender resources of the Madras Government and its ill-equipped laboratories and men are not sufficient to carry on the full activities of this department?—Not the full activities of the department, but the particular work.

Granting all these are given, then you would be for the department being left with the Madras Government?—By all means.

You have travelled in Germany, etc.?—Yes.

Each country has got a Fisheries Department?—Yes.

You know perfectly well that if the activities are concentrated in a smaller area the work would be much better done than if they are scattered over a larger area?—You have got certain instances. It is impossible for you to limit them to a limited area. Take the instance of the sardine fish. That is the answer to your question please. There are certain classes of fish the investigation of which cannot be limited to a particular area.

What is the drawback in having a smaller area?—The sardines may go away after remaining for a few months or a few years.

Supposing it goes beyond the jurisdiction of the Government of India?—Even then the Government of India can do it.

There is an international agreement between all nations bordering on the German Ocean. They have undertaken to do a certain amount of international work. It does not matter if a Danish man goes to the Irish coast and does research. All that is expected is that they must carry out research and at the end of the year publish the result and make comparison?—Now, taking the sardine fish, if you confine your researches to the district of Malabar only, your knowledge would be confined to Malabar. How are you benefited? If the Government of India takes it up they have a wider field.

Suppose the sardines go out of the jurisdiction of the Government of India, are we to say that the Government of India should hand over this kind of work to the International Fisheries Department?—If they are in charge of the research work they will go wherever it is worth going.

So, it does not prevent the Madras Government going a little out of their jurisdiction?—Yes.

To find out the plankton?—Yes.

So, that is no reason for transferring the Fisheries Department to the Government of India?—I do not mean the Fisheries Department. I meant that this particular item of work can be done better by the Government of India than by the Government of Madras.

Then, all research work can be transferred to the Government of India. Why the Fisheries Department alone? We have got the Forest Department, the Agricultural Department, etc. There may be an all-India research department with nothing in the provinces?—No. There must be certain works done by provincial people. The Pusa Institute is doing work of a particular nature whereas the Coimbatore Agricultural Institute is doing work of a particular kind confined to the southern districts.

You ought to enlarge the scope of the Coimbatore research?—Yes.

You ought also to enlarge the scope of the Fisheries Department?—Enlargement to a certain extent there ought to be.

Therefore you would not press for an all-India research department for all branches of science?—All branches of science! I am not in favour of that. I say that research in certain branches of the Fisheries Department can be done with greater facilities by the Government of India.

When you are in favour of the activities of the Coimbatore Agricultural Institute being extended, you are against it in the case of the Fisheries Department?—There is no comparison between the two.

Can you give any answer?—This is the answer. The Coimbatore College has got a certain programme of work and it should be developed. The Pusa Institute is for the whole of India.

We are not satisfied with Pusa alone. We have our ambition to have institutes of a smaller kind in other places?—It is a matter of duplicating. It is not good policy. Pusa serves the whole Empire.

Would you like to have a laboratory here that will satisfy the local conditions and requirements? Your research may be directed more to the local conditions?—Please explain what the local experiments are?—Do you know that there are different kinds of fish in the West Coast and on the East Coast?—Yes.

So, any research work which you carry on in the West Coast cannot be the same as in the East Coast?—What is the research? Please explain what do you mean by research?

Yes. You want to study the habits of certain fish, their breed, what food they take, in what temperature they thrive and so on. Don't you think all this comes under research?—Yes.

Don't you think that at certain seasons of the year, certain fishes stick to a certain coast and afterwards disappear?—Yes.

Is it not your duty to find out the special reasons that attract a particular fish to a particular shore in a particular season?—Yes.

This sort of work is called research?—Yes. I now know what you mean by research.

We want certain laboratories for that research?—Yes.

Now you are satisfied that you want laboratories on the West as well as on the East Coast?—You are speaking of scientific research. Of course it has got a distant relation to industries also.

I shall go to industries afterwards?—The very instance cited by you is a sort of work that ought to be taken up by the Government of India.

As regards the fishes on the West Coast . . . ?—West or east or south, or Indian Ocean or Bay of Bengal, it is a matter that ought to be taken by the Imperial Government.

Do you mean to say that fishes are just the same all over India? Are they not different in different places?—That is what I say. Yes. Different kinds.

Don't you think different fishes require different investigations?—Yes.

Don't you think that different people will have to make different researches?—If you have got thousand and one people you may do so.

I am only asking you about the researches we have to make. You don't care about the expenses?—You said that if a certain thing has to be done it ought to be done. Never mind the expenses?—About what?

About expenditure in research work itself?—I said that in connexion with a chemist. As regards scientific research my only reply is that the work you contemplate will be better done by the Government of India.

You seem to have a special attachment to the Imperial Government?—No. But you have not got facilities.

When I tell you that fishes are different in different provinces?—Have you got a man like Sir Alcock in your department?

The Government have not become bankrupt with all these activities. You need not care very much about the bankruptcy of the Government. They are quite all right. Your object is to get proper men. If proper men are available they can be got for the Madras Government also?—Where is it?

You seem to be very pessimistic?—It is a work that ought to be done by the India Government.

So far, your case rests on the ground that we have not got proper men?—I would object to the spending of money in the name of fisherfolk on departmental men. Fisheries Department is not a scientific body. It is an Industrial Department. Every pie should be directed towards the industrial business and not towards scientific work.

Then no expert is necessary for carrying on the department?—You are mixing up science and industries.

You put in the forefront the industrial aspect of it?—It is only a department on a limited scale. We must have a central department for scientific research on an all-India basis.

You said something about Ratnagiri boats?—Yes. The local fishermen said that they were not able to handle those boats.

Did you enquire the fishermen as to the catches they made in those boats?—I asked the fishermen. I do not indulge in statistics at all.

Did you give the fishermen training?—We asked them to come in the boat and gave them a chance for training. But the whole scheme was knocked on the head in less than a year.

Why, you had two years?—It requires ten years to train these men. You must educate the young fellows and ask them to go in the boats.

You trained then and after that?—We did not train. We attempted to train. We failed because sufficient time was not given to it.

I am asking about the industrial side. You said that you sent fishes from here to Palamcottah?—In 1915, during war time we sent trial consignments in a bamboo basket without any additional care. We sent only once.

You are very much interested in the industrial side of the department. Why did you not continue it?—It was war time. Kerosine was selling at Rs. 15. We had an oil-engine and we could not work it under the circumstances and Sir Frederick said we should stop.

When did you retire?—I worked from 1918 to 1923 and retired in the year 1924. I had nothing to do with the cannery since Sir Frederick went away. The refrigerating machine was afterwards handled by raw hands and it was spoiled and they had to sell it for a song.

Even now supposing a refrigerating machine of the kind you had is put in Chaliyam, it would be useful to the public?—I say it need not be done by Government. Private persons should do it. Private parties have not taken it up till now because it requires much capital and skill. We have demonstrated its usefulness. It is now for the public to take it up. The public have not availed themselves of it because they have no money. We ought not to repeat it. Ever since I retired I have been trying to float a company, but nobody comes forward with capital.

It will give a sort of technical education?—Yes, but boys come and go.

Would you like to stop the Government Industrial Institute?—There is no comparison. The refrigerating scheme cannot be compared with that.

Mr. Tampoe: You said that the existence of the Fisheries Department in Madras is unnecessary?—Yes; so far as the management of the fish-curing yard is concerned.

Management?—I mean rather the Madras Government retained the fish-curing yards because they have the Fisheries Department.

The appropriateness of an existing department to manage it was an accident?—It was very appropriate for this department to run the fish-curing yards; but unfortunately the results do not justify it any longer.

The appropriateness of the accident and not the Fisheries Department?—In Bombay there is not this accident of a Fisheries Department. But as regards the work of the Fisheries Department so far as the fish-curing industry is concerned, the original idea was well conceived and well worked out. From experience we see that it is impossible to help the fishermen or that the fishermen are not willing to be helped by the efforts of the department. The fishermen are complaining that you are taking away too much of their money for salt and so on, and that you are not wanted.

It is an ample answer to my question, but it failed in a material detail. You say that the existence of the Fisheries Department is an accident. The Government of India thought that this was the appropriate department. Was that the accident?—Properly speaking, it is the duty of the Fisheries Department.

Not hang it on the Police Department?—Certainly not.

You say that if customs, fisheries and salt yards are under one department, the same officer could inspect all?—Yes.

Don't you think that would necessitate a reduction in the area of jurisdiction of individual officers?—I may tell you that when the fish-curing yards were originally started, customs officers were actually in charge of them.

When I joined service there were 18 districts and now there are 24 districts?—Yes.

Further, there is such a thing as quality?—Yes.

The work done now is more intensive than formerly?—Yes.

So, in the light of present-day experience in other departments not only in this country but in other parts of the world, don't you think there is need for reduction of the area of jurisdiction of individual officers of the Salt Department?—What is the necessity, please explain.

If more work is added to the present-day duties of the existing customs officers of the Bombay or Madras Presidency, would it or would it not necessitate any reduction in the area of their jurisdiction?—I can speak of my experience of what they are doing in the Bombay Presidency. The Collector of Customs goes about and inspects all these things and his subordinates also go and do all this work.

Have you any knowledge of the relative area of jurisdiction in Bombay and Madras?—All on the coast line. Just like this coast.

Each officer must have a limited jurisdiction?—At Ratnagiri, an important port, there are one or two officers. They carry on their duties properly.

That is very nice information, but it does not answer my question. You have no definite idea on the subject of areas of jurisdiction?—I have nothing to add to my answer. You can get the reports of the Bombay Government.

You said that cost will be reduced by transferring to the Customs Department. Are you taking in the calculation of costs any proportion for supervision charges by the Customs Department of the fish-curing yards? In Madras we are debiting a certain proportion of the pay we give for central men towards fish-curing yards. Are you taking the same debit?—When it comes under the control of the Central Revenue let them allow it according to their will and pleasure.

At what cost?—Cost will not increase.

The fundamental reason being cost, anything that affects cost affects the logic of your proposition?—Yes. From experience I know that it is much better to manage under the combined system than by the Fisheries Department in Madras.

So that without any analysis of the elements involved, you have a firm conviction or vague conviction?—Not at all vague. I have travelled with the Bombay Collector of Customs and with the Assistant or Deputy Commissioner and I know what it is. I am giving my experience. I never went into their budget estimates and all that.

It will be better done whatever the cost may be if it is transferred as you suggest?—It will be better done and it will be cheaper also.

You say you know nothing about cost and you also say that it is cheaper?—Bombay sells salt at 12 annas and Madras at Re. 1-4-0. This shows that it is cheaper there.

Are you sure the method of canning is the same?—I do not think the Imperial Government is in any way inferior to the Provincial Governments in the matter of canning.

Have you any idea why the price of salt was increased?—The provincial resources were very much handicapped. The Fisheries Department had to duplicate its own establishment and other things and they said that they were suffering loss and let the poor fisherman pay.

When the cost was 10 annas you know they were debiting it to the cost of establishment?—Every item of expenditure incurred in connexion with fish-curing yard must be borne by the Government.

That is the proposition?—That is the fact.

That must be or can be a fact?—It is a fact as proved by the report of the Salt Department.

You do not seem to know the elements that contribute to make the issue price of salt Re. 1-4-0?—I know the result of it. I know that the department is taking Rs. 1,18,000 from the fishermen of these two districts. This department was intended for the uplift of the fishermen and the result is this.

How do you know that it is the fault of the Fisheries Department?—The Fisheries Department is administering it. It is their fault. The Fisheries Department says we have no resources and so we must tax the fishermen.

I entirely sympathize with the conclusion, but there is another aspect to the question?—The aspect of the public is what I know.

There is nothing secret. There is what is called the financial aspect?—That financial aspect was in the hands of the Salt Department. Then it did not grumble and why it is grumbling now is a thing which I cannot understand.

Have you made any effort to understand?—I know. I have got the literature and I will convince you.

I have read the literature?—You have read the literature from the point of view of an officer.

You talked about the research. Your objection to the trawler is that it is undertaking research quite out of keeping with the modest needs of Madras?—Undertaking means what?

Undertaking the work?—What is the nature of the work? I understand that a trawler is a fishing vessel. It has to go fishing for about 50 or 100 miles. That is all what I understand by a trawler. Now, I understand from the report that the trawler is to be made the maid-of-all-work. I say it is wrong. A late member of the Legislative Council asked the Minister "Are you going to make the vessel a maid-of-all-work?" I say it is wrong for a trawler to be used for all these purposes. As a vessel if it is going to be used for research work, I agree. But don't think that by these alterations you will be able to use her in a commercial way.

It would not be a commercial proposition?—A trawler is a vessel fit for catching fish and not a commercial vessel.

Your objection is that it is now entrusted to one vessel. Supposing in the intervals of trawling it does a certain amount of spare time work, would you agree to it?—When the West Coast conditions are unfavourable for fishing, by all means go to the East Coast and do work there. Why should a trawler be idle at all except for overhauling? There is no need for the trawler to be idle.

Observations have to be recorded and worked out. That must take some time?—What is the record? You haul up the trawl and after three or four hours (by the time the fishermen clear it of the nets, etc., and the scientific work is over) you can again sail.

There is something to be done. They have to find out the state of the bottom, the quality of the stuff underneath and make various observations and work out?—When the trawler is used as a research vessel all these things will come in. I am speaking of the trawler as a commercial vessel. You may use the trawler for any work you like.

But as a representative of the public, would you agree to the trawler being used for research at all?—I think that research work must be done so far as the industrial point of view is concerned. Whenever there are facilities let it be used. Its function is to catch fish. It may catch many kinds of fish, etc., and zoologists may work at it; but fish is most important. You have got the "Lady Nicholson," a specially designed vessel, with a laboratory, room for staff and a hold where you can keep a lot of stores.

Your objection is to the use of the trawler for this particular work?—This trawler is not designed to do scientific work. If you will go through the file of the Lady Nicholson you will find that Hornell boasted about it. It was all his design. They did not know how to build a boat for scientific purposes. He himself went to Calcutta, placed the order with Burns & Co. and got it constructed. You will find that the important thing for her to do is scientific research and I agree with it. Mr. Hornell wanted to do this, that and so on, and Government sanctioned it. And what are the results? "Margaretta" cost us Rs. 15,000 for a single cruise. He wrote a report. What became of the material he collected. In the footnote to that report he says I have got most valuable materials. I am going to send a report. What is the report? Where is the material?

After this pleasing statement, you are against fisheries research?—I do not see any result from fisheries research.

In the result, you are against research?—Mr. Hornell is a capable man and such a man was not able to give you any return for your money. Therefore, I doubt very much if there is any one in the department who can do quite half his work. So I say it is not worth doing. So I say that if the thing is placed in the hands of the Imperial Government with better resources and better men and our people co-operating it will be useful.

Let all Governments be made Imperial Governments?—It is not my business.

Is there any prospect of the Central Government doing better research?—Oh, yes. The Agricultural Department have done very well.

Agricultural Department is still Provincial?—But the other people also come and help.

Is there anywhere any research given up by the Provincial Government to the Central Government?—All research is the Central Government's. [Vide paragraph 72 of the Report of the Indian Industrial Commission, 1916-18, which supports my views on this subject of scientific research work being undertaken by the Government of India.]

Have you any experience of any such transfer resulting in good?—The Imperial Government people have done as good work as anybody else. In fact I should think they have done far better work. The Government of Madras in the matter of the travelling allowance say that they have cut it down to such and such a figure whereas the Imperial Government pays liberally. Their subordinates can go anywhere in pursuit of their research.

I have long been in Government service. My experience does not tally with yours?—My personal experience supports me.

(Addressing the Chairman) I have done with the witness, Sir.

The Chairman: (To the witness) You can withdraw. I do not think we any longer require you.

M.R.Ry. M. ANNAYA Avargal, Merchant and Honorary Magistrate, Malpe.

Replies to the Questionnaire.

II. FISH FOOD SUPPLY.

8. Yes.
9. Yes.
10. There is no local demand.
11. Nil.
12. Any material increase in supply is not likely to find a ready market elsewhere without bringing down the current price.

III. IMPROVED METHODS OF FISHING.

13. Yes.
14. No improvements as yet in any of the kinds of fishing. The old methods continue in practice with sufficient advantage.

IV. DEEP SEA FISHING.

- 17 to 37—not applicable in this district.
38. Fishermen go out to a distance of about 10 to 12 miles from the shore.
39. For fear of not being able to return to the shore the same day with the caught fish, they do not go beyond that distance. There is also danger of the fish being spoiled.
40. The distance prevents them for the reasons stated above.

V. FISH-CURING YARDS.

44. The Fisheries Department is able to control the fishing industry more rigidly. The fish-curing sheds are built in an improved fashion though at a comparatively high cost.
45. The present systems of fish-curing, viz., Colombo, Ratnagiri and local systems are cheap enough and satisfactory to the ordinary fishing folk. Any improved methods which are likely to involve additional labour and output may not find favour with the people in the district.
46. A reduction in the price will be very useful.
47. Yes.
48. India Government.
49. The fishermen and the curers will be mostly benefited.
50. The fishermen cannot afford to purchase salt at the present rate to salt all the fish caught sometimes with the result that good fish which cannot be salted to the best advantage is sometimes dried for manure and sold at a very low rate. The market for cured fish is always fluctuating according to the daily catches from the sea and when the price goes down the fisherfolk suffer very much on account of the high price of the salt.
51. No.
52. There is no local demand.
54. Yes. By keeping limited number of people in the establishment during the period of heavy catches and an efficient peon at other times when there is less work.
57. Yes.

IX. KINDS OF FISH.

97. Mackerels and sardines.

XII. RESEARCH.

133. It is a fact that during some seasons sardines have disappeared but not mackerel.

134. It is a fact that these sardines and mackerels appear only in particular season of the year.

135. No.

XIII. TRANSPORT.

No changes necessary.

XIV. SOCIO-ECONOMIC WORK.

The education imparted in the fisheries schools is the same as that of the local board schools. A modified system of education introducing industrial education suited to their profession will be, in my opinion, more useful. The present education can as well be had in the local board schools.

Oral Evidence.

The Chairman: You come from South Kanara?—Yes, from Malpe.

To what community do you belong?—Billava community.

What is your profession?—Fish business; I purchase fish and sell. I advance money to the fishermen and purchase the fish which they catch. I purchase from Rs. 300 to Rs. 500 a day during the season. The fish is taken from sea shore to inside a yard, there salted and dried and exported to places like Colombo. I don't send out fresh fish for sale.

When it is deteriorated you use it for manure?—Yes. It is sold at a low price, Rs. 8 to Rs. 10 per ton.

How many bags is a ton?—About 24 bags.

Mr. Tampoe: How do you charge interest for the amount you give?—For one boat of 50 men, I advance each man Rs. 30 or Rs. 40 or Rs. 50. All the catches are brought to me every day. I purchase the boats and nets and give these to them. The return for my money is I take half the catches every day for myself and purchase the other. They do not go and sell it away to others, but they sell it to me and I pay the market price.

The Chairman: How do you find the market price?—Some purchaser will enquire of the neighbouring people, and they will do likewise and in that way the price will be settled.

Have you got anything to say as to what the Government should do to better their condition?—Only the price of salt should be reduced.

Do you think that a co-operative society for these people would be useful?—Yes; it should be governed by proper persons.

Would you be the president of the society?—I am already the president of one. I can't take up another because I find it difficult to manage even one.

Were you ever in Colombo?—Yes.

You have seen fish-curing yards there?—I have not seen.

What is the Colombo system of curing?—Tamarind and salt are put together in the casks.

What about Ratnagiri system?—If there are heavy catches, these people will not be able to cure all the fish. In that case they simply bring the fish without cutting and cure it in the Ratnagiri system, that is, more salt is used than under the local system, and allow it to remain for three days. First day they put ten bags of salt, next day it is removed, and again it is salted with a less quantity and so on till the third day, without cutting the fish. Under the local system, fish is brought inside, cut, and salt is put into it. For one day it is allowed to remain in the shade, next day it is washed in the same brine.

Which do you think is the best method?—Local method is the best; then comes Colombo.

And the demand in the market is in the same order?—Yes.

Is there disinclination on the part of the people to purchase the fish prepared by the local method?—No; they purchase willingly.

Do you advocate the system of educating the fisher boys by teaching them how to make use of their nets and boats?—Boating, fishing, preparing nets, all these must be taught.

Do you think that education could be given before they come to the IV standard?—Yes; afterwards they will not be inclined; they will become "gentlemen."

Dr. Gravelly: Are you yourself a ticket-holder in the Government yard?—Yes. I have three sheds all of the new type.

Have other people got sheds of the old type?—There are very few old type sheds. There is no difference in the selling price of fish cured in the old type and new type sheds.

If there is no difference in price do people prefer the fish cured in the old type sheds or new type sheds?—The stuff should be clean and good. The purchaser does not care in what type of shed the fish is cured. The curer finds it advantageous to have the new type sheds.

(The witness withdrew.)

M.R.Ry. M. U. GOPALAN, Health Inspector, Wynaad.

Replies to the Questionnaire.

II. FISH FOOD SUPPLY.

8. Sufficient quantity of fish is not caught for local consumption.
9. Fish food is cheaper than other kinds of non-vegetarian food.
10. In the rural parts away from the sea coast towns there is an effective demand for more fish food.
11. A greater supply of fish food can create an effective demand.

V. FISH-CURING YARDS.

57. The hygienic conditions and the methods of curing are not satisfactory.

58. The improvements suggested are :—The curing of fish should be conducted on an impervious floor of concrete and cement. Proper flushing of the impervious floor with chloride of lime or some other disinfectant should be effected as often as possible or at least immediately after the operation is over. There must be proper closed cemented drains or drains made of glazed earthenware pipes laid at proper gradients below the surface of the earth just to reach a point in the beach in the low water mark. The flushing and washing should be done every now and then so that there can be no repugnant smell thereof. The brine should be kept as fresh and neat as possible. And brine once used should never be used again but should be disposed as quickly as possible away from the human habitations; otherwise the smell of the semi-liquid brine will be quite unbearable.

It is generally the boats or wooden troughs that are used for effecting brine. The effluent waste water may soak the wooden material and create a bad smell.

59. The cost of erecting an up-to-date impervious fish-curing yard with necessary troughs would be not more than three to four thousand rupees.

60. These fish-curing yards can be let out to fishermen and traders on payment of fees who may be directed to close all the private fish-curing yards and utilize only Government fish-curing yards constructed on hygienic principles for the purpose. They should be prohibited the use of private fish-curing yards of their own by the enforcement of laws and regulations framed for the purpose. This will to a great extent prevent the insanitary conditions and public nuisance now prevailing on the sea coasts of Malabar in general (in some of the private fish-curing yards).

VII. EXPERIMENTAL STATION, TANUR.

70. I am acquainted some five years ago with the working of the Tanur Experimental Station.

The institution was started as a model institution to teach the fishermen and traders the up-to-date and sanitary methods of curing fish, manufacturing fish oil, fish guano and fish meal and the drying and the smoking of fish and the preservation thereof, etc.

A good number of fishermen, traders and business men have been benefited by this institution. A good number of them have adopted the construction of impervious floors, and barbecue for the drying and curing of fish, manufacturing of guano and fish meal, etc.

73. The barbecue should be made up of an impervious floor or be made up of a thick layer of concrete nine inches thick over which should be put neat cement half inch thick, the surface of which should be made so smooth that persons using the barbecue should experience no slipping or a fall when working or flushing owing to the oily substance sticking on to the floor. The oily matter can be removed by chloride of lime. The surface

arbecue should have proper stop so that the waste effluent liquid matter, when flushed with water, should be collected in a catching pit from which it should flow into a closed drain of glazed earthenware pipes or a closed drain of cement laid under the surface of the ordinary level of the ground with gradients to lead to a point in the low watermark of the beach line. The action of bacteria in the matter of decomposition will be swift if proper and immediate timely flushing or cleaning is not effected.

74. As a result of the experiments conducted at Tanur Station most of the private fish-curing yards, fish oil and guano factories, etc., have been very considerably improved by the owners of private fish-curing yards and factories as far as their (a) fish-curing, (b) oil extraction, (c) guano preparation, and (d) manufacture of fish meal are concerned.

They have constructed impervious floors, barbecue, oil tanks, troughs, etc.

It was the Experimental Station at Tanur that prompted them to adopt model factories, barbecues, fish-curing yards, etc., to run on the lines at Tanur.

I beg to submit a point not referred to in the questionnaire—

- (i) How to keep a fish-curing yard hygienically neat and clean?
- (ii) Where to construct or establish or start a fish-curing yard?

A fish-curing yard can be kept hygienically neat and clean by the provision of neat cemented impervious yard where frequent flushing should be undertaken as often as possible the effluent waste water being disposed of as quickly and effectively as possible. The effluent water should not be allowed to come in contact with the atmospheric air of human habitations. Under-ground drains and proper flushing are the conditions whereby the offensive smell can be overcome.

Fish-curing yards should be established away from public thoroughfares, human habitations and very near the coast lines. There are three conditions to be satisfied before a fish-curing yard, a fish oil factory or a guano factory can be declared to be sanitarily neat and clean. The barbecue, the floor, the closed drain and tanks should be constructed of highly impervious material whereby proper cleaning and flushing of the factory or curing yard can be effectively achieved.

Oral Evidence.

The Chairman: You come from what place?—I come from Wynaad. I am the Health Inspector of that division. I am in the Sanitary Department. My designation formerly was Deputy Inspector of Vaccination. I am even now doing vaccination work. I am also doing propaganda work in sanitation.

Have you had anything to do with fish-curing yards?—I was holding office as fish oil factory sanitary inspector. The District Board of Malabar in consultation with the Director of Public Health appointed me. I held that office for three years. I have come to give evidence from the sanitary point of view. Fish oil cannot be taken as food by itself. It can be taken just like cod liver oil if it is properly purified on scientific and hygienic principles.

Is there any oil factory where scientific methods are employed?—Mr. M. P. Krishnan was purifying oil on scientific principles. I do not know what they do for purifying.

Had you any process by which you can find out whether a certain oil is of the proper standard or not?—No.

What is it that you were doing?—I was inspecting the sanitary condition of the fish oil factory. I have never tasted the oil.

You were there to see that the conditions around and in the factory are not insanitary?—Yes.

That is to say, to see that no filth is left on the floor, that it is properly drained, that it has cemented floor, etc.?—Yes.

When you said that Mr. Krishnan has done it under sanitary conditions, you meant that the floor was cemented, etc.?—Yes. I have not seen the process by which he was extracting oil. Of course I know what the fisheries people or rather factory-owners are doing. They extract it from the sardine. They boil it, put it under some pressing machine and crush it and the oil comes out.

There is nothing to show that that is the proper method?—I was in the Tanur Government fish factory. I know the method employed there. I had in my jurisdiction 56 fish oil factories. Of these only four or five adopted the system in vogue at Tanur.

You think the oil prepared there is better than the oil prepared in other places?—About the quality of the oil I am not in a position to tell you.

But the prevailing sanitary conditions are better in those places than elsewhere?—In most of the private factories, sanitary conditions are not satisfactory. There are no public factories except the one at Tanur.

Can you give us some idea of the quantity of oil produced per day in one of these machines? How much oil they extract assuming that there is plenty of fish available?—They get two to three boats full of oil. They make 10 or 12 kerosine oil tins per day. They sell it to local merchants and also export it to Colombo and other places.

Was any oil left behind for want of purchasers?—There was great demand for it. Nobody suffered on account of difficulty to find a purchaser. They used to sell also the guano. They used to send it to Colombo. At that time guano was selling at Rs. 75 per ton. The fish oil factories used to get 50 per cent profit out of guano and oil.

Mr. R. S. Nayudu: The district board grants licences for fish-curing yards?—Yes. There are no fish-curing yards in Wynaad. I was in the Health Department for five years and before that for three years I was in the local fund service. Now I am in the Public Health service.

What are the conditions the district board insists upon before granting a licence for a fish oil factory?—The floor must be cemented and there must be a proper drainage, and it must be disinfected.

What licence fees you charge?—Rs. 10 annually. Sardine will be appearing in the sea from September to March. In certain years it will be a thorough failure.

Is there any municipality close to the oil factory?—In Calicut there are three or four factories at that time just outside the municipal boundary, but now they are inside the municipal limits as the municipality has extended its limits.

So you don't charge double fees: the municipality one fee and the district board another?—At that time nothing like that happened.

(The witness then withdrew.)

**M.R.Ry. M. VISWANATH Avargal, Merchant, Commission
Agent and Contractor, Calicut.**

Memorandum.

I believe the objects with which the Fisheries Department was started were (1) to improve the supplies of fish food in the country, (2) to demonstrate new methods of curing fish, (3) to exploit fish resources, and (4) to improve the socio-economic condition of the fisherfolk.

If I am correct in my above statement I regret to say that none of the above objects have been achieved to any substantial extent so far as the West Coast is concerned except the introduction of fish oil and guano factories and the starting of some schools for the children of the fisherfolk.

As far as possible the consumers would like to eat fresh fish. To gain this object the department must devise some cheap method of preserving fish fresh at least for three days so that it may be sent to up-country markets. Generally salted dry fish does not last for more than two to three months. The department must find out some means of preserving this kind of fish at least for one year.

Fishes that are of more economical value in Malabar are sardines, mackerel and cat-fish. These appear on the coast only during particular seasons. For the last five years sardines, "the poor man's food" in Malabar, have not appeared in large shoals and during the last season in particular these almost disappeared but last year we had a plentiful supply of mackerel. The department must engage experts to find out the reasons for the failure noted above and make researches with a view to retaining the particular kinds of fish along the coast.

Whenever the department meets with any success in their experiments they must explain the methods by issuing pamphlets in vernacular amongst fisherfolk and curers and also educate them by practical demonstrations especially in the fish-curing yards managed by them.

Fish food is no doubt cheaper than other kinds of non-vegetarian food for people who live along the coast. I should think that sufficient quantity is caught on the Malabar coast for local consumption and even for export. Sometimes the fish caught is not enough; it is not due to want of improved methods in catching, improvements in boats or nets, but it is entirely due to want of appearance of fish on the coast. Sometimes the catch is so abundant that the fishermen throw away the excess back into the sea or convert the same into manure.

As far as I know no improvements have as yet been effected in fishing-crafts, gear and tackle. To my mind it appears that no improvements are necessary at present. If the West Coast is taken, we find that the nets used in one locality differ from those used in other localities. Any attempt at introducing new kinds of nets will not be suitable to a particular locality on account of the rocky condition or the shallow nature of the sea.

If deep sea fishing is attempted and if it becomes a success it could only be done by capitalists. This would deprive the poor fishermen on the coast of their daily bread.

The fishermen on this coast fish up to 30 to 40 fathoms deep and go up to a distance of 10 to 15 miles from the shore. They don't go beyond this distance fearing they will not be able to bring their catches to the shore before the fishes are tainted.

The main consideration which led to the transfer of the fish-curing yards to the department appears to be to suggest better and more scientific methods in curing. I do not know whether the transfer is justified by the results so far achieved in the matter of curing. The only improvement effected after the transfer was the introduction of cement flooring for curing fish. It was after the transfer to the department the price of salt was enhanced. The price should be reduced to the old standard and the supply could be made by whichever Government—the Madras Government or the Government of India—that could supply cheaper. If the price of salt is reduced both the curers and the consumers will be benefited.

Regarding the Cannery at Chaliyam, it is a well-known fact that it has not served any useful purpose. It has not trained any outsiders; on the other hand it has been a losing concern. No cannery has yet been started on the model of the Chaliyam Cannery. But before the Chaliyam Cannery was ever thought of, there existed a cannery at Mahe. This cannery was working successfully during the lifetime of the originator, a Frenchman. On his death his wife who managed it for some time sold it to a company which was managed by Messrs. Wilson & Co., of Madras. They also did, I believe, profitably work it during the Great War, after which it had to be wound up as it was not paying at all and had finally to be sold. This cannery (*The Malabar Canneries* at Mahe) served as a model for the starting of another cannery there by name *Nanoe Freres*. These are not working profitably at present. It is a fact that Malabar canned fish does not find a ready market in competition with imported canned fish, the reasons being the higher price of the Malabar stuff and the inferior quality of the goods produced here. To popularize the Indian canned fish there should be a protective tariff on imports.

The Tanur Experimental Station must be continued under an expert who should find out new and cheaper methods of curing and preserving fish fresh for export to up-country markets. An expert must be got down for this purpose or one from the department or an educated fisherman himself who has had local knowledge of the coast and fishes must be sent at Government expense to the Imperial Fisheries Institute of Japan or other important fisheries stations to study the method of curing and preserving fish done in those parts.

The industry of fish oil and guano can further be developed if an oil chemist is engaged. Devices must be found out to purify the bulk of the fish oil to be used as edible oil and in the manufacture of soaps, candles, etc.

Researches must be made to find out pearl beds on the West Coast or if possible they must be reared if the conditions are suitable on this coast. From shells of various types such as oysters, muscles, etc., buttons and other small trinkets can be manufactured if small instruments are used, which the department should find out and thus give an impetus to this as a cottage industry.

I have not heard of chanks on this coast except in Travancore. Wherever available chanks must be collected by the department and sold in convenient lots. Some workmen who could convert these shells into ornaments such as bangles, rings, etc., must be got down and our fisherfolk women and boys must be taught to make these little things and develop this as a cottage industry.

It must be arranged with the railway to transport fresh fish for immediate consumption at least at a much cheaper rate than the existing rates.

The poor fishermen who catch fish are always handicapped by money-lenders and the middlemen in the trade. A money-lender who advances small amounts to the fishermen always gets a share in the daily catches of fish and thus he calculates towards the interest only and he does not care to collect his capital, as the arrangement mentioned above is very paying to him. If co-operative societies can relieve these poor fishermen out of the clutches of the money-lender it is a great help rendered to them. Co-operative societies must also be started for supplying fishermen with boats and nets and also for selling their catches.

Oral Evidence.

The Chairman: You are a commission agent?—Yes, and a railway contractor.

Have you got anything to do with the fishing business?—From 1908 to 1910, I was under Sir Frederick Nicholson as apprentice in the fish-curing yard at Cannanore. I wanted to start a fish industry myself. My idea was to go to Japan. I got the prospectus of the Imperial Fishery Institute, Japan. I consulted Sir Frederick Nicholson. He said that there was no use of my going then and advised me to study the local conditions. I worked under him in the fish-curing yard. I also studied the oil and guano industry. Then I came to my place and started an oil and guano factory—in the middle of 1911. Along with it, I learned curing, smoking, salting and other things. I found it difficult to sell the fish thus cured. When I took it to the market, they said, "Oh, the appearance is all right, but we want to have fish which have the mango smell," and they showed some of their fish. I distributed all the cured fish to my friends as an inducement that they might come in for more later on. For about two years I did the curing; then I devoted myself to the oil industry. That was from 1913–1918. Sir Frederick himself came to my factory and approved of its working. He also gave me some instructions which I followed. Fish did not generally come in large shoals; sometimes they come, sometimes not. I cannot keep a permanent staff; in the end it was not paying to my satisfaction. So I gave up that industry. Then Walker & Co. wanted this fish oil, and I entered in their service. That was in 1918–1919. I had statistics of all the Malabar factories, and what little improvements I knew I suggested to them. I got oil extracted in that way, collected all the oil and stored it for Walker & Co., and they began to export it. Then I left Walker & Co. and joined the timber business.

What is the average catch here?—They use two kinds of net; one is purse net. With two boats they go; when they meet a shoal they scoop it, as it were, and whatever escapes goes out. Then there is the drift net. Here also a number of people go; they make a lot of noise; as a result the fish are frightened and get entangled. They have to take the net out and pull them. That will spoil the fish. By the time they take it the fish dies.

In the purse net also they die?—Not immediately. I have heard complaints from fishermen in Malabar against the use of drift nets. To Sir Frederick Nicholson they complained. They say that if they make this noise the shoals are disturbed and go away.

Where is the question of complaint? It is left to them to use any kind of net?—Drift net is rather cheaper; when the purse net people go, they find it difficult to get the fish.

If some cheap refrigerating plant can be had and provision made for keeping the fish in a sanitary condition for three or four days, the biggest catches made on this coast can be utilized for this industry?—Yes. The present one costs too much. They had one at the Chaliyam factory; it is not to be seen now. If they can preserve fish for two or three days, it will be the most useful thing the department can do for the public here.

You also want that some research should be conducted to discover why the sardines disappear often?—Yes.

You then ask for some propaganda work, demonstration and publication of pamphlets concerning the achievements of the Fisheries Department?—Yes.

You don't think that the dearth in certain seasons is in any way due to the fisherman or his boat or his net?—I don't think so.

Have you heard of these boats called Ratnagiri boats?—Yes. There were one or two boats during Sir Frederick's time. They go far out into the sea and bring big catches of big-sized fishes. The fishermen do not take to this boat for the reason that it is costly. In Cannanore there was a rich man. He used the Rampini net. It brought Rs. 5,000 to Rs. 6,000 worth of fish at each haul. It will be about four or five thousand rupees. But it did not succeed. He was of opinion that there were rocks underneath. He found it difficult to haul the fish, either owing to shallowness or rocks. His name is Unnicholi. He belongs to Cannanore and related to the late Dr. Koman.

You say if a trawler is introduced, no doubt more fish can be caught in the deep sea but the poor people will be out of employment?—Yes.

Don't you think the fishermen will be useful in taking them to the market?—The fishermen don't go, it is the women that go to the market.

When machinery for cotton industry was introduced in England there was at first some objection. But to-day you find that cloths are produced very cheap?—Yes.

But along with the trawler there must be a refrigerating plant?—Yes, to keep them for two or three days.

If there are motor-cars equipped with cold storage rooms these fish can be conveyed to distant places?—Yes.

They don't go beyond the ten-mile or the fifteen-mile distance, because they will not be able to return to the shore to salt their fish?—Yes.

You think also that their boats cannot stand longer journey?—They are too small to go into the deeper waters.

They take cooked food to last for two days or so?—Yes; some congee and other things. As regards fish-curing yards, the flooring is good, but the drainage system is very bad; the washings are taken on their heads by those people. There was an awful smell before; it is not so now.

Don't you think that the dried fish now sent out is much more sanitary or hygienic than it was ten years ago?—May be; it contains less of sand.

Regarding the cannery at Chaliyam, to popularize the Indian canned fish you think there should be a tariff?—Yes.

You also think that some improved methods should be adopted, such as placing on the market better tins than are produced now?—Yes.

I am told the tins they now use is very thick?—Yes; sometimes they have to go to a blacksmith to open it.

If they use a softer tin, it will cost less?—Yes.

That would add its own share in making the thing more popular?—Yes.

Somebody said these big tins were not required in the market?—Mostly these tins were purchased by travellers; three and a half ounces tins will be of smaller size and will find a better sale.

So if all these three improvements are made, there will be a good sale?—I think so.

Now, about the tariff, it is the Government of India's business. The Madras Government has nothing to do with it?—Yes.

There are people who think that bounty would be better. Bounty is a certain grant made by the Government to the producers. For instance, if you produce so many thousand tins a year and put them on the market, Government would give you so much, one or two per cent, to enable you to compete with foreign goods?—I don't mind one or the other.

In the fish-curing yards we have not got an expert now?—I do not think.

You want some expert or master-fisherman who would cure the fish on the latest methods?—Yes.

It is quite possible you would get very good fish, but the question of market has to be studied?—Yes.

Is there any truth in the statement that there is not much market if you use better methods?—As I told you before, people are accustomed to some bad smell and they will go in for that only. They must be educated and then only they will go in for better fish.

It is worth trying; the health of the people is more important?—Actually there will be worms creeping on the fishes, still they like such fish.

As regards the oil, it must be deodorized?—Yes; I want a chemist who will remove the smell from the oil.

You will have greater facilities for soap making and other things?—Yes.

Is there any co-operative society among the fisherfolk?—I think there are some.

They are closed or they don't work?—I don't know which.

As regards the cannery you say if you are allowed to work it you will bear the entire loss if loss occurs, but if there is profit you will give certain percentage to Government. We have not yet considered the offer, but I may assure you we will give it our best consideration.

Divan Bahadur Kumaraswami Reddigar: Is it possible to work this Chaliyam factory without loss by private enterprise?—Yes.

You think under private management raw materials will be purchased at cheaper rates?—Certainly.

If you are to work the cannery, are you prepared to work without interfering with any research work that the Government might undertake?—Yes; On the other hand, Government would be helping me.

Would you object to any apprentices being trained?—No.

If they fix any specifications will you abide by them?—If they want a particular way of doing things and if there is no market, then they will be stored up as they are stored now. But if there is a market I will certainly do it. I am prepared to abide by any reasonable conditions.

Mr. R. S. Nayudu: When you take apprentices for training you will have to devote some time for training them?—They will be working there just as others; the teaching portion of it will be entrusted to somebody appointed by the department.

Will it not interfere with your work?—I doubt whether a good number will come; one or two students will be coming; it is not going to be a school with a large number of students.

Officers coming and going, and the apprentices undergoing training, all these may interfere with your work?—I don't think. Officers coming and going will be an advertisement to my business.

Apprentices will be taking much of your people's time?—There is the department who can put them in the way.

Are there other canneries like this?—There are two in Mahe; they are not working satisfactorily; no apprentices are being trained there.

Dr. Gravely: I don't think it will be possible for the department to have a man to teach the apprentices. Will you be prepared to take an apprentice, get one of your men to show him a certain machine and let him work there, and after a week or two, take him to another machine and so on till he has understood the whole working? Will you allow him to learn all your trade secrets?—There is not much complicated machinery to study. This is only a fish boiling process. There will not be much damage done by the apprentice in handling the machinery.

So you can take one or two apprentices every year and allow them to learn everything?—Yes. If the business is successful I can myself engage them.

What is the period for which you will be prepared to take the business?—At first, three years, with the option of extending it to seven or eight years.

(The witness withdrew.)

M.R.Ry. M. RAMASWAMI NAYUDU, Inspector of Fisheries on board the trawler.

Oral Evidence.

The Chairman: You are now what?—Now I am Research Assistant in the West Hill research station at Calicut.

Previous to that where were you?—I was on the trawler for ten months from 15th August 1927 till very recently. And prior to that I was in Vizagapatam in charge of the fish-curing yards in the Northern Circars as Inspector of Fisheries.

How long were you there?—I was there from 1st April 1924 till 15th August 1927. I was at Calicut prior to that. I was then in charge of the laboratory with an assistant. Then my designation was research sub-assistant. On that occasion I was in Calicut from 31st August 1921 to July 1923. I entered service in the Fisheries Department in June 1915.

What did you do in those first six years?—From June 1915 to December 1917 I was in Tuticorin under Mr. Hornell doing various things there. I was investigating the lower Algae on small plants you find on the sea-weed. These are not sea-weeds, but lower in rank than planktons. That is a work for the biologist.

You found animal life in them?—It has a plant life and animal life. I am a zoology graduate and I had some training in biology also. Formerly we had a paper in biology. We were taught something about botany also.

We will divide your service into five periods?—The first is at Tuticorin. At the second stage I was in Madras doing socio-economic work for fishermen. The third stage was at Calicut, the fourth at Tuticorin and the fifth on the trawler.

During the first period you say you were simply assisting Mr. Hornell doing such work as he asked you to?—Yes.

I suppose you cannot really call that research work?—Of course I was practically helping him in his research work doing whatever he wanted me to.

Then in Madras?—In Madras I was doing socio-economic work.

Leave aside socio-economic work?—I was in charge of inshore fishing experiments carried on with the Malabar canoes. This was intended to test the utility of the Malabar canoes on the East Coast. We judge them by the quantity caught by the net. We tried whether the canoes would suit for fishing in the East Coast and also whether the bigger nets were capable of bringing in better catches. I was investigating into it for three years. The results of the first year of our observation are published as part of a bulletin. Fishing conducted in water from five to six fathoms deep is called inshore fishing. Canoes were found to be not very suitable to the East Coast, because the East Coast is surf-beaten. For that catamaran is more suitable than canoes. Further, the canoe is a fragile thing and it would break. They had to take shelter in the Madras harbour.

So that you are not in a position to recommend their introduction on the East Coast?—It was not tried properly. We recruited the men on a monthly payment system. When the local fellows were out in the sea these people could not be found at all. It was Mr. Govindan who got Government sanction for this experiment. I was in charge for two or three years. Mr. Govindan in his evidence has said that the subordinates did not conduct it properly and therefore it was a failure. I was in actual charge of the work. Many a dark night I have gone in the canoes, but found our men actually sleeping on the walls of the harbour. The fault was due to the system of recruitment on payment of wages. I suggested that these people should be recruited on a different system and payment made on the basis of the catch.

It only comes to this: Mr. Govindan has put it on your head?—I told this to Mr. Campbell and he himself inspected the work and found that it was correct.

Supposing these canoes are given to the fishermen on the East Coast, do you think they will use them?—We have been inducing some of the capitalists among the fishermen in Rayapuram and Triplicane to take to the canoes, but they have been hesitating because they are not quite sure of the utility of the canoes.

I suppose they prefer their Masulipatam boats?—They are fit only for the shore fishing.

They would be content with their catamarans?—As long as they have not got any harbour to take shelter under, no canoe can be of use there.

What was the work you did there?—I identified various kinds of fish that were caught and also some of their sponges.

Could not this kind of work be entrusted to a schoolfinal man? Were you doing biological work?—I was doing socio-economic work and also organizing co-operative societies.

Even that is not biological work? I am trying to see whether any attempt has been made to do biological work. Except that you had to identify the species of fish caught, most of the other work was either socio-economic work or the tests conducted to find out the fitness of canoes for use on the East Coast. That takes you to what year?—From 1918 to 1920 I was doing this sort of work. In 1920–21 I was at the cannery for about a year. Then I was sent on special duty from 4th August 1920 to 26th August 1920 to select a suitable site for a second cannery on the East Coast. I was in this cannery from 1st September 1920 for eleven months. At that time sardine canning was not a losing concern. The after-effect of the war had not yet been felt. We were getting tins from England through the High Commissioner for India.

Can you get these tins at a cheaper rate in the local market?—We can, but the substance was not quite fit for making tin cans. It has to be a little soft and malleable for drawing into cans.

Have you heard about tin-poisoning?—If the tin used is of an inferior quality there is a liability to tin poisoning. What we call tin is only a thick sheet of iron with a coating of tin on either side and if the coating is very light it may result in tin poisoning. Even the corrugated zinc sheet is only iron with zinc coating. We can get such sheets of what thickness we want in the market. But, for the cannery we require a certain gauge and that alone we have to get from England.

Are you saying that you cannot use a thinner sheet?—The die is so made that there is only an upper die and a lower die. The two dies won't work on a thinner sheet. We tried with a thinner sheet, but did not succeed. There must be a particular malleability.

You think it ought to be possible to find some thinner sheet of tin which might yet be put into this to be made cans?—It might be possible to try. That requires experimenting. At the time when I was there there were no apprentices.

Was there a sufficient market at that time?—There was no such thing as destroying tins. Many tins were not destroyed.

Was there over-production at that time?—All that we produced, we sold. There was very little balance left. If you want me to say what I think about the failure of the cannery, I will tell you now.

Why do you think the cannery has failed?—There is difficulty in disposing of the tins. I should think that something seems to have been changed. Subsequent to that, one of the other causes which I can attribute to the difficulty which we have been experiencing will be this: that we have not been doing anything in a businesslike manner to dispose of the thing.

The business side has not been attended to?—Yes. During the war there was demand. Foreign goods were not coming in and after the close of the war there was glut.

What do you mean by business side?—Wider advertisement. We must, if possible, for a few years undersell, so that we can create a market for our goods. Even if we lose for four or five years I would advise the Government to undersell taking care that we maintain our reputation as to quality.

I suppose now there is nothing wrong with the quality so far as you are aware?—How could there be? The experiments have been standardized and they are in the records. We have been only following the recipe. Canning is a difficult process. It is an art which requires some amount of skill. With sufficient care and skill and education if we follow the standard recipe we have arrived at after years of experiments, I do not see any reason why our products should deteriorate to any extent.

Dr. Sundara Raj: Has any one trained in our cannery gone over to other canneries?—Some one went. He was working in our cannery and he went over to the Malabar Cannery. We had a certain recipe of our own for preparing prawn paste. It was liked by Europeans. Somehow or other, they came to know of the thing.

The Chairman: You need not be sorry for it, because your purpose is to show the way to the people?—Of course, but we should guard it till we bring it to perfection.

I suppose this man was doing his duties here well?—He was one of the ablest of our men. He used to come at about 7 in the morning and return only at 5 or 6 p.m.

We next come to your Calicut stay. During that time you were studying the life-history of sardine?—There was one Mr. Whitehouse who was appointed as Marine Biologist. He was working at Tuticorin carrying on research work in general. Government by that time did not approve of pure scientific research being carried on by such a highly paid officer and so they said "We do not want the research work to be conducted on this scale. We will pursue such of the research work which has a direct bearing on the economic problem awaiting solution." They then asked me to conduct research on the West Coast on the migration of sardines and mackerel, why they were found in abundance in certain years and poor in certain other years and why in certain years sardines yielded a certain amount of oil only and in certain other years yielded a larger amount.

And also something about the food?—As you have heard, the food of the fishes can be divided broadly into two classes: those that live and have their being on the surface and those that live and have their being at the bottom. The bottom fish lives in the bottom of the sea and live on animal organisms found there. As an example of the bottom fish you can take the Zella or Jella. They live on worms. Surface fishes are sardines, vanchiram, etc. They feed on what is popularly known as plankton. It is a common name given to all organisms that are either mostly plants or unicellular or animal and other organisms. When I was asked to investigate about the migration of the sardines naturally I had to confine my attention to their food. Because, it has been recognized all the world over that the causes for the migration of animals and fish in particular are mainly three: for the purpose of food, for spawning, and for climatic reasons. The migration may be due either to one of these causes or to a combination of two or three. So naturally I planned the lines of investigation on the lines followed for herring and other fish in the West. I worked on these lines for three years. The results of my enquiry for the first year have been published and we are able to draw inferences which were unknown before.

Give some examples of the inferences?—At the time I commenced the experiment, all that was known about the sardines was that the spawning time was at about certain months, etc.

What was it that you discovered in the first year?—We were able to discover the maximum age to which the sardine could live; the minimum age at which it can attain sexual maturity, when the deposit is formed, etc. The migration of the sardine towards the shore was determined to be due to food causes.

How do you say that?—We have been collecting data. Twice a week we go to the sea with a net and collect organisms found in the water. We cut open the sardines found in the locality and find out whether there

is any co-relation between the two. The stomach contents of the fish and the organisms found in the water vary by months. In certain months there will be certain organisms and certain species of dietems. In some months there will be some other species of animal for its food. The organisms found in June 1921 will not be found in January 1922. Therein lies the necessity for continuing the experiments for a number of years.

Did you find out anything about the spawning grounds?—We were able to find out the rate of growth of the sardines. We used to take 100 or 200 from the day's catch and work out the average size. The average went on increasing week by week until about the end of March, the growth stopped for four or five months. That period coincided with the period of scarcity of food organisms in water. There was a ring mark in the fish. It clearly showed scarcity of food and arrest of growth. Five months afterwards when the food organisms increased in quantity the sardines began to regrow.

Are you sure that the animal is the same one which you found before?—We have measured it. We have been collecting and examining them twice a week.

You are collecting every week and you discover that they are growing from time to time until at last in March there was no growth and then after five months there was growth again?—Yes.

Is there anything to show that you catch the same fish again? Do you send the fish once caught?—Unless the people are educated they would not be able to help us like the fishermen in the West.

But still you could have tried the experiment?—With the equipment available, we have done our best.

My question was with reference to this particular matter?—Twice a week we have been examining about 200 to 400 fishes. If there had been any belonging to other grades we could have come across them.

You catch the fish and are able to find out that for a certain period there is an arrest of growth. During that period there was not sufficient food found and it is perfectly legitimate to conclude that this want of growth is due to want of food. Now, what is there to show that this fish which were growing found themselves in want of food and migrated to some part elsewhere? The fish that is caught five months afterwards might belong to another shoal altogether?—Simultaneously with what we were doing, we were able to identify certain marks in the scales of the fish that were there. When we found the food organisms beginning to increase we found improvement in the size of the fish and simultaneously with that we found the scale of the fish growing also. These three factors all proved the same thing. If these had gone out and fresh ones had come in, there should be no mark in the scale. We discovered that the maximum age of the sardine will be two and half years. We discovered rings round the sardines and we found in the corresponding period of the same year the second ring. The same conditions repeated year after year. We did not find any fish with more than two rings and so we concluded that the fish never lived more than two years.

Did you rear this fish artificially?—No. It is very difficult. It is a delicate thing.

So that from any experiment of that kind you cannot discover whether the scales show the age of the fish?—We have been studying the various groups.

In some fish the scale may mean two years? The ring in some may mean one year's growth?—In other fishes they have studied it. The ring always shows the arrest of growth.

I wish to know whether a ring may not mean two years?—In some it may be so. But in this we have studied it.

Have you yourself reared it and studied the same fish every day?—Then also we cannot say. We cannot produce the natural conditions in our aquarium. The rate of growth in our aquarium may be different.

I am questioning the correctness of your conclusion?—If we feed the fish regularly and there is no arrest of growth, then no ring will be formed at all. In that case you will have no criterion to judge the age of the

fish. The scales in the fish are like our nails. It is only when the food is scarce and the fish becomes stunted in its growth the ring is formed. When the food is abundant, the whole body grows and the scale also begins to grow.

Formation of ring is an index of insufficiency of food in certain stages of its life?—And we have found that this scarcity has been occurring once a year. We have also seen that the sardines begin to spawn in their first year. The young ones begin to appear about the 14th August each year. By about May they begin to develop their organs. Eggs are called roe and the male element is called milt. Pulasa comes up for spawning. Pulasa has the habit of spawning. Though it lives in the sea it ascends the rivers.

If they are coming for spawning purposes, how comes it that we have never come across these little ones at all in the Godavari waters?—That is one of the things we have been investigating for the last two years. One of the reasons is that they are fishing with drift net. Unless they use a smaller net they won't catch them. The Kattoo (a smaller kind of net) ought to be able to catch them. It is likely that soon after they hatch they migrate into the sea. That we have not investigated. Artificially, Dr. Sundara Raj was able to hatch some. We collected both the male and female when quite live and warm, gently took them and introduced them in hatching jars and they all hatched in the morning.

How long did the young ones live?

Dr. Sundara Raj: We kept them for three days, after that there were no facilities. They were all hatched in one night.

The witness: Through this sardine investigation I am able to prophesy whether a season would be a successful season for fishery or not. I can also say whether the coming season would give a good percentage of fish oil.

Suppose you are posted here from August next to April next, will you be able to prophesy about next year?—Certainly, whether the next year will be successful for fishery, whether the next year's yield in oil will be of the same percentage, and all that.

(The witness withdrew.)

The Committee then adjourned till 11 a.m. on Friday, the 20th July 1928.

Friday, July 20th, 1928.

CALICUT.

PRESENT :

M.R.Ry. Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, Kt. (Chairman).

„ Diwan Bahadur S. KUMARASWAMI REDDIYAR Avargal, B.A., B.L.,
M.L.C.

Dr. F. H. GRAVELY, D.S.C.

Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, M.L.C.

M.R.Ry. P. V. MANIKKA NAYAKAR Avargal, B.E.

„ R. S. NAYUDU Avargal.

Mr. A. McG. C. TAMPOE, I.C.S., M.L.C.

(Dr. B. SUNDARA RAJ was also present.)

**M.R.Ry. M. GIRIYAPPA Avargal, Deputy Registrar of
Co-operative Societies, Coimbatore.**

Oral Evidence.

Diwan Bahadur Kumaraswami Reddiyar: You are the Deputy Registrar of Co-operative Societies?—Yes, and I am in charge of the circle comprising the districts of Coimbatore, Malabar and South Kanara. The circle is going to be bifurcated in October.

Are there any societies intended purely for fishermen in the South Kanara and Malabar districts?—Yes, there are 63 fishermen credit societies.

No non-credit work has been done on their behalf?—All the 63 are not credit societies. They are credit and non-credit societies combined. Six societies are non-credit and 57 are credit societies. They advance loans. The district banks do not lend money. These are merely thrift societies. They are expected to save money and lend the same. They do not borrow money from the Central Bank. They go on paying the share capital and loans are granted from this to the members.

It must be a small amount?—The original idea was that these societies should not borrow. If that was allowed it would not encourage thrift. On an average there are 30 to 40 members in each society. Each share is worth Rs. 50. They go on paying the share capital in monthly instalments. During the rainy season for four months when they have no income they are not compelled to pay the share capital. They are given loans out of the share capital already collected.

What we understood was that they applied for loans from district banks and as there was no sufficient security loans were not granted?—That happened in the case of one or two societies because the societies had no securities to offer. We thought there was no use applying to the Central Bank. Except three or four, all the non-credit thrift societies are in a bad condition. I have now three or four applications for voluntary liquidation. The reason for this state of affairs is that the required amount of intensive supervision is lacking. One has got to be always after them. During summer there should be one man working behind these people to snatch away what they are able to save and during the rainy season we must give them the

articles of food. If we give them money it will be frittered away. Further during winter an article costing 2 annas is charged 6 annas. Therefore during winter we should supply them with provisions instead of lending them money. Unions are unable to give adequate supervision. There are co-operative union supervisors. These people are able to supervise the societies only once a month. There should be an agency to see that every pie of the savings of the fishermen is snatched away from them during summer. These agencies or rather the societies should stock rice and other things and sell them cheap during winter especially.

So you recommend that instead of union societies Government societies should do it?—Yes. This can be easily arranged. The Government was doing that before with regard to all societies. What happened was that our agency was withdrawn. The Fisheries Department complains that it has no agency for intensive supervision. The result is that between these two bodies the societies have one by one gone into liquidation. Unless something is done urgently there is no hope.

You seem to have some coercive method to collect subscriptions every month?—We want one man to go and collect. We have to appoint what we call group examiners. At present we rely on the honorary secretary who very often is indifferent to the work and there is considerable default. When there is default we are empowered to collect it with penalty. We are unable to do anything else and the share capital is in arrears. We could apply arbitration process for the collection of share capital, but we are not doing so because the subscription for the share capital should come in voluntarily. If loans have fallen into arrears we can apply the coercive process. We have to collect the share capital by persuasion otherwise the societies will go to dogs. There is one credit society at Thalai near Tellicherry. Government have advanced a sum of money to this society to enable it to construct sheds. The Government loan is collected by means of an additional cess on salt. There it is supposed that the curers themselves own the fish-curing yards after the Government loan is liquidated. Now it is practically the property of the Government. There is another fish-curers' society at Cannanore and yet another at Maladi. The object of these societies is to enable the fishermen to cure the fish in the yard themselves. These are not a success because the boats are not owned by the societies. What happens is that when fish is brought the boat-owner snatches away the fish and dictates his own price. The condition on which he has lent his boat to the fishermen is that the boat-owner has a right to dictate his price for the catch.

It is these boatmen that do the curing also?—Sometimes others also cure their fish in the yard. Generally the boat-owners are the curers. So in the case of two societies the Fisheries Department and the Co-operative Department moved Government and persuaded them to give each society a loan of Rs. 1,500 to enable them to purchase boats and nets. The Government have sanctioned the amount as an experimental measure. But the rate of interest is 7½ per cent. I would suggest that Government might be induced to lend money at 6½ per cent. They are lending money to co-operative societies at 6½ per cent. If the Government can be moved to reduce the rate of interest to 6½ per cent it would be better. If this is done the people can go out fishing in their boats and get their fish cured and sold at their price. Now there are the middlemen. The poverty of the fishermen is due to these things. There are two middlemen between the fishermen and the purchasers or consumers at Colombo. One is the boat-owner and the other is the dhal of the merchants. What we propose to do is to eliminate one of the middlemen so that if the society could own the boats the fish will be their own and they can sell it. If we have a sufficiently large number of societies, these people can have an agent at Colombo, send the fish direct and get proper value. With Rs. 1,500 each society purchases three boats and nets. Three boats are found to be sufficient.

You don't think any society of the type of rural societies is necessary to advance loans?—I strongly deprecate any such attempt to give loans in cash. Because, as a class these people are sure to fritter away money. What we have got to do is to collect money in summer and give them articles of food in winter. They are earning enough in summer, but all that is now snatched away by the bazaarmen.

The one thing that you want with regard to credit societies is better supervision by Government agencies?—If that is arranged they will work satisfactorily. There should be a large number of curers' societies.

And you want the Government to advance loans to some more societies so that after a time the bank could be induced to lend money?—The bank is shy to lend money.

Don't you think the district banks would advance money to these societies?—They won't. They say that they have no security. As a class the curers have no property. For a time, I should think, this experiment should be tried. Now Government have lent money to only two societies. I would like the Government to lend to two more societies.

Each fish-curing station must have a society?—Yes. There should be one society for a village. These are the two recommendations that I make with regard to credit work among fishermen.

You know a good deal about the fishermen here?—I am in touch with them, but not so much as the Fisheries Department.

You have seen fish-curing yards?—I have seen many.

Do you advocate the establishment of special schools for fisher boys?—I would like the fishermen themselves conducting schools.

Do you want separate schools for them?—I would like to have separate schools for these people. Those schools should be in touch with the daily life of fishermen. They should be segregated and given special education.

Would you advocate their being given special education from the beginning?—Yes. They should be educated in boat-making, net-making and fishing.

We were told by some witness that till a certain stage we should give education with a vocational bias without actually giving vocational training and after the fifth class we should give them actual vocational training. What do you say?—That might be done. If schools are established exclusively for fishermen, they should continue under the Fisheries Department. My reasons for this suggestion are that it is these people who are in touch with the activities of the fishermen and therefore they are in a better position to improve them than others.

Don't you think also that they will have greater sympathy for the fisherfolk than a department which has to deal with all classes of people?—Yes. I would very much like that even for these agencies they should be in the Fisheries Department.

For the sale of fish you said that there is another middleman. To eliminate that man what would you suggest?—I would wait until we have a larger number of societies. Then they can pay for a man at Colombo who will be in direct touch with the consumers. In fact, in the model fish-curing yard we attempted it, but failed.

So you think nothing is required at present in that direction?—No.

With regard to the sale of fishes here, do you like to have any sale societies?—As it is I find there is not much difficulty experienced in selling fish here. I do not think a separate agency is necessary. The important market for cured fish is Colombo. One man named Impichi now monopolizes the whole trade. If we have a large number of societies we can oust him. We can find an easy market for more cured fish.

Dr. Gravely: These people are already indebted and therefore if co-operative societies are to be started, they ought not only to provide funds for nets and boats but should also provide funds for weaning them from the clutches of the money-lender to whom they are already indebted. With your experience of co-operation we should like to have your suggestion as to what could be done under the circumstances. Are the fishermen so much indebted as to require relief? Can they be redeemed?—I do not think they are in such a state of indebtedness as not to be redeemed. I do not think there should be another bank merely to redeem their debts. The debts are not big. They are very small.

I understand that the two societies to which the Government have advanced Rs. 1,500 each cannot start work immediately because the fishermen are very much indebted to the money-lenders, and that they ought first

to be redeemed?—You can redeem them out of their income. Their average indebtedness is less than Rs. 100. Their present indebtedness will not stand in the way of the societies working in the manner I have mentioned. The societies themselves could redeem them from their debts.

Mr. Tampoe: Do you know the Agriculturists Loans Act?—I do not know.

You know the agriculturists have loans given them, one for improvement of land and the other for provision of seed-grains and live-stock?—Yes.

Do you think that a co-operative society among the fishermen can do as much for the fishermen as the Revenue Department is doing to the ryot population?—The co-operative society could do.

The agriculturists are getting loans on easy terms from the Revenue Department?—But even there considerable difficulty is experienced in getting loans. I urge for easy loans at 6½ per cent. The idea is that if Government could advance money on easy terms it would certainly be good.

Are the loans to be granted on the credit society system or on some system analogous to the takkavi loans?—I have already said that the Government should reduce the rate of interest from 7½ per cent to 6½ per cent.

To fishermen or generally?—To the curers' societies.

Some witness said that the fishermen being ignorant, find it very hard to remember the dates on which the repayments are due and, without any intention of defaulting, they automatically become defaulters. Is it an insuperable difficulty in the way of co-operative efforts?—I have suggested that there should be intensive supervision by the officers of the Fisheries Department. Then that difficulty could be got over.

What is your candid opinion as to the comparative advantages of having a fisheries bank (department) and co-operative bank (department)?—A special department could be better. I am decidedly of that opinion.

Mr. R. S. Nayudu: Supposing as you say they are asked to subscribe for shares and their debts are reduced in that way, don't you think that without redeeming their debts you cannot proceed much? They will again be in the clutches of the money-lender?—Not necessarily. Supposing these societies are able to own their boats and nets, they could get fish cured and sold and out of that income they could redeem their debts. But if their indebtedness is very large it would be very difficult to redeem them.

To whatever extent they are indebted you must redeem them first before you put them on their legs. Then only they will be able to do their work?—In that case we will have to redeem them and then begin work. The bank will not advance money for redeeming them. The only way is for the Government to lend money. Any loan given to them should be spread over a period of ten years.

That means you will have to redeem their debts and then provide money for purchasing boats and nets?—Yes. I suggest a long-term loan for the purpose. Unless this is done we cannot improve the condition of the fishermen.

When it is a long-term loan and the amount is big, don't you think that it will be rather hard for them to repay?—If it is spread over a long period the repayment would be easy and the amount of instalment is very small. It will be necessary in certain cases to spread the period of repayment up to fifteen years.

When you have found provision for purchase of boats and nets, don't you think side by side we shall have to organize a society to find a market for the sale of these goods?

They will have to find a market. The society which makes loans should find sale for the fish in which case it can easily recover the loan. We must have not less than 100 societies for four districts to ameliorate the condition of the fisherfolk.

What amount do you think would be required to redeem their debts and to finance them for their boats and nets?—I have no idea.

Mr. Tampoe: The average debt of a fisherman is about Rs. 200 according to some witness?—In that case, taking six to be the average number of indebted persons in a society, we may require Rs. 1,200 for the liquidation of debt only. I don't think we need try this in all societies. We may take a few societies in Malabar and a few in South Kanara, try the experiment and then extend. Further, we may select societies where the people are not indebted to the extent of Rs. 200.

Mr. R. S. Nayudu: You are here to give relief to the people who require it?—There may be people who are beyond redemption. Such people we have to give up as hopeless.

We ought not to give them up as hopeless?—We must get a large amount of money for attempting their relief. Personally, I would like to select some areas in each district and find out where the people are less heavily in debts.

You are trying to find out where the work of relief would be easy. Our object is to relieve people who are under the heels of the middleman?—I would select an area where the people are less indebted.

To the more heavily indebted people you ought to advance money and teach them habits of thrift. Your object is to give relief and to teach thrift?—Yes. We ought to relieve people who are less indebted. It will not be worth while redeeming the impossible people.

Dr. Gravely: You take what is possible first and then extend your activities?—Yes.

Mr. R. S. Nayudu: You are selecting a comfortable area for the department. What is the use of selecting an area where the help is more or less not needed at all?—Otherwise the work will be very onerous and very slow and it will not be possible to redeem them completely. I would select six places in Malabar and six in South Kanara. Four lakhs of rupees would be required to relieve the indebtedness of all people (fishermen) in my circle.

Mr. Tampoe: My calculation is 5 lakhs.

According to your calculation how much would you require for the relief of the less needy in the 12 places you selected in your area?—Half a lakh would be required calculated at the rate of Rs. 4,000 for each society.

As regards sale societies would you like to try particular areas or have societies everywhere?—Each society must have a sale side.

Would you like to have a sale society where there are no credit societies?—There will be some difficulty. In the case of sale societies the question is one of human material. You cannot find men to sell these.

I will come later to the point as to who should be in charge of them. First tell us whether it is possible to arrange a sale society without any credit society attached to it?—It is possible. I would leave these things in the hands of the Fisheries Department.

Dr. Gravely: You would like to hand over all these things to the Fisheries Department to find their own officers and so on?—If the Fisheries Department can develop the system of co-operation they may do it without assistance from us. What we could do is to train the men whom the Fisheries Department employs and sends to us for training.

And then you would have nothing to do with fishermen?—Yes.

Do you find any difficulty in the dual control now?—We find. We have not got the staff nor are we in a position to take up the work of supervision. The Fisheries Department also are unable. So, between these two, the societies apply for voluntary liquidation.

Our officers have only just been given some knowledge of co-operation?—That is only for four months.

You spoke of three or four societies which are working well. Is that due to the fact that they get good supervision?—It is due to the interest which the members themselves take in the society. The satisfactory work of a society is due more to the interest which its members take than to the supervision.

In other words there is no society which has got either from you or from us the supervision that it requires?—No, not a single one. You cannot find men in all societies for these things. In the case of a few there are some who take some interest, but in the case of others one man may not be able to get others interested in the work.

You have not yet found anybody who can make the members of a society take interest in their society?—No. In the case of one or two societies the Fisheries Department did take interest and the societies did improve. So that I am hopeful that the Fisheries Department can improve these societies. The control of the societies should be in hands of either the Fisheries Department or the Co-operative Department.

*Are the thrift societies in a position to help people save during the fishing season? You said that a few of these societies worked well. Have they helped people to get out of debt?—They were less indebted.

Was any portion of their share capital used to clear their debts?—A part of their share capital was lent to clear their debts and a part was given them to enable them to purchase articles of food, etc. I cannot say whether they have been completely redeemed. Some amount has been advanced for redemption of debt.

We want to know the period within which the loan should be repaid and how far that is being done now?—In the two societies where we have lent Government money what we do is this: there are a number of fishermen who go in each boat. Supposing they get Rs. 10 by the sale of fish, they pay 8 annas for each coolie who works on the boat and the balance goes for the liquidation of Government debt. A fraction of it is given to them by way of rebate. This system has been working for the last one year and they have repaid a portion of the debt.

Mr. Tampoe: What percentage have they repaid?—I have no idea of the actual amount. I think they have repaid 35 per cent. I consider that it is adequate.

Do you think that it would be a nucleus to start a fund?—It is sufficient even to do that.

Dr. Gravely: There are several proposals in connexion with the fisheries schools. One criticism with regard to them was that it is no use teaching subjects like net making, etc., to fishermen's children. They can learn it much better from their parents. Give us your opinion. Do you feel any advantage in that kind of teaching?—I do feel that there is a real advantage gained at such schools. I think it is better that the boys are taught these things in schools. Teaching by parents may not be satisfactory. I think the boys would be trained better in the schools than at home by their parents.

Although the teachers do not have very much experience?—Even then there is considerable difference between that training and the training given by parents. The training in the school gives them a wider outlook.

With regard to the teaching of carpentry, do you think it serves any useful purpose?—I must admit I have no idea about it.

The Committee had before it a number of witnesses who belong to the fishermen community and who have had the benefit of higher education. Do they move freely with the actual fishermen who are in the business?—They do move freely with the people.

You don't think that the education which they are having now has necessarily cut them away from their relatives or profession?—I don't think.

You don't think they would get out of touch with their community and environments?—There is no such danger.

The Chairman: I take it that you agree with the view that if separate schools are instituted for the purpose of giving a sort of fisheries bias to the pupils that are educated there and to the teachers that are trained there, it is an advantage? The idea is that these teachers when they are trained should go to a fisher village and be teachers in the schools and train the boys not only for three years, but even more?—Yes.

In fact, they are to live in a fisheries atmosphere?—Yes. I should consider the fisheries bias to be of primary importance to them. These fishermen should have primarily the fisheries bias; they should be trained there, and after that, they should go and preach this thing in the fisher villages so that they can develop this idea among them.

Do you think, on the other hand, if these teachers are trained in the ordinary schools, they won't have the sympathy towards the fisherfolk?—No.

After school hours all students may meet and mix together at some place outside the school?—At a playground. It is a good place for growth of comradeship.

Will you tell us what service you have had in the Co-operative Department?—I joined as Inspector in 1914; I became Chief Inspector, then Assistant Registrar, and am now Deputy Registrar. I belong to the Billava community (whose vocation is tree tapping).

You are a native of South Kanara?—Mangalore. I worked as Chief Inspector in Malabar for two years and in South Kanara for five years. I was Assistant Registrar for three years and I have been a Deputy Registrar for the last three years.

(The witness withdrew.)

M.R.Ry. M. OTHENAN Avargal, Cannanore.

Replies to the questionnaire.

I. AIMS OF THE DEPARTMENT.

1. The objects with which the Fisheries Department was inaugurated are (a) the improvement of the fishing industry, (b) the improvement of the condition of the people engaged in fishing.

2. These objects have been achieved to a certain extent, but there is still room for more to be done in these directions.

3. Failures are to be noticed in not introducing any new methods of catching or curing fish.

4. The cause of failure, in my opinion, is the lack of technical knowledge on the part of the officers of the department.

5. There is no denying the fact that the objects are worth achieving and to remedy the cause of failure I would suggest that experts, with more technical knowledge should be appointed to the department. As young men selected from the fishing communities will suit the purpose better than any others, I suggest that all officers of the department should be men from the fishing communities.

6. The main objects of the department should be the improvement of the industry and the condition of the fishing people.

7. These improvements can be made in the following lines: In (1) hatching, (2) catching, (3) curing and (4) marketing fish and improving the condition of the (1) health, (2) wealth, (3) wisdom of the people.

II. FISH FOOD SUPPLY.

8. If local consumption means only the consumption by people of the fishing villages and suburbs, the present quantity of fish caught cannot be said to be very deficient. But if local consumption can include the consumption by the people of the whole district or Presidency, the fish caught is far below the demand.

9. Fish food, in my opinion, is considerably cheaper than many non-vegetarian food and seeing to its nutritious value, it should be said to be doubly so.

10. Fish food is more in demand now on the West Coast as cultivable lands, where after the harvest of the principal crop of paddy, the poor used to grow vegetables, are being converted into coconut gardens. Fish, especially sardine, is one of the staple foods of the poorer classes on the West Coast being very tasty and nutritious and at the same time cheaper than most other foods. So the failure of the sardine is felt by the poor more than the failure of the paddy crop sometimes.

III. IMPROVED METHODS OF FISHING.

13. The present methods of catching fish so far as they concern fishing in not very deep waters cannot be said to be very inefficient or ineffective. But the chief difficulties that the fishermen find in catching fish now with their present implements are that they are not able to go far and wide, in search of the fish, nor are they able to catch the fish even if they see them, if the currents and wind are not in their favour. If methods can be devised to enable the fishermen to go far and wide and to tide over the difficulties of adverse currents and wind, the catch of fish can very much be improved.

14. I regret to note that no improvements have been made in any three of the undermentioned: (a) fishing craft, (b) gear and tackles, (c) fishing grounds. They remain what they were, some decades ago.

15. The reason for the non-effecting of any improvement in these is, as said before, the lack of technical and practical knowledge on the part of the officers who are deputed to the work. Hence the necessity for appointing men of practical experience in these matters.

16. I would also suggest the introduction of small steam and motor boats in the place of small canoes used by the fishermen now.

V. FISH-CURING YARDS.

43. The main consideration that led to the transfer of the fish-curing yards to the Fisheries Department was the improvement in the methods of curing fish, which the department was experimenting upon.

44. But the results so far achieved do not justify the transfer, as no improvement worth the name or of any great advantage to the curers have been effected.

45. Improvements in the methods of curing can be introduced into the yards, even if the yards are under the Salt Department as before. It will be sufficient if experts, with knowledge of the new methods of curing, visit the yards and demonstrate the new methods to the curers. But if the improved methods will not bring in a comparative profit to the curers, with the extra expenses and trouble, the curers will not take to it so readily.

46. The enhancement of the price of salt in the yards, since the yards came under the Fisheries Department, is a severe blow to the curing industry, and a heavy burden on the poor half-starved curers. In this aspect, the transfer of the yards to the Fisheries Department has done more harm than good to the poor. The fish-curers are a set of people who live entirely upon curing and on the very meagre and uncertain profit they get out of it. The raising of the issue price of salt is, therefore, a real menace to the industry. Under these circumstances, I suggest and request that the issue price of salt should be reduced to as minimum a rate as possible.

47. If tenders are called for the transport of salt to the yards, the transporting charges shall be cheaper and the supply will be more efficient.

48. As salt duty is principally a concern of the Government of India, the supply of salt to the fish-curing yard should, in my opinion, be undertaken by the Government of India.

49. The reduction of the issue price of salt will benefit the curers and consumers more than the fishing men and middlemen.

50. The poor curers do not see any reason why the price of salt should be raised. The Government had been kind enough to give the curers salt at reduced rates ever since the introduction of duty on salt. The object of the opening of the yards was to help the poor curers by supplying them with duty-free salt.

51. The quantity of fish salted shall vary according to the catch of fish. But on an average according to my rough calculations the quantity in each yard on the West Coast may come up to between seven and ten thousand maunds a year.

52. The demand is likely to increase with the introduction of new methods of catching fish.

54. The maintenance of the fish-curing yards can be cheapened. Under the present arrangement, each yard has an officer and a couple or three peons. The work these men have to do at the yards is very little. The distribution of the salt is now practically done by a masalchi. The officer only keeps an account of the salt issued every day. This work can be done by a clerk on a pay of Rs. 20—25. The peons are not a necessity. A single peon to help the clerk is sufficient. A night watch is also necessary. In all, a yard can be kept in order by a clerk on Rs. 25, a peon on Rs. 10—15 and a night watch on Rs. 10. At present there are inspecting officers, who visit the yards in the name of inspection. But they seem to have very little to do at the yards. So these inspectors can be said to be a superfluity.

57. The hygienic condition and method of curing are not very unsatisfactory.

58. Better and more convenient arrangements for the supply of water for washing fish, the floors of the sheds and the nets and mats used for drying and an equally convenient arrangement for the draining of the used waters will add greatly to the sanitary and hygienic curing of fish in yards.

59. This can be done at a cost of a few hundreds of rupees for each yard.

60. The cost can be met by the levy of a small cess on the salt issued, in case the price of salt is reduced.

VII. EXPERIMENTAL STATION, TANUR.

70. I have visited the Tanur Experimental Station two or three times when I had been to the place in connexion with my trade in fish oil and guano.

71. The station was opened with the object of experimenting upon new methods of curing fish and treating fish in new ways.

72. The want of an expert with practical experience of the industry has stood in the way of achieving many of the objects.

73. The working of the station can be improved by the appointment of an expert and experienced man as its manager and by shifting the station to Calicut where now the facilities of electricity are also available. The Assistant Director, Coast, who is directing these activities, must also be one with practical experience.

74. I regret that the results of the experiments in none of the under-mentioned have been availed of by any one on the Coast. Tanur being an out-of-the-way station, people seldom visit the place. The people of the place are mostly ignorant and illiterate and are not in a position to take advantage of the results. The results of the experiments have not been adequately published or circulated. Leaflets in vernacular languages, on the results of the experiments, and demonstrations by the staff at the fishing villages shall help the spread of the results among the people.

VIII. INLAND FISHERIES.

I am sorry to note that the department has not done anything in the matter of inland fishing on the West Coast, even in rivers which are teeming with many varieties of fish.

IX. KINDS OF FISH.

97. The most important varieties of fish that are of great economic value on the West Coast are (1) sardine, (2) mackerel, (3) cat-fish, (4) ribbon fish, (5) prawns.

XIII. TRANSPORT.

Most of the fishing villages have not roads connecting them with the railway stations and much difficulty and inconvenience is experienced by the fishermen in carrying their catches to the railway stations for export. The fish oil and guano factories are all situated on the beach. They also find the same difficulty in carrying their produce to the railway stations. Most of the fish oil factories are beyond the port boundaries and the customs authorities object to shipping their produce direct from the factory, and insist upon their being brought to the port for export. Even in bringing the stuff to the port, there is the difficulty of obtaining consent from the Customs authorities. So, it will be a great advantage if these difficulties in the way of export are removed.

The railway and steamer freights are a little high. The railway and steamer companies allow reduced rates to wagon loads and larger quantities at one time. These reduced rates should be given to all loads. In the matter of booking goods priority should be given to fish, as it is a perishable article. The business of exporting fish guano and oil is much handicapped, as there are not means of direct conveyance to Japan and Europe. Steamers do not take fish guano direct to Japan or Europe.

XIV. SOCIO-ECONOMIC WORK.

One of the two main objects of the department is the improvement of socio-economic condition of the fisherfolk. The socio-economic work should be directed in improving the health, wealth and education of the people.

The health of the fishing people is rapidly deteriorating. The insanitary condition of the villages and the drink evil that is prevalent among them are the causes of deterioration. About the sanitary condition of the fishing villages the less said the better. Fishermen always prefer to live in clusters as their calling is inter-dependent, and for this reason most of the fishing villages are greatly congested. This congestion with the absence of any

sanitary arrangements for the removal of the remains of fish and nightsoil which are always thrown on the beach and in the close vicinities of their houses make the place most untidy and unhealthy. Periodical outbreaks of cholera, plague, smallpox, etc., carry away a large number of the people. Other ailments disable many among the remaining. The children are found to suffer from sores and itches and many other ailments. There are a number of puny and weak children among the fisher people. Pure air and pure water are a desideratum, which tells upon the health of the people of the fishing villages. Wells contain brackish water and they are contaminated by the throwing into them of the remains of fish and nightsoil by the crows. Nothing but a personal visit to these places will convince of the sad condition of the health of the people. To remedy these things I suggest the removal of congestion by providing new open places for the building of houses and providing pipe water. Another evil that is eating into the vitals of the Hindu and Christian fishermen is drink. The existence of toddy shops in almost all the villages where the Hindu and Christian fishermen live, sometimes two in a single village, is a real menace to the health and economic condition of the fishermen. I suggest and request that these toddy shops should be removed from these villages.

The economic condition of the fishermen is also not very satisfactory. The most irregular and uncertain nature of their income and the want of thrift among them have thrown many of them in deep debt. The fishermen spend lavishly during the times of heavy catches of fish and are forced to borrow during slack seasons. Facilities and arrangements to redeem their present debts, and to keep by a portion of their income during heavy catches, will relieve them a good deal. Co-operative societies are now established in many of the villages. But they have only made the fishermen more indebted as they have not cared to lend the fishermen money for legitimate needs. Co-operative societies should redeem the existing debts of the fishermen and enforce payment of the loans during heavy catches. The co-operative societies started in some of the fish-curing yards are doing valuable service. The appointment of inspectors and supervisors, from amongst the fishermen communities, who are better acquainted with the wants and needs and customs and manners of the fisherfolk, will help a smooth management of the co-operative societies among them.

The appointment of a few honorary socio-economic workers of the fishermen caste will greatly improve the socio-economic condition of the fishermen.

The fishermen are very backward in education. Recently with the opening of fishery elementary schools in fishing villages and the fishermen coming in contact with educated officers of the Fisheries Department, an awakening for education is visible among the fishermen. The elementary schools opened by the Fisheries Department are helping the spread of elementary education a good deal. There are a few who have received higher education among the fishermen, but the difficulty they meet with in securing appointments are discouraging others to go in for higher education. The Fisheries Department should give preference to educated young men of the fisher communities in the appointment of their officers. The educated fishermen on account of their hereditary inclination and association with the fishing industry are better fitted to occupy such posts.

In the elementary schools opened by the Fisheries Department, at least a period of their school hours should be devoted to lessons on fishing industry.

Attached to every elementary school, there should be a small reading room, where the grown-up can read newspapers and magazines. The fishermen by the nature of their calling are disconnected by the outside world. They go out to sea early in the morning and return to the shore only late in the evening. As such they have very little occasion to improve their knowledge. A reading room in their close neighbourhood will attract them to it and it will also distract them from the enticement of toddy shops and gambling dens, which are their resorts at present. With the spread of education and knowledge among the fishermen, the industry will also improve.

I beg to conclude my evidence and suggestions with a request that the Committee will be pleased to go through them carefully, and give their best attention to the points raised in them. I further beg to thank the Committee for their kindness in giving me an opportunity for placing my views before it.

Oral Evidence.

The Chairman: What community do you belong to?—Mukkuva community.

What is your present profession?—I am a trader in fish oil and fish guano.

Have you got a factory of your own?—Yes; at Cannanore; it is tarwad, i.e., family property.

How many people do you employ in the factory?—According to the supply of sardines. When it is a bumper catch we will employ something like 100 people, both males and females of the Adi-Dravida caste, but no fisherfolk; they don't come for that work generally. The Mukkuva women are engaged in fish-curing yards; they never go out of the boundary of their village. The fishermen generally don't like to live apart from each other. Fishing wants co-operation.

Is there any objection to-day to employ fisherwomen in the factories?—There is no objection on the part of the employers. These people do not come to work in the factory, they generally come to carry fish from the boat to the factory. We do not make any distinction in employing people. There are many Adi-Dravidas along the coast. I have been to Quilandy, Badagara and Chowghat in connexion with my trade. When we started at Quilandy we had to take Adi-Dravida coolies from here on monthly pay.

Do fisherwomen object to live side by side with the Adi-Dravidas?—That is one chief objection which has prevented the fisherfolk from resorting to the factories for work. But it is gradually weakening. The Adi-Dravidas are getting access to the villages now.

In your factory what is the annual output of oil?—That depends on the catches; in some years we got up to 200 tons of oil. A ton sells from Rs. 65 to Rs. 300. It is exported to Calcutta. There is a large market there for fish oil used for batching jute. This oil is used for jute, for tanning leather and soap manufacture. They are making some other uses of it also. I find samples imported from Japan, which are free from all disagreeable smell. It is deodorized and in solid form, and white in colour. It is sold cheaper than ours. I had to do it at the Calcutta soap works; I made it into a solid substance with the assistance of a soap expert. But he won't give out the secret.

Do you know that a good deal of the oil goes to France?—There may be some European firms in France or Hamburg. I don't know. The first European firm that took up the trade in fish oil was Thompson & Co. of Cochin.

How do you purchase this fish?—We make advances to the fisherfolk for the purpose of taking the whole catch of the fish to our factory. There are ten to fifteen boatmen under me who receive advances and supply fish. I pay them according to the market rate. It is not only sardines, but every catch must be brought to us.

Let us take the sardines; suppose there is a catch of 3,000 sardines, what is the price?—It is not so sold: it is mackerel which is so sold.

What is the average price of 3,000 mackerels?—Rs. 2 per 1,000.

How is it determined by weight or by baskets?—It is by kallis. The boats that are now used on the West Coast for fishing have got partitions which are called kallis. The partition is made by means of bamboo tatts. A kalli will sell from 8 annas to Rs. 5 and Rs. 10. It is only when it is 8 annas and 10 annas that the factories have been able to make any profit.

How many kallis would be required to get a ton of oil?—Nobody can answer that question; it depends on the oil contents of the sardine. Generally 60 kallis will be required for one ton.

How much do you get for a ton in your own place?—We don't sell it in retail.

Mr. Tampoe: Suppose you did, what would a ton cost ex-factory?—Rs. 65 to Rs. 200. Though a catch may be small, the oil contents may be good, and vice versa.

Do you keep accounts showing the purchase of fish, the yield of oil, the price you paid and all that?—We keep an account of the purchases and sales, but we don't keep an account of the oil extracted. We can find it out from the sale-proceeds.

You dispose of every year's oil that very year?—Sometimes we do. The oil is not spoiled by keeping for one year. Generally we find that it is very profitable to stock it.

Will you explain how you treat these catches?—We carry them in baskets and put them in boilers that are ready. (The boilers are iron tubes in the shape of boats with fire underneath. One tube would contain three to five kallis.) Ordinarily we heat from ten to fifteen minutes. The first boiling is a little difficult. After they are heated, they are thrust out into a tube attached to this boiler. From the tube the water along with the oil will be drained to a pit; there we have process of separating oil from water. (The stuff that is in the tube is put into a coir mat and pressed from which oil as well as water will be drained to the pit.) The oil will collect on the surface of the water. After removing the whole water, the oil will remain. If there is still some water, it can be removed by boiling the oil.

What do you do with the fish that remains?—It will be pressed, and then dried and sold as manure. A ton of it will sell from Rs. 45 to Rs. 120.

How many tons of guano you would get roughly corresponding to a ton of oil?—Nearly five to six tons of guano.

The Chairman: The oil so prepared is not treated afterwards, either for removing the smell or any other impurities?—No.

The witness: As regards the disappearance of sardines, the failure of the sardines is the failure of the principal crop as it were in these parts. The poorest sort of people depend more on sardine than on rice. They do not get mackerel; it does not also agree with their stomachs. The sardines are taken any quantity without any bad consequences. If the department can do anything in the way of research, it is in these four things: hatching, catching, curing and marketing of fish. If there are no sardines they must see how they can hatch them or find out where they have gone. That can be ascertained from the sea drifts that are washed along the coast. When the sardines appear in large numbers, there will be some sea drift. An examination of that as well as the examination of the sea currents will help us to understand the causes of the appearance and disappearance of the sardines. When the sardines disappear, the drifts also will disappear.

Assuming they go to South Africa or Canada, how will you follow them?—We cannot assume, that, because we have not been able to find sardines on the Coromandel Coast.

Mr. Tampoe: Snipe comes here and goes to Siberia?—But when they come they come all along the coast; when sardines come, they come only in Malabar. There is another kind of fish which is found in Karachi, and sold in Karachi and other markets. It is called Bimbly fish. It is consumed by the labouring classes. It is about three inches or four inches; it is caught at Karachi and taken to Calcutta. In the East Coast, there is another kind which is called Nathallu. Bimbly is like Nathallu in colour and appearance. It is the poor man's food. Then we have to improve the methods of catching. For that we must encourage deep sea fishing. I don't find any trawler experiments done in this direction.

The Chairman: Suppose they put a trawler on the waters and bring good catches; do you think that people here will be able to form into a society and purchase them?—I am for starting a joint stock company, and for shifting all the experiments from Tanur to Tellicherry or Cannanore. Tanur is not a place where improved methods will be taken advantage of by the people. It is an out-of-the-way place. Better classes of fishermen are at Tellicherry and Cannanore.

Calicut is a very good trading centre?—I have no objection to having it at Calicut. Any centre selected must be accessible to the people. If Cannanore is selected there is every facility for the South Kanara people coming. The cost of living at Calicut is also greater. Under curing, we may include all processes of treatment of fish from the stage they are caught till they are ready on the market for consumption.

Mr. Tampoe: Do you use any processes for curing fish?—No; we don't cure ourselves; we entrust all the curing to the fishermen. Under curing comes salting, cold storage, fish meal, manure and all that. The department has not made any improvement in this line. But I don't want to cast any aspersions on it.

Dr. Gravelly: Did you introduce any change in your factories?—We are not men who have any chemical knowledge. In the present process of extracting oil there is not any scientific or chemical process involved. It is in a very primitive stage. The soap factory at Calicut had been purchasing my oil. They called for samples, and they showed me some samples from Japan. It is quite different from what is produced at Tanur. We don't get the white solid substance. We might employ a chemist to work this out for us but a chemist means a big salary. If I had the capital, I should think it worth while to employ one. I want to bring one fact to the notice of this Committee. Owing to the absence of a chemical expert in the factory, we are exporting all our fish guano to Colombo. What they do there is to analyse this and find out the percentage of nitrogen that it contains. If we have got an expert or anybody who can do the analysing work for us, then we can say that our guano is guaranteed to contain so much percentage of nitrogen. Almost all the merchants who have been dealing in fish guano have sustained great losses on account of the reduction in price owing to the reduction in the percentage of nitrogen as shown by the analysis at Colombo. So Government should see that the guano that is exported from Malabar is analysed by their staff before it is despatched to Colombo.

Do you think that the percentage of nitrogen comes to be reduced by storing?—To a certain extent, by absorption.

Do you store your guano?—We stock it in gunnies, one over the other; and we find a lot of beetles between two gunnies; we don't know how to prevent them. As regards marketing, all the salted fish is exported either to Colombo, or to Tiruttani, Villupuram and other places. Villupuram is the second exporting station next to Colombo. I find most of the fish-curing yards have not got any road connexion with the railway station. That is telling very much on the industry of the villagers. Then there is the customs. Suppose we have got a factory at the north end of the beach here. The customs people don't allow us to take the goods from there by sea to another place in the south. There is no road connecting the two places. That is a real difficulty. Then all the guano sent to Colombo is analysed there and the result intimated to us. There is no officer or expert to supervise the analyst there. The buyers are at the mercy of these people. Almost all the fish oil and guano factories have sustained heavy losses, on account of the alleged reduction in nitrogen.

Mr. Tampoe: There is a commercial chemist who will do the analysis?—They don't rely upon his analysis. When we send results of our analysis to buyers, they won't take it. Buyers always demand delivery at their place, c.i.f. It is only in f.o.r. delivery we have samples. In some cases where we sell f.o.r. or f.o.b., analysis should be at their end only.

What remedy do you propose?—The remedy is that as soon as the shipments are made, the Government should see that the samples are examined by experts and also make other arrangements to protect this industry.

The question is whether the trade is sufficiently large to justify expenditure on expert officers?—To safeguard against wrong analysis.

Dr. Gravelly: Most of the destruction of the flesh of these things is going on on the outside. If you draw your samples from outside you would get much less nitrogen from them?—The samples are not drawn in that way. When they are ready for shipment, the buyer's man will visit the place where the bags are stacked and he will select some ten or fifteen out of the stock, and just open the stitch and pass his hand inside a bag just at the middle of the contents and draw the sample in this way from ten or fifteen bags and then he will mix all these and sample again is drawn from them.

(The witness withdrew.)

M.R.Ry. E. RAMAN MENON, Headmaster, Fisheries Training Institute, Calicut.

Oral Evidence.

The Chairman: You have been Headmaster of the Training School?—Yes; for nine years. I train the pupil-teachers. There is also attached to this an elementary school, up to the V standard.

How does your training school differ from other training schools?—We have three years' course instead of the two years there. Not only do we devote the extra year to extra subjects, but we also devote extra time all the two years to extra subjects. We teach social economics, co-operation, rural sanitation, temperance methods, then we teach zoology with special emphasis on marine products, and fisheries science as it is called. We teach the various aspects of the industry. We send the students out to the sea to learn how to manage the boat. These are the specialities, but apart from these we have tried to teach all subjects suited to fisherfolk.

Suppose you train a student in the ordinary training school for two years and bring him and train him in your school for the third year, do you think he will be inferior to the man who goes through all the three years' course in your school?—I would have two years' course in the ordinary training school and two years in the Fisheries Institute. For getting the fisheries bias one year would be insufficient. There are certain advantages in having pupil-teachers sent to the ordinary training schools, but the other training school is a more efficient institution for professional training. But our model school is an inefficient one compared with other schools. The teachers that we appoint are men of lower status.

Why do you appoint such teachers?—The difficulty is our training school trains only ten or twelve a year. Government will not be willing to spend so much on its equipment.

You are referring not to the pupil-teachers but to regular teachers?—Pupil-teachers have to follow the methods shown by model school teachers. If these be inefficient, how can our teachers be efficient? We employ only elementary grade teachers in the model school. In the ordinary training schools they have secondary grade men. Their salaries range from Rs. 35 to Rs. 60.

What will be the difference in pay if the whole school is manned by secondary grade teachers?—Rs. 700 to Rs. 800 a year.

Our model school teaches only up to the fifth standard, but other model schools teach up to the eighth standard. This is a serious defect to our training secondary grade men.

How many boys have you got in the training school?—33.

How many matriculates or S.S.L.C.'s.?—Only one. They don't insist on this qualification.

They don't set value on the eligibility certificate?—No.

You set up a standard of your own and call these men secondary grade men?—Yes.

Supposing that higher classes up to the eighth standard are introduced in your school, do you think there will be material enough from the fisherfolk?—There will be sufficient number of boys to engage the teachers. I would propose the raising of all model schools to this standard.

If that is done, then you will have no complaints?—Then we should have some playgrounds. There is what is called mixing with other teachers after school hours.

Is there not danger in such association? Probably they may think that other professions are better than the fisheries profession?—The elementary grade teachers are not likely to run away from their profession. They know that fisheries pay them better than anything else.

Will they have the same sympathy towards the fisherfolk?—They are members of the fishing community. Except their school hours, their life is spent as fishermen. We have the special training in any case. I wish that it should be for two years if the present efficiency is to continue.

Dr. Gravely: One of the difficulties is, you don't get enough people into the training institute to make it a paying proposition and supply the corporate life?—It is not that we don't get men enough. We must give them an opening later on as teachers in elementary schools; as the number of schools is limited, if we take a larger number we shall not be able to provide them with employment later on.

If as a result of this Committee's recommendations a large number of schools are started, then these improvements that are suggested would take place in the training school?—Yes; in that case a separate training school will be absolutely necessary, because the present training school will not be able to provide the accommodation.

Then your medium of instruction should be Malayalam?—Yes; except to the secondary grade men.

If we start on linguistic basis we could enlarge this training institute rather than start another in South Kanara?—That is quite true, but the language difficulty will still remain. There Kanarese students will have to be trained through their vernacular; here all boys are Malayalam boys.

If the teachers' training is all done in the ordinary schools, they could be brought over here for special training?—Yes; our teachers are sent for ordinary training, in the language areas, to separate training schools. All of them could be brought over here for special training. But the course should be increased to four years. It would not be more costly.

Would you have any difficulty in getting men for a four years' course?—I don't anticipate much difficulty. From the original letter of Sir Frederick Nicholson, it will be seen that he wanted to institute a four years' course, but since it was limited to three years he wanted to supplement it by additional training at a sessional class.

You teach carpentry?—Yes; we are teaching it to teachers and they are teaching it in the elementary schools.

Do they take up carpentry during the time when they have no fish catching?—They can't take to it as a profession.

Have you seen any fisherman actually repairing his own boat?—I think it is not time to expect such results. It is only during the last two years that carpentry has been taught.

(The witness withdrew.)

The Committee then adjourned till 11 a.m. on Tuesday, the 24th July 1928, at Madras.

Tuesday, July 24th, 1928.

MADRAS.

PRESENT :

Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, (*Chairman*).

Mr. A. McG. C. TAMPOE, I.C.S.

M.R.Ry. P. V. MANIKKA NAYAKAR Avargal, B.E.

Dr. F. H. GRAVELY.

(Dr. B. SUNDARA RAJ was also present.)

**M.R.Ry. U. KARUNAKARA MENON Avargal, Assistant
Director of Fisheries, Coast.**

Oral Evidence.

Mr. Tampoe: You are a graduate of the Madras University?—Yes. I am a graduate in History and Economics of the Madras University. I entered Government service as clerk in the Revenue Secretariat in the year 1907. In December 1918 I was appointed Personal Assistant to the Director of Fisheries and then in 1924 as Assistant Director of Fisheries in charge of the West Coast.

Do you wish to answer any particular question in the Questionnaire?—I saw the Questionnaire only very late when it was published in the newspapers.

You have a fair idea of the main objects of the Fisheries Department?—Yes. I think all the objects of the department have been achieved to a considerable extent. The main objects were the supply of fish food and scientific research and also socio-economic work among fishermen. Our object is not so much the increase of fish food supply as the improvement of the quality of it.

Has there been a distinct improvement in the quality of the fish food supply?—Yes.

In what way? In regard to fresh fish your department has done nothing?—No. In regard to cured fish it has placed it on a scientific basis.

So that, the chief success has been in the direction of better prepared dry fish in the fish-curing yards?—Yes. With regard to fresh fish the department has not done anything materially. At Tanur something has been done, but even that has not achieved much success.

Has any trader in fresh fish ever consulted you?—No, Sir. But Mr. Soma Marakala has consulted the Director of Fisheries and advice has been given by him.

Has he adopted the advice?—He was sending fresh fish to the interior. He was curing the fish and sending it packed in ice. It was not quite a success, because he could not promise regular supply. Now he has started an ice machine.

V. FISH-CURING YARDS.

Can you tell us anything about the fish-curing yards? I should like to know your experience with regard to them, whether the improvements are appreciated by the fishermen?—The improvements are appreciated by the fishermen.

Although they pay for improvements themselves?—They appreciate the improvements, but of course they protest against the increasing issue price of salt.

Some witnesses said that the middleman goes and buys fish at the current market price from the fishermen?—Yes. I have not actually seen it. Further, one who is present when these transactions are going on will not know. It is really the capitalist who has advanced money to the fishermen that has the right to purchase the fish. The price of the fish is regulated by competition among the capitalists who have advanced money. Even that competition will not be appreciable. If a fisherman does not wish to sell his catch for the price offered by the middleman, he has to make himself the customer of another capitalist and then sell it. He should first discharge his loan. The middleman therefore practically fixes the price. The fisherman is not allowed to sell fresh fish to the ordinary public. He can do so only if the capitalist does not want to purchase it. If the capitalist wants to buy the whole lot, the fisherman has no alternative but to sell his catch at that price.

Does the capitalist ever buy fish for selling fresh himself?—He sells in the bazaar. He is the middleman for that too.

Is the bulk of the fish in the yards the middlemen's or of the fishermen?—The bulk of the fish belongs to the middlemen although a large percentage of the ticket-holders are fishermen. Almost three-fourths belong to the capitalists.

So that any remission in the issue price of salt will really benefit the middlemen only?—The fishermen will get a better price from the middlemen.

That is left to his generosity?—There will be competition among the middlemen.

This restricted competition will act favourably to some extent?—Yes.

The consumers also will get the benefit of it. Now, we wish to know whether in your opinion the issue price of salt should be enhanced or reduced?—It should be reduced.

What would be the reasonable figure?—I think 10 annas a maund.

In saying that, are you taking note of the fact that if you reduce it to 10 annas, it will not completely pay for the transport and maintenance of the yards?—They ordinarily intended this 10 annas to cover only the transport charges. I think the rest should be a legitimate charge on the department itself.

Have you thought at all about the agency for this salt supply, whether it should be the Government of India or the Government of Madras? Which would you prefer?—All salt belongs to the Government of India.

But who should arrange the supply to the curers?—The Fisheries Department. I think it will be better and the fishermen themselves will appreciate it. The officers of the Fisheries Department are more sympathetic to the fishermen than the previous ones.

Do you think they are in closer touch too?—Yes.

At the time when the fish-curing yards were under the Salt Department did any fisherman tell you anything about the difficulties then?—No, but from the way in which the fish-curing yards were being managed I saw that there were difficulties. I saw it at the time when the yards were transferred to us.

What was the main difficulty?—The rules were very strictly enforced; there were difficulties with regard to the period for which the fish was to be kept in the yard, the period after which it should be removed from the yard, etc. And then there was the rule that whatever be the quantity of salt in a bag it should be paid for as if it were a full bag.

Don't you insist on that now?—Now we have made it a rule that no bag weighing less than 1 maund and 30 seers should be issued.

You make allowance for shortage?—As a matter of fact we find very few short weights.

Who bags them?—The Salt Department.

If you find a large percentage of short-weight bags you should all the same pay?—Yes. Formerly the Salt Department was itself the issuing

agency and except in rare cases they did not complain against themselves. We have sometimes to make complaints against the Salt Department for short weights.

Why should Government reduce the price of salt?—In the interests of the quantity of food that should be available to the people. I think the reduction of the issue price of salt would cause more fish to be cured. The fish which is now used for manure will then be brought into the yards as also the large quantities of fish which are now privately cured with bazaar salt.

Surely it is more expensive than curing in the yards?—Sometimes it is not more expensive. In some places salt is sold at one rupee per maund more than the issue price here. But then in the yards there is the expense of transporting salt, expenses incurred for removing fish to and from the yard, the observance of the rules of the yard and lastly there is the fact that a bag of salt is issued as a full bag whatever may be the weight. All these considered, it seems more profitable for the curer to cure his fish privately.

Do you insist on a minimum quantity of salt being used for a certain quantity of fish?—Yes.

They can do it privately with less salt?—Yes.

So, the cheaper the salt the better the chance of all fish coming to the yard?—That is my opinion.

Assuming that the salt is free, then all fish will be cured in the fish-curing yards?—Yes.

Will there be any private curing then?—I don't think, provided there is fish-curing yard in the neighbourhood. I have got official reports to show that people began to cure fish privately only after the price of salt was enhanced.

Was there any fish-curing privately before the enhancement?—Very little.

So you think that in the interest of discouraging private curing of fish and on hygienic grounds also it is better to reduce the issue price of salt for fish-curing yards?—Yes.

You think also that this will financially benefit the fishermen ultimately?—Yes.

The profits gained thereby will not go to the middleman, but to the fishermen?—Yes.

Have you any idea of the quantity of fish sold in your jurisdiction?—It is given in the administration report.

What percentage of fish is sold in the bazaar as fresh fish?—More than half.

Do you think there is a legitimate demand for more fish-curing yards on the West Coast?—There is.

In how many places?—It is only when matters come to my notice I can say. I have half a dozen places in view. Vykumpadi, Madakara and Tiruvengode. A yard for Puthiyakatappiram near Tanur has been already sanctioned. Nattika has also been sanctioned a yard. In Mulke there is a private fish-curing yard. I think there should be a Government curing yard.

What do you mean by private fish-curing yard?—In a private fish-curing yard the ticket-holder engages private men entirely supported by himself. He pays money for the establishment and spends money on it.

Have you any idea as to what he pays for the establishment?—There is one petty yard officer on Rs. 20 and a peon on Rs. 12. It is also part of the contract of this one ticket-holder that nobody else should be allowed to cure fish in that yard. There are three such private yards. One is at Malpe and the other is at Tonse West. All these three yards should be converted into ordinary yards. At Malpe there is also a public fish-curing yard and therefore there is no need for making it a public one. In Mulke there is demand for a public fish-curing yard. In Tonse also there is need. In any case five more yards should be established by the Government, but they should not insist on the yards being self-supporting.

Now, do local people in your jurisdiction eat this salted fish?—No. It is all for foreign export, to Madura, Colombo and other places. The local people get fresh fish; it is only when fresh fish is not available that they use salted fish.

Can you suggest any changes in the way in which the fish-curing yards are run?—There are some yards in charge of peons. I am of opinion that no officer lower in status than a petty officer should be in charge of a yard, however small the transactions in it may be. The reasons are these: in the first place the peons do not get any additional remuneration for being in charge of yards. If a peon is posted in charge of a yard, he will take the earliest opportunity to take leave and get away. As a rule, they do not like to be in charge of yards unless they are bad men. Another thing is that a peon by himself is not able to command respect. But a senior peon is sometimes able to manage a yard. Literacy is indispensable and so our selection of peons is also restricted. I think it is necessary that we should have a bigger agency for issuing salt in times of rush. To meet this rush in two yards we have got additional establishment.

Why should you not do the same with regard to the other yards where there is rush?—For the two yards I have mentioned, additional establishment has been sanctioned. Even when there is need for additional establishment we have not succeeded in getting Government sanction for it.

That is a matter in which the Director can help you. With regard to the issue and entry in registers do you find any difficulty?—No.

Are the fishermen unduly delayed in getting their salt?—No. We have issued instructions that they should not be delayed. There was an instruction that the full consignment should be in the yard before salt is issued. This had the effect of tainting the fish. I have issued instructions that as soon as a certain quantity of fish is brought into the yard, the salt should be issued. It is an instruction issued by me. And probably it has found a place in the revised rules.

You find the Washington lights quite adequate?—The lighting arrangements are satisfactory, but there is difficulty in getting the curers pay for it. The yard people should not have any sort of financial relations with the curers. They, however, have to collect money. If we do not provide lights they will have to bring their own lights. They prefer the Washington lights, but it is supplied only in two yards. The other yards desire to have these lights.

If they like, why don't they pay?—It is the ticket-holder that should pay. All of them should join and purchase a number of dice, but they do not join and therefore the ticket-holder feels the difficulty. Some will pay their share, but some do not want to pay. In the smaller yards, night operations will be very small and the ticket-holders do not want the light; but still, for the sake of a few, we have to provide the light. For overtime operations the curers pay for the light. The difficulty can be overcome by getting them to co-operate by gentle persuasion.

So there is some difficulty with regard to lighting?—Yes.

Which would be better: to maintain the present issue price of salt and give them these conveniences, or, to reduce the issue price of salt and persuade them to provide these conveniences at their own expense?—Personally I prefer the former; but they would prefer the latter.

Did you suggest any means of lowering the cost of the maintenance of fish-curing yards at all?—No. On the other hand, my opinion is that the pay of the petty officer is very low. He gets only Rs. 20 to Rs. 25. He ought to be paid from Rs. 25 to Rs. 30.

With regard to the general sanitation of the yards have you any improvements to suggest?—I think the drainage charges should be met by Government.

Have you any idea of the cost for an average yard?—I have no idea. For water supply, open wells should be sunk inside the yards. If it is not fresh water it does not matter very much. It may not be useful for drinking purposes. But then generally water will not be brackish. They want fresh water to wash the fish and then they wash gunnies and nets also.

Dr. Gravely: Do you think washing the net inside the yard would be good?—They may take water outside and wash the net. They do so at Telli-cherry themselves.

How do you propose to supply water? Do you allow them to draw water or do you wish to give them a pump?—Just allow them to draw water. Several of them can draw at a time.

It has been suggested to have a tank and have taps to all. Do you think it is necessary?—It will be very costly. Public opinion among the fishermen will not allow dirty pots being thrown into the wells for drawing water.

Supposing public opinion among fishermen is not enough to regulate the use of the water, can you suggest any inexpensive means for drawing water and putting it in a tank so that the main source may not be made dirty?—They will draw water from the wells without making it impure. The other course is useless, because water is more likely to get impure in a tank than in a well.

Dr. Sundara Raj: Have you any suggestion to make with regard to the pay of these men? I think you said that the petty officer should be given from Rs. 25 to Rs. 30. Have you anything to say with regard to the pay of the other officers?—The sub-inspectors should get from Rs. 60 to Rs. 120. Now they are paid Rs. 30 to Rs. 80. The salt and excise sub-inspectors get Rs. 60 to Rs. 90.

Why do you suggest this?—Recruitment hereafter will be difficult if we do not pay our men on the same scale as in the Salt and Excise Departments. I can't say if the present establishment is satisfied with the rate of pay now.

Mr. Tampoe: These men have no work for the whole year. What do they do when they have no work?—For four months in the year they have an easy time. In Malabar there is work for ten months. In South Kanara there would be work for eight months and in the northern parts there would not be work even for eight months.

Dr. Gravely: Do you think any improvements are necessary in the matter of cutting the fish, etc.?—No. It is not done in the yard. It is done outside.

What about the pay of the inspectors?—The assistant inspectors in the Salt Department get Rs. 150 to Rs. 275 and those in the Excise get Rs. 150 to Rs. 250. The assistant inspectors in those departments correspond to the inspectors in the Fisheries Department. We pay them only Rs. 70 to Rs. 250. I am satisfied with the maximum, but I think the minimum should be Rs. 150.

Mr. Tampoe: Your sub-inspectors go up to Rs. 80 and your inspectors should be started on more than Rs. 90?—Comparing the prospects I think the maximum should be Rs. 120.

To Mr. Tampoe: Thrift societies were started before I joined and deposits consisting of savings by fishermen during the good season were received. These deposits were very small, they were so small that you could not make any advances out of them sufficient to purchase nets, boats, or even to mend them during the off-season. These societies were, as a rule, failures. Most of them were not in working order when I took charge. As a result of proposals made by me, Government lent two sums of Rs. 1,500 each to start societies, and they are still working. There are 60 other thrift societies. I understand that collections and recoveries in the thrift societies are very bad. In the two societies, at Blangad near Chowgat and at Palapatti near Ponnani, recoveries are being made regularly. They were started only a year ago and 35 per cent of the loans have been repaid. I would advise waiting two years more at least to see whether these debts will be repaid within that time, and forming new societies with rules modified by that experience. I would take the next step only after we have definite experience of the results of the working of these two societies. In the meantime, efforts may be made to revive these thrift societies and make them work more efficiently. The supervision of these societies is primarily entrusted to the local unions, and the Fisheries Department is also expected to keep an eye on them. For want of establishment I have not been able to do my duties by them quite as well as I should have liked. I would suggest that the work of the present inspectors be reduced by reduction in

the size of their charges. The Assistant Director can, with their help, afford the necessary time to supervise these in addition to his present duties. The Fisheries Department is to base its general control over these societies on a certain amount of detailed supervision, and this can only be afforded if I have additional inspectors. In no case can the Assistant Director do this detailed inspection himself. But given a certain amount of assistance by inspectors, he can also do a small percentage himself. I would disaffiliate fishermen co-operative societies from local unions altogether, have them audited by the Co-operative Department as usual, but arrange for all other supervision and control by the Fisheries Department.

The ordinary fisherman is distinctly conservative and there is some difficulty in persuading him to adopt new methods. If the fisheries schools are under the Fisheries Department, their influence over the boys is likely to help them in persuading these boys to try new methods.

Dr. Gravely: You look at the question from the point of view of the relation of the teachers to the fishermen? You consider that we require specially trained teachers for that purpose. I think it is generally agreed, from the educationist's point of view, that the methods we are using to train these teachers, because of the small numbers turned out each year, are not as successful as they ought to be. That is Mr. Lobo's opinion and also Mr. Ramunni's opinion that the training school is not as good as it ought to be, that the model school is not up to the special standard. One proposal is that they should go to the ordinary training schools for two years and study special subjects in the Fisheries Training Institute for one year. This is already tried with regard to the Kanarese students. Do you think it is a success?—I don't think it is a success.

Is it because the Kanarese student going to the Fisheries Institute with a different vernacular has to take much of his instruction through an interpreter, or because he does not have the time to enter into the life of the Institute?—So far as technical subjects are concerned, it is probably because they have to be taught through an interpreter, but as teachers in fisheries schools they are satisfactory. It is not their knowledge but the general understanding of the problems that is not satisfactory.

How are you going to rectify it? Have you any proposals with regard to the Fisheries Training Institute?—One of the complaints made by the District Educational Officer is that the Fisheries Training Institute is too small; if the Government are inclined to sanction a large number of schools as Sir Frederick expected, then we would have a larger number of students in the Fisheries Training Institute. That would rectify matters to a very large extent.

Do you think there is room for these schools?—If schools in fishing villages are to be run by the Fisheries Department there is room, but in places where there are local board schools, especially where there are these one-teacher schools, there is no scope.

Would it be satisfactory if these schools are taken over by the Fisheries Department and staffed from the Fisheries Training Institute in course of time?—I don't know.

Suppose you do away with the non-fisheries schools?—I doubt it very much; there is not sufficient accommodation. For instance there will be 300 students of the schoolgoing age in a village, and the accommodation provided will be for 40 or 50 pupils; and under the rules one teacher can handle only 40 boys.

Do any fishermen students attend such schools?—These one-teacher schools many fishermen do not attend.

Are these people completely cut off from other communities or do they form an integral part of the village life outside the schools?—They are as a rule separate. But there are other castes living in a fishing village, and they mix freely with them. The lower classes will mix with the fishermen.

As long as a community is an integral part of the larger community, the Government take the view that the larger community should be responsible for running schools of the local boards. I think that the fisherfolk are so definitely cut off from the main community that they don't form an integral part?—Yes; there are also other low castes living.

From the school point of view, all contact is cut off?—Yes.

How many Kanarese students are there in the Fisheries Training Institute?—None.

By starting a second fisheries institute at Mangalore you won't reduce the number of students in the Fisheries Training Institute?—No.

How many are there in the Fisheries Training Institute?

(Mr. Tampoe: 14.)

So an additional fisheries institute is called for in South Kanara?—It is not the fisheries technical institute, but a technical institute where the three years' course could be undergone by the Kanarese students.

In other words, you would establish in South Kanara exactly what Mr. Lobo suggests for the Kanarese students. How many schools have you at present in South Kanara?—Ten.

How many more you think we ought to have?—It is easy to open four or five schools every year.

There is a proposal to open a fisheries training institute in the Tamil country and another in the Telugu country?—It is very desirable.

In practice, how should we be able to supply the sufficient number of teachers? Already, the school at Calicut is very small. Have you any suggestion as to how these teachers should be trained? If the Institute at Calicut is very small, the Institute in South Kanara will be smaller still. Then what do you propose to do for the Tamil and Telugu country?—I say that these people should be brought over for the third year's course to Calicut.

You said that that did not give satisfactory results? Anyhow, they won't be worse than those trained in the ordinary training institutes.

You have no more definite suggestion on that?—No.

The Chairman: There are a number of factories for extracting oil?—Yes. There are about 300 to 400 in Malabar, and about 200 to 300 in South Kanara.

Did the Government or the officers of the Fisheries Department render these factory men any help in any direction at any time?—They would inspect these oil and guano factories and give them advice. They are overworked and so this work has been neglected. Most of the factories are not working.

So that in recent times practically no help has been given?—No.

Seeing that there are 500 factories, don't you think that an inspector trained at our Tanur Institute would be useful to them?—Yes; two of the inspectors have had training at Tanur.

Do you think there is work enough for one inspector?—I don't think there will be sufficient work for him, because most of the year, fish oil and guano factories will not be working; only in the season they will be working. An inspector may be trusted to do it within the area under his jurisdiction. There are at present three inspectors in Malabar and South Kanara; if you have five, it will be possible.

You advocate the appointment of such inspectors?—Yes.

Are you in favour of reopening the cannery at Chaliyam?—Yes.

Are you or your subordinates doing the inspection of sardines and mackerels?—Mr. Ramaswami Nayudu is doing; I am not a research man.

Do you think the Institute at Tanur should continue?—Yes.

What work is done there?—Manufacture of fish oil, guano, fish meal, cured fish.

Do you think we have reached a stage when it could be left to private enterprise?—If it is left to private enterprise the industry will be killed, because it is Tanur that sets the standard.

Your officers are not going round these factories in recent years and are not introducing any changes; how do you say that these other men are benefited by your Institute there?—I don't know whether much improvement has been made.

Then why do you say we are making improvements?—I think there will be greater demand for our oil.

Because of your past name?—We continue to live up to that name.

Is there not room for improving the quality of the oil?—There is room, provided there are men who know the work.

Do you think the present officer in charge of it can effect improvements?—I don't think so. We must have an expert from outside. It will be costly, but the trade will improve.

Even if you send a man from India to foreign countries, he will take some time to learn all about these, about two years or so?—Probably it would be better to get a man from abroad.

Dr. Gravelly: Tanur is not manufacturing oil but they get it from other firms and refine it there?—Yes. Private contractors get their oil refined at Tanur.

Is it not that the Army Department required certain standard and they could not get it anywhere except at Tanur?—I don't know.

You bought crude oil from other manufacturers and brought it to the required standard at Tanur and resold it?—Yes.

The Chairman: What quantity do they require in the army?—Sometimes they require 6,000 gallons a year. If Tanur station is abolished they would purchase no more Malabar oil.

Oil extraction is done only in one season, and on a particular day the catch may be several tons and the factories may not be able to consume all that; if they are allowed to remain for two or three days they will get rotten. Supposing a cold storage is constructed by Government where everybody is allowed to have his own fish there, would it not be useful so that they can utilize it for extracting oil on the third or fourth day?—Yes; I don't know for how long the fish will be good for oil purposes; experts alone can tell that.

You say that at present the licensing fee and profession tax are levied; do you think they will be able to pay at least one of these taxes?—Some of them can afford to pay; generally I don't think they will be able to pay either of them. I don't think fish-curing can be brought under noxious trades. I know of cases of fishermen being prosecuted for curing fish on the beach under some provision of the Penal Code. If fish is dried in the beach for domestic consumption I don't know how it can be construed as nuisance. On the other hand, there is what is commonly called nuisance always going on in the beach which is not taken notice of. Licence fees to the extent of Rs. 10 or Rs. 12 are levied. Those who keep a place for fish-curing are, under the Act, required to take a licence. On the assumption that a man who cures fish must have a place, the local bodies ask him to take out a licence. A man may be selling fish straight from the yard.

The Chairman: The law must be amended?—The result of all this is the fish is driven out of the fish-curing yards and cured stealthily in their own houses.

(The witness withdrew.)

The Committee then adjourned till 11 a.m. on Wednesday, the 25th July 1928.

Wednesday, July 25th, 1928.

MADRAS

PRESENT :

Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu, *Chairman.*

M.R.Ry. P. V. MANIKKA NAYAKAR AVARGAL, B.E.

Mr. A. McG. C. TAMPOE, I.C.S.

Dr. F. H. GRAVELLY.

Dr. B. SUNDARA RAJ.

M.R.Ry. M. RAMASWAMI NAYUDU.

Oral Evidence.

To the Chairman : Sir, the other day I was explaining to you the research work we were doing in connexion with sardines. I wanted to tell you about the study of the rate of growth of the fish and about their sexual maturity from the time the ovaries were formed. We found that by about May they were fully matured, but they were not in a condition to spawn. Both females and males have their ovaries and testes fully matured, and both will have eggs. What is popularly known as egg is only ova. Spawn is a collective term which includes both female and male elements.

The Chairman : There is no separate name for female element?—We call it roe and other one we call milt. The eggs in the ovary have to be fertilized by one of the spawns of the male element and when the eggs are fertilized the larva will develop. Both the elements are shed in water and fertilization takes place by mere accident. It is a chemical attraction between the one and the other.

Did you do any experiment on hatching?—We were not able to get the adult fish with the eggs. Long before they reach that stage they migrate elsewhere.

Does it mean that spawning and hatching does not take place on our shore?—We do not know. It is not likely that they spawn far out into the sea. We have not found out that our waters are unsuited for spawning, but we have found that they are likely to spawn not far from the shore. By about the middle of August we get the thing once.

If you keep your eyes open in the sea for a fortnight you ought to be able to say that?—It is for that purpose that we want a sea-going vessel to do research in running seas.

For how many days should it be on the sea?—In June, July and August if we utilize her for a fortnight, we might trace them. The bigger fishes belong to the second year group. I have told the Committee that the maximum age of the sardines is two and a half years or so. These seem to spawn a little low. Even during the years we were conducting the investigations we found at least one in a mature condition late in the season.

The first catches are always the bigger fish?—In the earlier part of the season we get the small ones. In August 1922 they were nearly three inches long and those were the smallest ones recorded.

Supposing you get all this data, spawning, etc., how does it help the commercial side of it and how does it help the fishermen, the oil extractors or the merchants?—In three respects. We were able to help the economic side of the industry through the research. A few months before the actual

hery, we are now in a position to say whether the fishery will be a success or not. We can foretell three months before time as to the appearance of these things so that if a merchant wants to take a forward contract he can do so. We can say how much oil can be got three months hence from the sardines.

From what can you say that?—During our investigations we have been making a note of the growth of the fat contents. Oil sardines is one of the few fishes in which the oil is deposited as a sort of nutritive reserve. This is a sort of provision to tide over the periods of famine in good organisms which we have noticed newly. The fat deposits begin to form at a time when there is plenty of food organisms. When the food organisms decrease in quantity there is an appreciable decrease in the fat deposits in the body of the fish.

You are able to say, three months before its actual appearance, whether the fish food organism and oil will be abundant?—Yes, because we have data about the quantity of the food organisms that contribute to the formation of fat deposits in the fish. Among the food of the sardines some are fat nutritive organisms and the fish which appears when these particular organisms are abundant would yield a greater percentage of oil. In 1921 the conditions were very normal and the oil contributing food organisms were in greater abundance. November and December are the two months during which the oil yield of the sardines is considered to be the maximum. In December 1921 the percentage of the oil extracted from the sardine came up to 18.9.

Percentage of the weight of the fish?—Yes. In 1922 during the same month it was 8.9. It shows deficiency in quantity of fat deposit in the fish.

Did you correlate this variation with the variation in the food supply by direct method?—Yes. We noted this week after week. We have got the data of the food organisms found in water. All these factors coincided.

How long have you been investigating the plankton?—For two years and during that period we found fluctuation in the various organisms. The fluctuation has not been uniform. In 1922 the scarcity of food began a month earlier than in 1921.

When you speak of food, are you speaking of any particular organism in plankton or the total bulk of it?—I am speaking of the dominant organisms in the food. These are called dinoflagellates and diatoms.

Do dinoflagellates come at a period when the plankton is relatively abundant in the year or the plankton as a whole is relatively scarce?—That I can't say. During the period when the dinoflagellates became dominant they were dominant in the plankton as a whole. During the other period diatoms were dominant.

Are dinoflagellates not equally good food?—They are. When the dinoflagellates were abundant the diatoms were scarce.

Were the vegetable organisms abundant at a time when the animal plankton was also abundant?—Copepods became abundant later on.

These appeared a month earlier than in the previous year?—Yes.

Apart from that, the total quantity was uniform in the two years?—The total quantity was less in the second year.

Was the quantity of sardine less?—The quantity of sardine was not less, but the oil was less. Sardines begin to come towards the shore when the phytoplankton is abundant.

How long does this phytoplankton go on?—For four months from September.

How soon after the beginning of it did the sardines begin to appear?—They began to appear at the beginning.

Then how are you able to forecast how much will appear and how much it is going to pay?—In 1921 when the conditions were normal, we have seen it.

For what reason?—We collected some data from the Tanur experimental yard and found out the percentage of oil yield they were getting and when we found that our yield was 18.9 which was practically very near the record, we came to the conclusion that that year was normal.

That is not a normal year. How do you know that in the following year the number of sardines will be as you say? What is the data on which you predict it?—We have got two factors to go by. One is the direct factor and the other is the existence of the fat deposit.

You told us you will be able to say in July?—Because the fat deposit begins to be formed in the fish by about September. I explain this further. The fat found in the fish is found in two places. In one place, i.e., below the scales, there is a creamy layer and then round the oesophagus also there is this creamy layer. The liver and other tissues of the fish will have a glistening appearance. When the fish is lean it will be dark in colour. During a whole year we have been noting the condition of the fat deposits. These are unicellular animals with hooklike organs. Since I had been examining the state of fat deposit during the various months of 1921 I know which is the full size of the deposit. So, in 1922 when I found the fish having only a deposit of one inch and not one and a half inches and never increased its size, I was able to determine that the fat deposit was less than in the previous year. It is direct evidence.

Can you distinguish this year's breed from the previous year's breed?—The previous year's breed also will be found along with the shoals of the small ones. So, when we catch the small ones we will be getting the previous year's breed also.

If the food organisms are not there, the mere fact that it is the last year's breed will not help you. Even last year's fish food might have continued for a year and a half?—It would be lost with the arrest of growth. The whole of the fat deposit will become absorbed. We have noticed that. When there was decrease in the food organisms in the water, the fat deposits began to decrease.

Mr. Tampoe: Am I to understand that they get sardines every month in the year?—During the years we had been investigating, we got them. Whenever there was a break in the monsoon they got them. There were years when there was no sardine to be got. Since we had been collecting the data, when we found that the fat deposits were smaller in quantity, we found that the organisms that were dominant in the previous year had become less in quantity. We were able to find out what these organisms were. We would examine them and see the oil globules also.

Can you forecast the oil that can be extracted at a particular period three months earlier?—By the examination of the plankton itself I may be able to forecast.

You say that the fish begin to appear with the appearance of plankton and that you can tell when they are going to appear and in what strength, three months before they come?—We cannot do that. As regards the number of fish that could be caught we cannot foretell. We can foretell to some extent. If the adult fish during the previous year does not happen to be in the normal condition the ovary will be smaller in size and the eggs less. In May of this year I will be in a position to tell you whether the fishery of the next year will be a valuable one or not.

When will it commence?—It will commence in August. Four months ahead.

You determine that from the plankton, not from the fish?—Yes.

The Chairman: Do you examine the plankton every month?—We examine them every week generally and twice a week till the monsoon conditions set in. There is no difficulty in getting them previous to May. Of course when I was there I had an assistant who used to go in the boat itself and when he could not go I used to go. We had a little canoe and two peons.

Dr. Gravelly: Can you forecast the quantity of oil that can be had during a particular season, from the plankton?—I can.

You can do it from the fish also?—The fat will be formed only in September and it is only in October there is a rapid increase in fat and in November you get the maximum. The organisms begin to appear in the last week of August.

Do you consider that further investigations on these lines of plankton and so on would be likely to enable you to forecast still further?—Quite likely.

Mr. Tampoe: What is the depth at which you get the plankton now?—Twelve fathoms at a distance of three or four miles from the shore. Investigation has also to be made on the vitamin contents of the oil. We have been doing something about that also. We found out that most of the organisms want diatoms which is the chief food during fat formation. This has been found to yield vitamin A in large quantities by a bio-chemist, Dr. Browne. Vitamin A is formed in grown plants by sunshine. This has been worked out by bio-chemists. I have been studying bio-chemical journals.

Am I to understand that no research has been done for the last some years?—It was continued.

The Chairman: You were there till 1923?—Yes; till the middle of 1923. My successor continued these experiments. Mr. Moses took up the work. Eight months before there was another gentleman, Mr. Madhavan, in the cannery. There was a complaint that some sardines were found to be far too bony. When examined they were found to be two-year old ones. We immediately sent a note to pick out such sardines. We don't purchase them for canning. For oil, second year old ones are good; they have a greater deposit of fat.

To Mr. Tampoe: The present equipment is very small and the nature of the work we have to do requires greater equipment. We have only a small open canoe for going out; our laboratory and appliances are meagre.

The Chairman: Can you give us an idea of the money required for the full equipment? I suppose it would not be a recurring cost?—I have not studied the question.

Will you please prepare a note on it and send it to us?—Dr. Sundara Raj will be in a better position. The staff is not sufficient. For want of staff we are adopting rough and ready methods. A study of the numerous organisms found in the plankton is essential.

How many people do you want?—Two zoology men should be in each research station, and two assistants (under-graduate men). If there is a small motor launch it will be of great advantage. We want one to take us into deeper waters. The open canoe takes several hours to go and return. We preserve the major quantity of fish in fluids. After certain hours, certain organisms lose their shape; the oil-giving organisms when the water is dried up disintegrate; even while we are examining them on the slides, they disintegrate. We have to change the water frequently, and rush to the shore. They are examined immediately they are brought on shore.

How do you catch this plankton?—With small nets, about a foot and a half in diameter.

It does not float on water?—We adjust it by attaching weights; we have a metal ring and we attach weights if we want to take organisms inside the water. Generally we take the surface haul. It will be three feet or so below the surface. If the boat is going fast, the net will come up to the surface; we have to regulate the speed. We require four stations for experimental work: one at Calicut, one at Krasadai, one in Madras and one in the north, say, Vizagapatam. There must be aquaria attached to each of them.

Mr. Tampoe: There must be one at Rameswaram.

The Chairman: Did any of the oil contractors come to you for help during the three years of your office?—No.

So science does not help you in assisting them?—No; of course I tell them some things; I have not tried about the markets.

Have you any experience of the canning industry?—For about a year I was there.

What is your experience of it? Do you think that the fish canned is quite good, so far as India is concerned?—It is quite good.

Do you think it is capable of improvement?—Yes; foreign people have been using certain ingredients such as olive oil, and their stuff has been pronounced to be very good. We have not been able to use such costly oils; we have been using instead deodorized cotton seed oil and groundnut oil.

Can you use fish oil for that purpose?—We have been using sardine oil. If we can deodorize and improve the quality of the oil, it could come in as one of the chief ingredients in canning. In 1921 I was at the cannery.

Was it in your time that there used to be leaks and rusting in the tins?—No.

Do you think it was due to the carelessness of the staff or defect in the machinery?—It must be due to carelessness in the process of manufacture. Through care, it may be prevented.

Are these cans made of zinc?—It is iron sheet with a coating of tin on either side. Tin is acted on by the flesh of fishes like sharks and prawns, which contain sulphur and other ingredients.

Is it only due to want of care or is it due to want of machinery or appliances which could make them free from such rusting and leaking?—What the foreign people have been using for cannery we have been using here.

We want some data on which we could base our recommendations for improvement in this direction?—Canning is one of the important processes of preservation and such industry should be developed.

Mr. Tampoe: The price of tin is more than 75 per cent of the contents?—Our expenditure began to increase since the tin sheets were purchased through the Stores Department.

The Chairman: You think that the cost of the cans has gone up on account of the tins being purchased at higher price through the Stores Department and also on account of the thicker plates being necessary?—Yes.

Did you ever attempt to purchase in the market?—We attempted to purchase sheets of tin in Calicut. There were some that were quite suitable. As regards the cost, we found the local ones cheaper.

Is it that the thinner plates would not fit into the machinery?—Correct gauging is necessary; sizing of the sheet is essential. The malleability of the sheet should be such as to be easily drawn out. The can must be air-tight.

Are there any things which can be remedied by your researches? I think it is more for the engineer than for the chemist?—It is a food chemist that must investigate these things.

Mr. Tampoe: In collaboration with the zoologist?—Yes.

Mr. Manikka Nayakar: To make it more commercial you require at Tanur and Chaliyam more of the engineering than of research work.

The Chairman: Do you think there is any further necessity for continuing the station at Chaliyam?—Yes; because there are other small things that make for the success of the canning industry. If the fish is not neatly packed it will give a sort of smell; then packing is an art.

If the canneries outside, at Mahe and other places, can produce as good canned fish as you are producing, where is the necessity for a Government institute to exist? Your business is to do the pioneering work; that is the policy of the Government?—Yes.

Have we reached that stage or not when we can safely entrust this industry entirely to private hands?—Private people have not taken to it so much as to make the industry a success. If you close this, there will be the factory at Mahe. Even their production is not up to our standard, so far as I know.

The Chairman: I am told the recipes are the same?—They may be the same; but the way things are packed is different and the materials used are not of the first-rate quality.

That depends on the honesty of the tradesmen. What has research to do with honesty?—But the other people have not taken to that industry. If you close this, this industry can never be revived. There are three main issues with regard to fisheries: capture, preservation and distribution. There are three or four methods of preservation.

We will confine ourselves to the canning business. In this business what is it that you expect to further develop and teach the public? You have already taught the process of canning?—We have demonstrated the process

of canning and our process is the same as that of the foreigners. We have not demonstrated as yet whether the cannery can be made a commercial success.

What remains to be done is purely of a commercial nature; professional honesty, using the right kind of recipes, using good machines and tins of the proper size. These are things which require no expert to teach?—Unless these are demonstrated to the public, they would not take to it. If they do not take to it, what is the use of all our endeavours?

Even you have not been able to show profits?—I do not believe that we cannot show profits. The difficulty we experienced might be remedied. If we have mass production and underselling for a number of years we may be able to capture the market.

In your cannery you do not show the overhead charges?—We have been showing.

If you do not take overhead charges into account, you can show it to be a commercial proposition?—We must sell it cheap for four or five years.

Is there much chance of your underselling? If the foreign trader knows it he will probably sell it for a song?—This is what makes me recommend. Ovaltine and Allenbury's food were not in use in India at all. In the beginning they were selling these for a nominal price and when they sufficiently advertised they raised the price and hundreds of these tins are now sold. It is this method that I want to adopt in our cannery.

When they can get fresh fish from the market, how are you going to make them take to this tinned stuff?—That is why I wanted to tell you about preservation. The fish that is not immediately used up as raw should be preserved. If you preserve it in ice you can keep it in good condition for a few hours. If you preserve it in any refrigerating plant you can keep it for a few days longer and you can preserve it longer still by salting or smoking it. Canning is the only method by which you can keep it in good condition for a number of years and as such it is an important food.

In all these cases you must not ignore the fact that people prefer to have fresh fish. There is always the idea that fresh fish is better?—But there are places where fresh fish cannot be had at all. In the Nizam's Dominions if good frozen fish can be had it will fetch any amount. The same is the case in Simla and other places. They cannot get it there.

Mr. Manikka Nayakar: Don't you think that it is necessary to continue the experiments in order to find out cheaper methods of canning? How far we can succeed is another matter. Don't you think for experimental purposes the cannery should continue. If we make it cheaper there will be more private enterprise?—That is why I say we should create a market for it.

Cannot cheap Indian dishes be prepared?—Yes.

The Chairman: Then I take it that in this respect nothing was done all these years?—Of course we have gone for foreigners in this respect. But some of the curried dishes are purely Indian.

You assumed that the European system is about the best that you know and you wanted to reach that standard?—Yes.

It never occurred to you that it is possible that other systems may be discovered at a less cost and perhaps keeping the stuff purer?—European nations have been working at it for a number of years.

The kind of ideas I am speaking of never struck you?—No. For years, they have been working. Our attempt has only been to come up to their standard.

The Chairman: That is about the Chaliyam factory. What about Tanur? You think that it should be continued?—Yes; they are extracting oil from fish and are also preparing fish meal. They are also curing fish there.

For that reason why should there be a station at Tanur?—Fish-curing is done in very many places in and around Calicut?—The people there have not taken to it completely. The best curing yard is only at Tanur. The public are under the impression that the fish-cured in other places is not as good as those that are cured in Tanur.

Oil extraction and guano are being done on a large scale in nearly 300 to 500 factories in Malabar and Calicut. So what else is there that is being done in Tanur?—We have to improve the quality of the oil.

That is a different matter altogether. If you want to have a chemist and deodorize, or decolorize the oil that is a different matter. The public have taken to the extraction of oil industry on a large scale. Then why should you have a station at Tanur? If you want to deodorize or decolorize you can certainly have it done in Calicut and you can have oil from the various factories of the Calicut town itself?—I agree to that.

What fish are used at Tanur?—Sardines.

You can have a good catch there?—Yes.

There are factories in and around Calicut. The raw material can be had there. For curing fish, you can have a yard at Calicut itself?—As regards curing and oil extraction others have copied down what is being done at Tanur. Guano also they are preparing themselves. So the only thing that is perhaps likely to be improved is the refinement of oil.

You do not want a large quantity of fish for experimental purposes?—No, that can be done in any of the existing factories.

So, for experimental purposes, I suppose enough fish will be available at Calicut. When you come to the commercial side, Calicut is the central place and it is best situated for trade?—Yes.

After June 1923 you were transferred to Vizagapatam?—Yes.

How long you stopped there?—From 1924 April to 15th August 1927.

What about the intervening period?—I was in Madras in charge of the aquarium. I was also in charge of collection of exhibits for the Wembley Exhibition.

In 1924 you were transferred to Vizagapatam. What were you doing there? Did you make any research work there?—Practically the whole of my time was absorbed in the administrative work.

What about the duties of a Specialist in Vizagapatam? Is there anything that deserves his study there?—Yes. There are other kinds of sardines that predominate on the East Coast. Oil sardines have been recorded in Ganjam district and during my time I tried to find them out but could not. There are other kinds of sardines got in large abundance and their life-history has to be worked out. Nathallu is a thing that predominates and that is got in abundance. We will have to work its life-history.

You think that some research is necessary there?—Yes.

Am I right in thinking that no attention has been paid hitherto on the East Coast to study any problems connected with the East Coast?—Nothing has been done.

Are you in a position to tell us as regards the need for any such investigation on the East Coast?—For instance there is a variety called Pulasa which has got plenty of oil and which is got in thousands near the anicut. It can be made much use of.

So the abundance of this kind of fish Pulasa is a justification for more investigation being made as regards its life-history?—Yes. Even artificial hatching we can resort to.

Supposing an officer is posted during the flood season from the end of July right up to November for four months, do you think he will be able to record any observations from which useful deductions can be made? Do you or do you not think that the time has come when an officer should be appointed to investigate into the history of this fish and make it commercially a success?—It is essential.

Can you mention any other fish on the East Coast on which investigation is necessary?—The Dora fish.

What is its commercial value?—It is used as food. Of course it is also sold, but only as fresh fish. We have to work out its life-history and the favourable conditions under which they thrive.

Do you think that some practical advantage will be gained by studying the life-history of these fishes, so that it will be worth while for the Government to invest some money and employ some officers and get research work done? Suppose we put a programme for the next ten years, what kinds of fish would you include in your investigation?—(1) Hilsa, (2) Mackerel, (3) Nathallu, (4) Prawns, (5) Mulvullu.

You do not want to investigate sardines on the East Coast?—In certain areas you find mackerels in abundance.

You are in Vizagapatam for how long?—Since April 1924 to August 1927.

During these three years had you any opportunity of advising the Director about these investigations?—From the time I took over charge I have been requesting for the establishment of a biological station. I think they have sanctioned it in their ten-years programme. I have also been trying to solve the problems connected with Kollair fisheries. Kollair has gone down so far as the value of production of fish is concerned. During my time I had to attend to something like thirty fish-curing yards. Therefore I could not devote as much time as I would otherwise have done in increasing the production of Kollair fisheries.

Have you got anything more to say to us, any problems connected with the Fisheries Department?—I was trying to explore certain places.

Have you got any boats?—No.

Then what do you mean by saying that you were trying to explore certain places?—Making enquiries of fishermen and seeing whether improvements could be effected. In Sonapur edible oysters are bigger than those available in Pulicat and proposals have been sent to the Government to establish a farm in Sonapur.

Dr. Gravely: Do you consider whether there is any need for establishing a fishery school in Vizagapatam as in Malabar?—Absolutely necessary. Otherwise there is the danger of fish industry dying. I have visited all the fishing villages at least in Vizagapatam, Godavari and Kistna. There most of the people have gone away to Rangoon as they found fishing unremunerative. In most of the villages only womenfolk were found and they were all in very straitened circumstances. The number of boats and nets which they previously used to have were much reduced. In places where there were 100 catamarans previously, you will find only twenty or thirty now.

Then who does the fishing at present?—The remaining adults.

Do you think there is any need for a co-operative society for fishermen so far as their education is concerned and also for improving their catching capacity?—Unless that is done you cannot prevent the fishermen from migrating to other countries.

With regard to educational work there, have you any idea as to how many schools are there?—There are only very few board schools there. The few elementary schools that are distributed among the fishing villages are not properly working.

If you suggest the establishment of schools for fishermen, how do you set about for getting suitable teachers?—We can get elementary teachers. If you give them six months' training about fisheries in general it would be sufficient for our present purpose. In South Kanara you have a training institute but the results produced by that institute are not as good as those produced in the Malabar Institute.

You would not advise their taking instructions in any training institute?—The people have presented a memorial to the Government in which they have asked for the establishment of a training institute as well.

How many teachers would you propose to train there annually?—As regards the training institute for the East Coast I have got certain schemes not on the same lines as they have got for the West Coast but on different lines. For the East Coast it is enough to get ordinary trained elementary teachers and give them six months' training in fisheries—I mean something connected with the fisheries in general. Beyond that I do not think boys of very small age would be able to assimilate more. Further we are in an age of specialization. In the modern trawler the man who is working the

trawler does not know carpentry. The skipper knows only to tow the vessel. There are people who know only net-making. So I would advise the establishment of a school where all these subjects are taught, and people who want to specialize in certain subjects may learn in that institute.

How many such technical schools would you have?—If the villages are very near of course you need not have a separate school for each village. It would be enough if you have one school for every two villages or three villages. For the East Coast we may select the elementary school trained teachers and they can be given six months' training so that they may study something about fisheries just as a sort of nature study or object study. I think that sort of training is sufficient for the present.

You don't think there is a demand at present for a larger number of fishery schools on the East Coast?—We can have, to begin with, such number of schools as would give us a sufficient number of trained teachers. Most of these villages are without schools at present. What we must do is we must give from six months to one year training to these elementary school teachers so that at the end of every six months or one year you may have one or two trained teachers coming out from this institute so that they may relieve other teachers to enable them to undergo training in the proposed technical institute. To begin with, we may start with 12 students.

What staff is needed to teach these 12 students?—About four teachers.

So, one teacher for three students?—It depends upon the number of subjects that the students wish to study.

How did you get this figure '12'?—Because Government may not give money if we start with more students.

Have you any idea as to how many schools would be required for the East Coast?—I have only a rough idea. We must have not less than 30 pupils a year for training.

On the whole, how many schools?—About 300 schools will be required.

You do not want to have all these started in one year?—In about ten years.

Mr. Tampoe: Can you offer me any reason for the impoverished condition of the fishermen?—I have been trying to find it out for a long time. The reason that these fishermen gave me was that the wages that they were getting were nowadays very low, so much so many of them had to go to Rangoon and other places where they were able to get higher wages.

Do you find that communication to these fishing villages is better or worse than it was before?—Much worse. That is one of the reasons as to why fishing is not paying them sufficiently now. Whatever they catch has to be sold only locally and it is not very profitable to them. Besides, the cost of living has increased.

Do you think that catches of fish are very poor on the East Coast?—Very poor. Fish is not found in abundance on the East Coast. During the season some kinds of fish will be in abundance. It might be possible that there may be a large quantity of fish in the mouth of the Godavari and Kistna.

The Chairman: You were next transferred to Tuticorin?—To the trawler.

When did you join that?—15th August 1927.

What was this trawler doing at that time?—She was in the Madras harbour awaiting the specifications from Messrs. Massey & Co.

How long did it take for the alterations to be completed?—There was also some difficulty about the crew. The captain had to suspend the crew. They did not work the engines properly. So he had to get a crew from Bombay. By that time I also joined. When we tried for about a fortnight they were not able to give the speed for trawling operations. So he had to dispense with them also. The engine was alright because he was navigating it all the way from England. Bombay men also failed in stalking as well as managing the machinery.

Dr. Gravelly: Is it a question of failure or a question of unwillingness to work?—The second and the third drivers were fighting with the first driver. The second man wanted additional crew more than what the Government had sanctioned. Without it they would not work. So we gave them a trial and they were not able to raise the steam to the required pressure.

The Chairman: Is it a steamer?—Yes.

Worked with coal?—Yes. About the middle of September we began our first trip. We carried out some experiments on Madras coast with the Bombay crew. It was not so satisfactory and after we got the Tuticorin crew we had to come down to Tuticorin for salt transport work. We came straight to Colombo and after taking coal and water we tried our first catching and we had good hauls. On the average a haul was about 700 to 900 lb.

How many hauls a day?—About four to five. Generally in the nights we did the trawling. In the nights we have bigger catches.

Does it carry search light?—No.

Did it occur to you that it is possible that some fish may come up and get caught in your nets?—No. Bigger fishes will be in deeper waters.

How many catches on the way?—Every day on the average about four to five hauls.

Each time one-fourth of a ton?—Yes.

How many days did it take to come from Ceylon to Tuticorin?—We can come in one night. One or two hauls we had on the way and we sold them at Tuticorin.

Did it stand till that time?—Whatever we got in the night we sent away by a motor launch to the shore.

What did it fetch?—One night's catch fetched about Rs. 20.

So that brings us to September?—This was about the 30th of October.

What about September?—We were trying experiments at Madras. It was only on the 24th October we left Madras for Colombo.

From the middle of August to October how many trips did you make?—Six trips.

Six trips in two months?—It was only in September that we did these six trips.

Each trip how many nights?—We leave in the night and return in the morning.

You were never in the sea for more than one night?—There was no refrigeration arrangement.

How many hauls?—One or two hauls.

Why?—The bottom there is almost all rocky. With every haul the nets were damaged and had to be got repaired. We could get twice the prices but must have good hauling grounds.

Did you weigh the catch?—Yes. We never got one ton from the Madras harbours.

Is it because there was no fish?—In the places we tried we met with obstructions.

Don't you carry trial net?—We did not carry.

Just to see what the bottom is like?—We did not try that.

You reached Colombo in the end of October?—Yes. The schooners were not ready and we again went for trawling. Seeing that we realized low prices we thought of salting them on board the trawler. We took some salt and stayed for six or seven days.

How many trips did you make before you went with the salt?—We took two trips. We stayed for one week.

How much did you catch on the first trip?—I do not exactly remember; not less than 300 lb. per haul. On the 31st October 373 lb. for one haul only. On the 4th November 179 lb. in one haul.

When did you leave the shore on that occasion?—We left the shore on the 3rd November. We started at 11 p.m. in the night, hauled the net at 2 and again at 2-45.

Generally you keep it two hours in the water?—If we meet with obstruction we have to take it.

Supposing a large quantity of fish gets in, will it give any indication?—Where we meet with any obstruction we can know.

You have nothing to know the quantity of catch?—Nothing.

How many pounds in the second haul?—There was only very little fish; about 24 lb. Then the next day we had the third haul at 3-45 and had 320 lb. We went 23 fathoms deep.

What was the depth in the case of the 24 lb. haul?—It must be somewhere between 21 and 26.

You were sure you were going into deeper waters?—Yes.

You did not sound the depth?—We have full details in the report. In the fourth haul she shot at 7 p.m. hauled up at 10-30 in 25 fathoms. I have not recorded the weight of the catch. The fifth haul we shot at 11-30 p.m. in 25 fathoms hauled up at 2-30 a.m. I have not noted down the weight.

This is the occasion on which you stayed for more than two days?—Yes.

How many hauls in these two days?—Five hauls. I will be able to tell you the weight later on after reference to the books.

You got it salted?—Yes.

Who did that?—The crew themselves.

They know to cut and salt?—Yes.

For how much was it sold?—We have no idea. We cannot know how much this particular catch could have fetched.

Then you had another trip for how many days?—Afterwards we had to go to Colombo for coaling.

How is it that the coal was exhausted so soon?—The bunker is capable of 180 tons.

How long would it last?—It would consume seven tons a day. We left for Colombo on the 30th October and again on the 9th of November. We had to go to Colombo for sweeping the bottom. The ship was not available and we had to fix it up.

So you went not for coal?—Not for coal.

How many days in all and how many hauls?—Sixty-seven hauls throughout November, December, January, February up to 10th March.

For five months 67 hauls?—Yes. Then we had to commence dredging operations for pearl oysters.

How long did you use it for this work?—March, April and May for three months.

Why should this vessel be used for dredging?—We had to find out if there were mother oysters. The Director wanted to do research work. When the vessel was free from salt work we had to do this work.

Was such kind of work ever done before?—Yes. Annually they inspected the pearl banks when dredging.

Where was "Lady Nicholson" at that time?—She was at Tuticorin and probably she was utilized for pearl fishery.

Was there particular use in using this trawler?—We found with the help of "Lady Nicholson" it was not possible to do schooner work. They were using only small dredgers with "Lady Nicholson." For large work we had used "Lady Goschen."

Dredgers are used with machinery on the trawler?—We use the steam winch.

What all do you record on the trawler?—After each haul we used to divide the species and record the weights of the various species. The marine organisms as are worthy of preservation are separated. The depth

of the place, the weight of the haul, the number of hauls are all recorded. We take the temperature of air, the temperature of sea water and the salinity of water. I also preserve the samples of water which are subsequently analysed in Madras.

To record the observations of a three days trip how long will it take to work it out?—About a fortnight. I take the rough note on the spot like this. Sky clear, wind west, course of trawler north-west, air temperature 84, water temperature 82, 53 fathoms, coral reef, speed 80 revolutions, pressure 150 lb. Without the net it will go at seven miles an hour. When the net is hauled the speed will be about three miles an hour. All these particulars have to be noted when the ship is rolling. These have to be registered in a book and subsequently transferred to the chart.

Are the results of one experiment or expedition of any use to the second exploitation?—Generally we explore fresh fields.

You do not go into the adjoining area?—It will be in the same area. More or less we are trying to survey the same area.

(The witness withdrew.)

Dr. B. SUNDARA RAJ (again).

Oral Evidence.

The Chairman: You have heard the evidence of Mr. Govindan who was an officer of the department, an Assistant Director for a long time. He told us that if the trawler is used for conveyance of salt it would be ruined if not soon, at least in course of time. Do you agree with that view?—I do not.

Why?—Because, for one thing, the trawler is designed in such a way as to catch fish up to 30 fathoms. As a matter of fact the whole work of the trawler consists in towing, and also going into deep sea up to 30 fathoms and catch fish. In the case of salt schooners they are only afloat vessels and the weight of the schooner is on the surface. So the question of the trawler carrying the weight of the schooner does not at all arise. Mr. Govindan is under a misapprehension that the trawler is required to carry the weight of the schooner. The trawler is not loaded with salt at all.

In your specification have you shown the maximum towing power?—It depends upon the horse-power of the engine that tows.

How many schooners were attached to the trawler and what was the maximum quantity of salt that was conveyed at a time?—The maximum quantity of salt that was ever conveyed was 12,000 maunds. She could carry much more than that. In other words, she could carry 12,000 maunds or 400 tons. She could tow much more. That was Captain Cribb's opinion. She carried 87 boats each manned with 15 to 20 divers and mundocks. It towed all these faster than any boat in Tuticorin.

Mr. Govindan also told us that the trawler need not wait for want of work when the research work done on the boat was being incorporated into the book for mapping. Do you agree with that opinion?—I do not know if he said that. Anyway I do not agree with that.

You remember that you told us that you were not using the boat during its off-time. Mr. Govindan said that time would be so short that one need not detain the trawler from its regular working. Do you agree with that opinion?—I do not agree with that. It is not practicable. I have got reports of trawlers that have worked in Indian waters. I have just read this morning from a report what amount of leisure was allowed for them. The actual working of the trawlers practically amounted to only twenty days. For ten days they have been ashore. Even working commercially, without any scientific results behind, even then these trawlers will have to remain on the shore on an average for ten days in a month.

Why was it necessary?—For landing and getting the necessary materials for the trawler and for giving rest to the crew thereof. I say on the authority of Mr. Hafford, Marine Biologist, who, while writing about "William Carrick" the trawler purchased and used by the Bombay Government, says on page 68 of his report of 1923 thus:—"About twenty fishing days per month is as much as can be safely reckoned for a single trawler." That observation is as true of our trawler as of the "William Carrick." That also was the experience of other trawlers that have worked in Indian waters.

Why are those ten days required?—In the actual working certain number of days are required for landing fish and for getting the necessary materials for the trawler and also for giving rest to the crew.

You agree that for the remaining twenty days the trawler can be used for conveyance of salt?—Yes. Ten days in a month, on an average, Mr. Hafford says, the boat has to remain at anchor.

Therefore these ten days are not available for conveyance of salt?—They are available provided you make your own arrangements, and fit in your work in such a way as the trawler may be used as soon the work on the shore is over.

Then you mean to say that if the correlation work is finished within ten days the trawler will be free to do any other work?—As far as I can gather from Mr. Hafford, ten days are obviously necessary for the trawler to remain at anchor. In any case so far as I have read, the arrangements made in other provinces are different from ours. To mention one fact I might say they had been using coal to the full capacity of the trawler on days when it had been fishing, whereas we were using in the shape of fuel only half of what they were using on those days when it had been actually fishing. By this method we were able to effect a saving in the use of coal. Secondly the Indian crew cannot be asked to work for all the 30 days in a month strenuously.

In other words, you say the work on the trawler fishing is much more difficult and will give work to all the crew, which would not be the case if the trawler is towing the schooners. When it tows the schooners the trawler will be practically at leisure?—What I wanted to say was that the work done by the trawler could not be recorded within a very short time and there can be no question of the trawler remaining on the shore only for such number of days as the "Golden Crown" and "William Carrick" found it necessary. When we have got to deal with scientific and research works it may be that we may require a little more time. We have found it possible to work the trawler for a fortnight.

Is it possible to trawl for night and day?—Provided you can. Of course the crew are also human beings and do they not require rest?—About the other matter that you were speaking of, viz., that you have to correlate information and record, in certain registers, the results of your investigation and scientific research, will you please let us know what are those registers?—The names of registers into which the information has to be correlated from field notes are as follows:—

- (1) Weekly Register of Meteorological and Hydrographical observations.
- (2) Fish Register showing particulars of individual hauls of the trawl with quantities of the chief kinds of fish caught.
- (3) Fish Sales Register.
- (4) Hydrographical Register.
- (5) Fish Measurements Register.
- (6) Register showing landings and amounts realized and remitted to treasury.

The trawler "William Carrick" was the pioneer in the field. When we started we had no experience or information as to whether any satisfactory results could be got. It was not in our programme to intrude upon their grounds. Therefore they were not of much value to us. It is obvious that such circumstance involved the smallest chance of success in the early stages of the enterprise. On the other hand we started with zero fund of information.

All that we need say is that our trawler is engaged not merely on commercial fishing such as the "William Carrick" and "Golden Crown" but it is also engaged in gathering scientific information.

Do you mean to say that "William Carrick" has not gathered scientific information?—Not as their main object.

From what you have read of "William Carrick" from Mr. Hafford's report it appears they gave primary importance to the quantity of fish caught and only a secondary importance to research work? Is that so?—This is what Hafford says "Later on, on the 25th November orders were received which implied a change of policy. Up to this date the primary consideration was to get fish for the market. More of catching the fish than research has been the main occupation of the Marine Biologist."

Is it not possible to work the trawler for all the thirty days in a month?—The trouble involved to the crew will be very great and they want some rest. The main consideration is stores and men and it is found in practical working that the trawler could not work all the thirty days in a month.

Do you think that if the skipper or the master of the trawler was prepared to carry salt from Bombay to Surat, you would allow it?—Yes, he could have done it. I quite agree with it.

Now the whole period during which the trawler has worked is 130 days. You may take that the actual trawling work that was done was for seven days in a month. Why is that? During this period, i.e., from 31st October to 10th March, did the trawler do any other work?—It did certain salt transport work. No doubt it did trawling work for seven days on an average during that period. But it must not be forgotten that during that period it not only carried and towed schooners laden with salt on two or three trips to Calicut but also had to undergo repairs. And there is the question of coaling also.

Mr. Tampoe: Under normal circumstances would you consider that twenty days working of the trawler to be an adequate period?—Quite adequate.

Dr. Gravely: You know of any vessels which are used for research in English or American waters?—They are older or larger vessels.

Can you mention any research stations which have trawlers attached to them?—The Board of Agriculture and Fisheries. So also the Northern Fisheries Committee. The vessel attached to the Scotch Board of Fisheries is mainly fitted for that purpose. There are three or four German vessels which are of a trawler type and which are used for fishing.

Have you any idea as to what type they use in America?—I have no idea.

The Chairman: Were these vessels originally intended as commercial trawlers?—I should think not. They were purchased and refitted.

They are not ordinary trawlers now?—Yes.

They have all had modifications?—Yes.

Would you consider any of those boats suitable to stand these waters?—Still further modifications are required to suit the work in the tropics.

While contrasting the work of "Lady Goschen" with "William Carrick" you were telling us that you gave prominence to research work while the officers on "Carrick" gave importance to the commercial side of it?—Yes.

Did you instruct your officers to carry on fishing operations from a commercial point of view or were they to catch fish for investigations?—Whatever fish they caught we used to preserve. What I told them was that they could catch as much as they liked but they should not devote their time for marketing.

Supposing you finished that work within the course of a year would you give up this work on the trawler?—It is not possible to finish that work within a year.

How long will it take?—The position is this. The trawler has got to cover somewhere about 1,750 miles of coast line. It has got to explore the whole area from Ganjam to the Cape, not only once but as many times as possible during a year so as to know the fish contents of the banks in the various seasons. You meet with fluctuations in fisheries which may be present or absent in a number of years in which case the research work will have to wait till they reappear.

What is the information for?—The information is the basis for all future development of deep sea fishing.

You told us that the marketing questions and the catching of fish for commercial purposes are no part of your work?—I did not say no part. What I wanted to emphasize was that they should not be permitted to interfere with those questions as the attention would be diverted otherwise.

That is, until you complete the whole of the investigation you will have neither the time nor the opportunity of demonstrating to the people at large that fishing on the shores by means of trawlers would be a commercial proposition?—Yes, Sir, we want to have data.

You also admit that unless people are shown by practical demonstration, facts and figures, etc., you don't expect the public to take to trawling?—No.

What good will it do if you simply go on making this research for ten or twelve years?—From the commercial point of view it is indispensable.

Will you please explain?—One of the reasons why the experiment failed is that they attempted too much within the short period. All the reports say that. They did not know the grounds.

Do you think that this kind of work should proceed?—It should necessarily proceed.

It is not possible for you to say at present how long this research work will have to continue?—So long as there is one trawler it will have to continue a good long period.

*You were referring to the trawlers of Bombay and Bengal and you must have seen the report from the Straits Settlements. The conclusion to which they came after one or two years work was that there is no good of trawling for fish in those shores for commercial purposes?—Yes, with the vessels that they have used, with the present state of marketing and with all the given conditions. With unknown banks and with the available vessels and without having the time to find out what exactly are the data these experiments did not produce commercial results.

If those disadvantages were present what prevented those Governments from satisfying those very conditions?—I cannot say that.

Do you think that if those conditions were satisfied fishing could be made a success?—That is what is said in the reports. Mr. Hafford ends his report as follows: "Further fishery exploration and experiment and further trials of methods hitherto untried here are necessary however before adequate data for the basis of such developments can be available." So even data are not available with these experiments at present.

So that practically it comes to this that these officers required certain data and conditions to be fulfilled before they could show any advance?—Yes.

Governments generally are disinclined to lay foundations?—Yes.

Therefore unless the Madras Government are prepared to satisfy the conditions which were required by those officers and unless they are prepared to go on for the necessary length of time it will be absolutely useless to go on with this trawler work?—I am afraid it is so.

How long do you think you will have to do research work to induce private persons to take to trawling?—I regret I am unable to say. I won't advise private men to venture because I have myself no data.

Take it from me that private men won't undertake an experiment?—In Bombay and Ceylon they have undertaken.

Merchants and tradesmen do not want experiments?—If they can help it.

Experiments have possibilities of failure and more of failure?—Yes; without data it is difficult to advise anybody.

Even to venture?—Yes.

So far as human anticipation can go you don't expect that any one would come forward to use trawlers and catch the fish in the near future?—Seeing Bombay and Ceylon one cannot say what will happen.

In what year did Ceylon people take up this?—In 1923-24.

And the results were such as never to induce private enterprise to come in?—A trawler has been purchased and is now fishing in Ceylon waters.

Dr. Gravely: Do the results justify the purchase of the trawler or was it due to the optimism of the Directors?—I can't say.

The Chairman: In Ceylon they carried on experiments of this kind from 1920-23?—Yes.

That was enough to induce an enterprising firm in Ceylon to undertake commercial trawling?—Yes, they intend purchasing three trawlers.

I suppose you do not know their progress?—It is only a month ago they have purchased the trawler. Captain Cribb was serving there?—He did some experimental work there.

You think that a certain amount of enterprising character is necessary?—I for one would not advise until data is available.

You cannot tell us how long it will take us to give full data?—It will take considerable work.

So that nobody with any precision or approximation to precision can foresee when this fish trawling will be undertaken in India?—I would not put it that way. That is what we are really after. The trawler is the best type of fishery research vessel. Until research has been made and completed and until we know the condition of our banks, the types of fish, season, etc., one is not in a position to decide whether trawling should be done or some other method of up-to-date fishing should be adopted. The trawler is out here not merely to find out whether trawling is possible but also to find out the best method of fishing possible. With a trawler fitted with Danish and American nets we want to give a real trial in deep sea fishing. Until a free trial is made we are not in a position to say anything definite.

In spite of the experience of Bombay, Bengal and the Straits you consider that this work on trawler should continue?—They have not tried them at all; they have themselves said so in their reports.

Their closing of this business was rather hasty?—Yes, it may be a majority in the Council that did it.

Dr. Gravelly: Is there no period within which it might be possible to advise some of these people to take to this enterprise?—It may be possible to advise immediately.

The Chairman: Do you think you can advise anybody to fish round Cape Comorin?—Not yet.

How long after will you be in a position to advise?—The trawler is the only type of vessel suitable for all the varieties of research in deep sea fishing. It is only after the necessary data have been gathered by the trawler with the various types of fishing implements available for deep sea work that it will be possible to definitely fix on the type of deep sea implements that could be worked with profit under Indian conditions.

Dr. Gravelly: You were pessimistic sometime back. Is it not possible that with the success that is expected of refrigeration experiments the condition may change?—It may change. Even in this country it is unnecessary to fit trains conveying fish with refrigerating plant provided there is refrigerating apparatus on the shore. Once refrigerated, fish could travel and remain without taint for 72 hours.

So that what you want is a cold storage room?—Instead of the railway building one carriage at a great cost you can build a number of refrigerating rooms at different fishing centres. Mr. Soma who gave evidence before this Committee at Calicut availed himself of the advice given by the department and is now just constructing a fish refrigerator and he has obtained machinery for making ice. That machinery cost him Rs. 4,000. The site on which the station was built was given free by the Government and also the Engineering Department helped him. The building itself cost Rs. 1,500, so that with Rs. 5,500 Mr. Soma is now preparing himself for conveying refrigerated fish to distant stations. This does not include a cold storage room which might cost him about another Rs. 3,000 or Rs. 4,000. I mention these facts to show that if side by side with experiment on the trawler and the investigations thereon to increase the catches, conveyances and distributing facilities are afforded there is every probability of demonstrating the advantages of deep sea fishing and showing that trawling is a commercial success.

Mr. Tampoe: Is it possible to work out data for the whole of the coast line with the trawler of the kind which we have at present?—We can work out our data by taking individual sections of the coast. By taking individual sections of the coast we can have greater facilities to correlate the results of our experiments. Our idea is that we must work out our data thoroughly and well and also to find out if there are people who wish to go in for deep sea fishing. Intensive work alone will not achieve the best results. I feel a much more cautious and prolonged enquiry is capable of producing better results.

What is the probable profit on the transport of salt by the trawler?—At least Rs. 50,000.

I take it that the sum of Rs. 50,000 is a saving to the Government in transport and other costs and all of this go towards the reduction of the issue price of salt?—Yes, all of this go towards the reduction of the issue price of salt.

You discovered the existence of coral shore?—The bank mark in the Admiralty chart without any detail has been found by us in our experiments to be a coral shore absolutely detrimental to trawling. In the Ceylon trawling map published this coral reef is not marked at all.

Mr. Manikka Nayakar: Supposing our Presidency has only 500 miles of sea coast, which you are investigating, would you plead that the fisheries investigation should stop with that short coast alone or should it be extended still further?—I see your point. My contention is that to the extent to which you restrict the scope of your investigation to that extent you will be greatly adding to the development of your industry.

Dr. Gravelly: Do you consider that any serious work is being done in the North Sea?—Splendid and serious work is being done.

(The witness at this stage asked the Committee if it was open to him to refute certain statements made by Mr. Govindan when he was examined by the Committee at Calicut and the Committee were perfectly willing to receive any information.)

The witness said:—In answering Question No. 11 Mr. Govindan stated in his written evidence that it would not be a business proposition to send fish however cleanly they might be cured all over the country, disregarding the taste of the consumer. This is not what he stated when he was in office. For instance in Bulletin No. 10 at page 25 Sir Frederick observes "it is of course obvious that men who for ages have accepted and have taken themselves to approved or routine food as their only food supply will not readily change it unless they are supplied with other highly flavoured products". Nevertheless Mr. Govindan considers "that the masses are actuated largely by cheapness and if we can supply good products at equal or cheaper rates the market will readily accept them. The difference is obvious". That was in 1910. Even in the year 1920-21 Mr. Govindan said in his letter of 5th December 1920 C.R. No. 123-20, paragraph 3, "that the experience gained in the sale of similar fish prepared at Tanur shows that the curers will have to be brought into touch with the consumers and that is the work which the department will have to undertake in the near future."

In answering Question No. 16 he says: "I made a special study of these 'fishing methods' when on deputation to Europe but was not given an opportunity to try them in our waters."

We have no statement to this effect made by Sir Frederick Nicholson who was the then Director. It is also strange that if this was a fact that Sir Frederick Nicholson should have failed to give him opportunities.

In answering Question No. 17 talking of "Lady Nicholson" he says "After the defects were removed she has become a very serviceable vessel fit to undertake ocean voyage, etc." The R.I.M. officers who navigated the vessel as well as others who have been on board the "Lady Nicholson" considered her unseaworthy.

In answering Questions Nos. 18 and 19 Mr. Govindan remarks "Nor is there any loss if the divers are not able to go out on any particular day. The chanks are stationary in their habits and if they are not fished on any day they may be available any other day whenever conditions are favourable."

I wish to point out that there is no comparison between the number of chank fish caught then and now and also I am surprised that Mr. Govindan does not realize that time is money.

Again he says "a trawler is built for a particular kind of work and she has hardly any spare room for the additions and alterations now being carried on. The result will be that she will not be able to carry on trawling operations properly." I wish to point out that fishery research vessels all over Europe are for the most part altered trawlers.

The Chairman: Will you be satisfied with a single bio-chemist for fisheries?—In the note, I have mentioned the staff I require. I have asked for an assistant for him, a laboratory assistant, a laboratory attendant and a peon.

Do you think that that kind of staff would be able to effect all the improvements?—They can make an honest attempt to solve all the problems.

Do you think that the Tanur station ought to continue?—There is a lot of work to do. What do you think of transferring it to Calicut?—The difficulty will be for us to do it as cheaply as we are doing it at Tanur, because fish is available in large quantities and you have to do it on an industrial scale. As we are proceeding on the lines that are being done at Tanur I strongly feel that we have reached a stage when we should have some mechanical contrivances. So far oil and guano are manufactured by ordinary labour and this is wasteful and unnecessarily costly. In America there are machines of this nature. Little by little the introduction of machinery into the industry is absolutely essential and I see no prospect of any individual manufacturer capable of doing it.

What will be its cost?—One important consideration that has stood in the way of putting forward that proposal is this. Even in a place as Tanur which contains very large quantity of sardines the smallest unit of the plant now manufactured in America is too large. The introduction of this reform in the manufacture of oil and guano is an experiment in commercialization. Therefore we have found it necessary to provide Tanur with a quick career from Calicut on the one side and another station on the other.

Don't you think that we should stop with experiment and not commercialization?—The experiment itself will pay its way. You are getting the opportunities to do that without practically paying anything for it. So you are gaining.

Dr. Gravelly: Instead of providing Tanur with power plant, if oil is pressed with hand do you think oil factories would have been started?—Many have been started. If there is one tangible effect on the trade by the fishery research it is the development of the oil and guano trade. We have created an industry which is bringing somewhere about half a crore. Does it not justify us to go in for a little more mechanical power?

It is only for large scale production and large scale production is not one of your purposes?—It is a waste of time to be supervising coolies when especially that has been copied by the people.

But is it commensurate with the cost involved?—It is when you consider the effect it will have on the whole industry.

You must not forget that you will have to keep commercial accounts which will always show a loss?—We will immediately start a co-operative society. I am not anxious to start it on a commercial scale. In this we have come to a stage when we ought to stimulate private capital. The plant could be loaned out to different people.

What will be the cost of the machine?—About Rs. 30,000.

Mr. Tampoe: You think it indispensable to have a station at Tanur with a power plant?—Yes. With the commercialization of the research done at Tanur an engineer will certainly be needed to initiate experiments. In fact, in my opinion, for the next step both at Tanur and Chaliyam an engineer and a bio-chemist are equally necessary.

Without strict supervision do you think that your staff is of much use?—It is not of much use. It is in a way conserved in this way. Our work now ceases with introducing certain varieties. If the tank is auctioned what happens is indigenous fishing is not able to capture all the fishes and they are thus protected. Secondly auction takes place for the whole year so that the contractor becomes the man in charge who guards. The results of each year more than repay our trouble and cost in stocking the tank. The fishes grow within that time to marketable size and the tanks fetch a much higher rent in consequence. The advantage of this is that places in

the interior which normally get no sea fish and comparatively small supply of fresh water fish, are ensured a much better supply of fresh water fish. But the stocking has to be repeated year after year as the tanks dry for four months in a year on an average.

What is your opinion in favour of transferring the fisheries schools to the Educational Department?—I am not in favour of the transfer. The present difficulty is a temporary one. With a more liberal policy I fully expect that the number for a class will come to 30 or 40. Then the advantages are very much more when the student is given a continuous course in the same city rather than two years in a general school and one year in a fishing school.

At what rate do you think we should increase the number of schools in order to touch the general sea-fishing population?—Four day and four night schools every year.

Dr. Gravelly: Do you think that Madras is in need of a fishery school, and if so, on what lines would you like to proceed?—I think the need for a school in Madras is more or less on the same lines we have got to deal with the East Coast from Madras to Cape Comorin. The school at Vizagapatam serves the needs of all the taluks in the Northern Circars.

*The Committee then adjourned till 11 a.m. on Friday,
the 27th July 1928.*

Friday, July 27th, 1928.

MADRAS.

PRESENT :

Mr. A. McG. C. TAMPOE, I.C.S. (Chairman in the absence of Rai Bahadur Sir K. VENKATAREDDI NAYUDU Garu).
Dr. F. H. GRAVELY.

Dr. B. SUNDARA RAJ.

Mr. Tampoe : I take it that the Indian fishery work broadly falls into two classes?—The Indian fishery work falls into two classes, viz., the breeding of food fish and oyster fish. Apart from these there is the stocking of fish in tanks which grow within the period in which the water is in the tank. We have also tried to introduce a better class of fish than those that already exist in various waters. If we take the tank fish, the fish which you can satisfactorily introduce into the tanks is very limited. Catla, carps, labeo, barbus and etroplus are some of the kinds and preliminary experiments in rearing them were not a success.

Are they all Indian?—Yes.

You can confine yourself for the present to the indigenous fishes?—Yes. We do not breed other kinds of fish at all. In the case of any other kinds of fish if we want to introduce them we have got a sufficient stock ; we can introduce them where they are not found.

Who collects them?—The local staff attached to the fish farms. They do that work.

How many of these fish farms are there?—Six.

Are they scattered in different places or do they form convenient centres for the stocking of tank fishes and food fishes?—An attempt has been made to combine the two. You cannot have a fish farm unless you have a perennial source of supply of fresh water. That necessarily limits the scope for selecting a site for a fish farm.

I am trying to find out how far your process of breeding fishes by having fish farms has satisfactorily worked and whether there is proper distribution of these farms all over the country?—The scheme has been extended only to two districts.

In the case of two districts we have taken over all the tanks which we wanted to take over in these districts. More important fresh water tanks have been surveyed in the districts of Chingleput, Nellore and Mopad. In the Chingleput district, Madras can be practically included. Besides we always stock all young fish which are capable of being transferred from one place to another. Even if you had no fish in a certain place, if the conditions are favourable there, for breeding, fishes from other places could be easily transferred there. Mulletts presented many practical difficulties. One of the initial difficulties we found was that young mulletts would not travel from backwaters to the tanks. When once we found we were able to transfer them, immediately we started making experiments at Ipur farm and we came to the conclusion that if certain conditions are fulfilled the mulletts could be carried. All the initial work was carried out in the Ipur fish farm.

Do you consider that much further work in this particular direction of stocking fish and investigation remains to be done or has that fairly been completed?—A good deal of investigation still remains to be done.

On the same kind of fish?—Yes, mulletts.

What kind of investigation?—Periodical investigation. The difficulty is this : selection is made automatically and that I consider unsatisfactory. We know that only certain kinds of mulletts resort to fresh water. So if selection is made by selecting these young mulletts with care in the higher reaches of rivers at a particular time my presumption is that they can be got in a large quantity. There is no knowing as to which of these will grow in fresh water and which not. Investigation in that direction is really the scientific part of the work. We are very near the point and are doing what Bengal has not succeeded, that is, in cultivating such kinds of fish which are of value to us as food fish. All Bengal literature will tell you that with regard to cutla there is the remote chance of cultivating it in tanks. I believe we have solved that problem. It will be possible before long to breed this fresh fish in tanks if certain conditions are fulfilled. All that work must be done in fish farms and not in irrigation tanks.

What do you want to say with regard to temporary tanks?—There is nothing special to say.

What about permanent tanks? The only experiment so far we have tried in getting fish is in Mopad tank?—Experiments were begun in Chembarampakkam tank but we found that that tank was saltish, nor had it a perennial source of supply of water. So we transferred it to Mopad.

I understand these experiments at Mopad have resulted in certain regular fresh fish food supply to the neighbouring taluk of Udayagiri very largely populated by indigenous Muhammadan population. Is that so?—The demand is very great and it is only now they are able to get supply.

What is the monthly value of that?—About Rs. 100 or Rs. 150.

Do you consider that meets the demand?—That is a small beginning. Marketing side as elsewhere has been neglected and experimental side has been emphasized. We are more concerned with what yields best results rather than finding cultivable supplies of fish.

Are there any other tanks situated near Madura, Trichinopoly or some big inland towns where fish cannot be readily obtained which could be used for the stocking of fish?—Yes, there are quite a number of them and if fishes are cultivated in those tanks immediately a large market for fresh fish can be found near those tanks.

Assuming that we have the benefit of experiments conducted already at Mopad, how do you propose to tackle further questions which may arise in other places?—If there is a very large body of inland fishermen living on the banks of these towns the first step would be to see whether we could hand over the fisheries for any reasonable rent and then induce the co-operative society to launch out into fishing experiments and send a man from Mopad to make experiments there.

At Mopad what stocking had you to do?—We have been stocking catla. We have been stocking certain other kinds of fishes such as barrier, wall, etc.

Do you think that by stocking operations if you are able to produce a larger supply of fish there will be a demand for it commensurate with the supply?—If intensive fishing is done, I am afraid that cultural work will fall through. The more you fish, the more food will be left to the smaller fishes and unless you can stock food as well, and unless there is some mortality among young fish there will be a very large surplus of fish left.

It is rather curious that the amount of stock food in tanks is sometimes surprising?—It may be due to so many causes. Certain fishes develop their taste for food in a certain way and certain other fishes develop their tastes in other ways.

So far you have only mentioned certain inland fisheries. You have stopped with temporary tanks. What about other classes of tanks owned by private persons?—We have a very large number of perennial tanks owned by private persons which are of immense importance from the fisheries point of view. These tanks are all wasted. It should be the business of the department if inland fisheries are to be developed to teach people to cultivate food fish so that it may be readily supplied to the local market.

Have you used Gourami?—Yes, we have used it. A friend of mine in Madura grows Gourami in his own tank.

When were these experiments started?—In 1911.

Do you consider that these experiments have yet justified themselves with regard to stocking?—Yes.

When did you begin the stocking operations?—Quite recently. I believe only about 1919.

How many ponds are you dealing with?—All the perennial tanks in Cuddalore and Kurnool districts.

Can you point to any benefits from these operations? It is rather difficult to get information about that, but still we have authentic information about a certain tank. Occasionally these tanks become dry. Experiments in connexion with the Gourami fish have not yet been commenced. This kind of fish is not suitable for the type of tanks with which we are dealing. Large reservoirs must certainly require a very large number of fish. So we want to restrict the quantity of fish produced in a tank. Gourami is a variety of fish which requires a larger fish farm. As a matter of fact experiments in one or two tanks have been started.

Can you produce any results? Have they been pleased with the results?—One of the recent experiments was done by a certain gentleman in his tank. He himself reported that they have multiplied in very large numbers. Apart from that another gentleman asked for a larger stock of Gourami. He said he would pay all the expenses.

Gourami would be themselves present in tanks in sufficiently large numbers. So, can you not drop breeding this variety?—Provided there are sufficiently large numbers of tanks we can do so. We have made experiments in connexion with some tanks and at this stage if we drop the whole programme, then in case we want to make experiments regarding the breeding of this species we will have to go over the same ground again.

You have also introduced Tencheons?—Just started breeding.

How long have these experiments been going on?—They have been going on since 1913.

Does Tencheon grow well, and if so where does it grow well?—It grows well and abundantly in the Ootacamund lake and in the hills. If you drop them for financial and other reasons it will be ultimately a loss to you.

Have they any characteristics in common with the Gourami?—Gourami will do well in lower elevation, whereas these Tencheons grow well in hills.

As regards oyster culture, what is your object in taking up oyster culture?—It is a subsidiary industry which is certainly promising. It is true that the country will not use these oysters. But if our export trade is established on a firm basis, we have a great future for this industry. At present our experiments are in the initial stages.

Have you any idea as to what would be the cost if you want to put this industry on a commercial basis and also want to establish a farm for the breeding of this variety of fish?—If we want to put this industry on a commercial basis, it needs greater attention of an expert. In other words, you would have to resort to taking up more expert advice and time and the major part of your time would have to be devoted for this kind of work by visits to foreign countries and so on. That probably is not a practical proposition.

With regard to these tanks running dry for eight months you are paying compensation to the local boards?—It has been proposed according to certain expert advice to lease these tanks for a longer period than one year.

You think from that point of view five years will be a reasonable period for you to lease these tanks?—If revenue is not your consideration. If you lease it for five years the man who takes up the lease might be benefited.

Have you had any agency to inspect these tanks and report to you as to when they became dry and so on? If not, how did it affect your professional work?—If we had an individual like that he would have made our task much easier, and it will be possible for me to delegate a certain portion of the work to him. But it is difficult to find an officer of that kind. Our

idea is to replace such an individual by a co-operative society. If the movement progresses along right lines the societies need not be necessarily restricted to fishermen. One agency has been given recently in the shape of village panchayat society which would undertake this work.

The fishermen complain that their means of livelihood are very low and with their limited finances it is very difficult for them to continue their fishing industry? So do you think that a co-operative society solely intended for them is quite essential?—In the Lower Anicut and also in Kollegal where you have a large body of fishermen there are co-operative societies for fishermen. Therefore, the problem is not likely to arise there. But if it arises at any other place, we should decide in favour of a co-operative society of fishermen or a society which will include in its directorate fishermen representatives also.

Don't you think it is desirable to have some legislative sanction with regard to restricting the catching of fish in certain waters?—I would not say there is no legislative sanction unless you take advantage of a particular section of the Indian Fisheries Act. There is a clause in the Fisheries Act which enables the Local Government to say that a particular water should not be fished for a period of two years. We have to take shelter under that and declare that no fishing should be allowed in certain waters. And we should empower the local boards to issue licences.

If the common law of the land is at variance with the special law, the special law will not prevail. I wanted to ask you what you considered about the relative importance of the inland fisheries as compared with the marine fisheries?—There are absolutely no statistics and therefore we have to compute it in some form. The only way available would be to calculate the total quantity of fresh water and the total area available in square miles and we may have some data then. We know definitely what a given area of fresh water is likely to produce in the form of fish. Calculated on that basis I have come to the conclusion that when fisheries are fully developed in this Presidency, the yield of the inland fisheries would be one-twentieth of the quantity of the fish that the sea is likely to produce.

But fresh waters adjoin more villages than the sea. They cater to a larger number of population than the sea. Very many people do not like cured fish. So don't you think that your staff has got to be spread over a very large area?—For the most part it is a very petty staff that is required and it will not cost you much.

Dr. Gravelly: In the fish farm at Porayar, the farm is carrying on fishing work in waters in which the people say they have a right to catch fish. So what little staff that we have in the different sections of the department is incapable of attending to such works. So, unless the department is staffed with men of sufficient qualifications, it will be of no use. Is the Assistant Director capable of doing his work without the Director?—No, no.

Do you consider if you could be relieved of the inland fisheries section as at present constituted it would really advance matters or you would require special research assistant? The question of the appointment of special research assistant for inland works is a very important one. Even if the present staff is going to deal with problems arising regarding inland fisheries, leaving the subject of marine fisheries to the Fisheries Biologist, the Assistant will have four marine stations and one fresh water station in his charge.

Mr. Tampoe: With regard to this inland fishery, you said it would be a great relief to you if somebody else assisted you. Supposing you had one assistant, could you then attend to research work and specialize in maritime fisheries and also attend to inland fisheries?—Yes, I could then attend to even inland fisheries. The difficulty comes in only when you will have to attend to all kinds of work. The present staff is not even adequate to attend to routine work.

How far are you wise in having these six farms?—The six farms are necessary not so much for the variety of fish we breed in those farms as for the fresh water areas for the purpose of stocking. If a programme is adopted it would be possible to reduce stocking. Each fish farm closing down

would necessarily mean a certain area of the Presidency giving up our stocking programme. Our present programme of fish is only for one-eighth of the Presidency.

If your inland fisheries work is reduced to a reducible minimum the staff and money could be fully utilized by you?—But the difficulty is as it is the inland fisheries are at a minimum.

Dr. Gracely: Supposing it comes to a question of reducing the six fish farms, do you consider that all the six farms are necessary for the bare minimum work? Would it not be possible to concentrate in Mopad and stock all the varieties of fish?—Catla ordinarily does not breed in tanks. I get it from Kistna and Godavari and take them to the tanks. Practically the fish farms stock Etroplus and Gourami which cannot be collected outside.

From Godavari you get them for the fish farms?—Yes. These fish farms are required to keep these two kinds of fish. These farms are necessary not so much for the varieties of fish we breed in the farms as for the purpose of stocking. If therefore any curtailed programme of stocking is started it is possible to reduce the number of farms.

In other words you cannot cut down the extent of fish farms unless you also limit the stocking in certain areas?—The closing of each fish farm would necessarily mean certain areas of the Presidency cut out from our stocking programme.

How much area does a farm conserve?—Half the district.

There are 26 districts, so that you should have at least 50 for which we have 6?—Yes.

So that our present programme is only supplying one-eighth of the Presidency?—Yes.

Have you got anything to say about the staff? Some of the fisheries staff have been questioned on matters of research outside their legitimate ground. Their reason is therefore not in conformity with my own.

What increasing research staff do you think is absolutely essential?—For the sea fisheries I consider four stations are absolutely necessary. We cannot do less than that. The sea coast of the Presidency falls into four natural divisions and each section requires a whole-time officer of the grade of an assistant biologist, a really well-qualified biologist. The natural divisions are Vizagapatam, Madras, Krusadai and Calicut.

For the trawler?—We would require one such biologist on board.

What about Tanur and Chaliyam?—They would require a chemist and an engineer rather than a biologist. A fisheries chemist is required on the industrial side who will be useful in many ways.

With this staff you could employ them on all legitimate duties?—Oh, yes.

They could carry on investigations all around the coast?—Yes.

Do you consider it sufficient to meet the case and do you consider it worth while to have one supernumerary to be working in one or other of the stations and moving wherever he is required?—That difficulty has been met by what I actually propose. The marine or fisheries biologist will co-ordinate the work of the research stations all round the coast. At each of these stations we have asked for assistant biologists who will also be gazetted officers. There is a good deal of routine work to be done like noting, recording, co-ordinating, etc. These have got to be done and we are not providing these men with clerks and the whole of the work will fall on the subordinate staff. So I have asked for an inspector, laboratory assistant and laboratory attender.

If you have three people the attender will be the peon. If you have two higher officers one taking leave do you think either of them alone can for that period carry out the other work?—The difficulty of break of work is provided for by one inspector. But there may be some menials required.

Mr. Tampoe: You will have a marine biologist, like yourself, with the same qualifications like yourself for carrying out the work of the other stations?—He can go round and stay at one place. He will have four men to see to what extent they could be entrusted. There will be a biologist on board and biologists on land. There must be some agency to co-ordinate their work. We are gathering statistics and by themselves they will be of no value. Conclusions have therefore to be drawn and you want a separate agency for that. The senior fisheries biologist on land will in the first instance train the five biologists who are to be in charge of the different stations and the trawler and then supervise their work intensively co-ordinating and connecting their research work. The propaganda work will be done partly by the fisheries school, partly through fish-curing yards and lastly through leaflets and bulletins of the department published from time to time.

(The witness withdrew.)

Thursday, May 2nd, 1929.

COCANADA.

PRESENT:

M.R.Ry. S. ARPUDASWAMI UDAYAR AVARGAL, M.L.C.

„ P. V. MANIKKA NAYAKAR AVARGAL, B.E.

„ R. S. NAYUDU AVARGAL.

Mr. A. McG. C. TAMPOE, I.C.S., M.L.C. (*Secretary*).

(Dr. B. SUNDARA RAU, M.A., PH.D., the Director of Fisheries, was also present.)

M.R.Ry. LAKSHMI NARAYAN, Metlapalin.

Oral Evidence.

Mr. Arpudaswami Udayar: Your name is Lakshmi Narayan?—Yes.

May I know what your occupation is?—I am the headmaster, Government Labour School, Metlapalin.

Has the Labour Department started schools for fisherfolk?—It has started schools especially for the depressed classes.

You are the headmaster of one of these labour schools?—Yes.

Have you come in personal touch with the fisherfolk in these parts? Have you moved with fishermen?—Yes. I belong to the fishermen caste and I am residing in a fishing village. My school is intended for fishermen.

How many schools of that kind have you?—About ten schools in the whole district.

In all these ten schools do you also teach the children in addition to the three R's, something relating to fishing such as the mending of nets, the making of nets, etc.?—No.

Are there many teachers like you in these schools who are able to teach the children about fishery? How many teachers are there in your school?—In my school there are two teachers.

Are both the teachers fishermen?—Yes.

Can you tell us something about the economic condition of these fishermen?—Economically they are very poor. Being unable to obtain even loans they are migrating to Rangoon for earning their livelihood.

Mr. Manikka Nayakar: In what business do they engage themselves in Rangoon?—Here they had been doing fishing work but after they go to Rangoon they take to coolie work which they can do only imperfectly not being accustomed to it before.

Mr. Arpudaswami Udayar: Have fishermen in these places good catches?—Not good catches. If large nets are used, they are able to get good catches.

So, if any contrivance could be resorted to whereby they could get large nets, will they avail themselves of such means?—Yes. Provided co-operative banks are opened and credit is given to them in the form of loans.

On what security can loans be given to them?—On the security of their houses.

Have they no boats?—Only small canoes or dug-outs.

How many boats have you in these parts?—Very few.

Can you give us roughly the number of boats in your village?—Twelve boats for a village consisting of 200 or 300 houses.

Is it catamaran?—No. It is a small canoe, or dug-out; there are also some catamarans here and there.

Do they catch several varieties of fish?—Yes. Now and then.

Will you please give me the names of the several varieties of fish which are caught in large quantities on this coast?—Yes. They are Jallalu, Royyalu, Peethalu, Chavidayalu, Pandugoppa, Pulasa, Mattagidasas, Ilasa, Kattachepa, Killalu, Thambaratta, Nelantu, Teki, Sorra (there are so many kinds of Sorras).

Are the fish caught consumed locally?—They are consumed locally, and the surplus if any is exported or sold elsewhere. Unless they are able to sell their surplus fish, they will not be able to maintain their families.

Are all the fish sold by these fishermen direct to purchasers, or are they bought by middlemen who afterwards sell them to the public?—There are middlemen who pay cash down, take the fish and then sell it.

Do they come to you or do they send their agents for purchasing the fish?—They themselves come. Generally they are also poor people.

How do they carry the fish to the markets?—By headloads in baskets.

Mr. R. S. Nayudu: How do they take the fish from the beach?—For a few furlongs from the beach, they have to wade through mud knee-deep because there are no roads.

Mr. Manikka Nayakar: Out of the live fish caught, what do they do with what is not sold?—Generally they are salted, and sold. Even if they want to salt and sell their surplus quantity, they are unable to do so because of the dearness of salt.

Mr. Arpudaswami Udayar: What is the price per bag of salt?—Rupees 3-8-0 per bag of 2 maunds.

From whom do they purchase?—From the sowcars.

What is the price at which they could profitably buy salt for the purpose of salting their fish?—If the tax on salt is Rs. 1-4-0 it would be enough.

Does the dearness of price in salt really prevent them from salting their large surpluses?—Yes. It is on account of this dearness their surpluses become rotten.

Suppose the Government start some kind of fish-curing yard, would it be of real benefit to these people?—Yes.

Mr. R. S. Nayudu: Where did you undergo training as a teacher?—In a training school in Cocanada.

Is fishery one of the subjects taught?—I underwent training only in ordinary subjects. By my own exertions and experiments I gained some knowledge about fisheries.

From how many villages do children attend your school?—From four or five villages.

Are they entirely from the fishermen community?—There are 40 children from the fishermen community. The other children belong to other communities. There are only two Adi-Andhra schools and the children belonging to the fisher-community are also admitted there.

So the Labour Department run the fishery school at your request?—We started the fishery school and asked the Labour Department to recognize it and they directed us to the Fisheries Department as the proper authority. It would be very desirable to open separate schools for fisherfolk. The teachers in such schools should belong to the fishermen caste, because, in that case, they will take and teach the boys with much interest.

Are all these children Hindus or Christians?—They are all Hindus.

I suppose you have Christian fishermen in these parts?—No, but some of them are converts to Christianity.

For how long has this school been working?—For the last six years.

Did the people agitate for a school where fishery subjects should be specially taught?—No.

Do you want that fishing alone should be taught in a school specially started for that purpose?—It would be better if fishing is taught along with ordinary education.

Can you give us the reason why you did not ask for a fishery school?—The activities of the Fisheries Department did not extend to these parts. From last year I have been taking some interest in this question and in a conference of teachers I also proposed and got passed a resolution that fishery teachers and fishery schools should be encouraged. I wrote to the Fisheries Department and they replied that they would consider the matter.

What is the standard up to which you teach the boys in your school?—Up to the sixth standard.

After finishing their course up to sixth standard, what do they do?—They take to fishing generally. If they are given appointments they are prepared to accept them but they are not able to get them.

Has any of the children from the fishing community gone above the sixth standard?—Yes.

How many?—Ten per cent of the students go in for higher education, if there are charitable and philanthropic men to help them with funds for their education.

Is there any specific case where boys belonging to the fishermen community have received such support?—I can say that the late Malladhi Satyalingam has endowed 8 lakhs of rupees as charities. In Malladhi Satyalingam school only 10 per cent of the students are fishermen. He entrusted the management of these charities to Brahmans.

Mr. Manikka Nayakar: When did he die?—He died some eighteen years ago.

Mr. R. S. Nayudu: Is there a real desire on the part of the fisherfolk for having specialized education in fisheries?—There is.

Do they not evince greater desire to have general education rather than education in fishing?—If he is educated up to the school-final class, his desire to learn fishing ceases.

Is there anybody like that?—None.

How did Malladhi Satyalingam earn his money?—He earned his money as a merchant in Rangoon.

He was a fisherman by caste?—Yes.

What was the article he was trading in?—He was a timber merchant.

Mr. Arpadaseami Udayar: Are there not men worth Rs. 50,000 or Rs. 40,000 among fishermen? How many are well-to-do people among them in this taluk?—There are no well-to-do people belonging to that community.

What is the average income per head at the proper fishing season?—Rupees 20 a month for a season which extends only to three months.

So they borrow money to pull on for the remaining period of the year and they repay it during the fishing season?—Yes.

Mr. R. S. Nayudu: Do you mean to say that fishes go farther away from the shore during the non-fishing season?—Yes, they recede far from the shore.

Then you want facilities for going a little far away from the land as the fishes recede?—Yes, we want facilities for deep sea fishing so that we may be enabled to catch these fishes which run away from the land.

So you want some facilities to be provided for catching fish a little away from the land all the year round?—It is only in order to enable us to catch fish for a longer time than is possible now that we ask the Government to give us facilities for deep sea fishing. If facilities for deep sea fishing are provided we may succeed in catching fish all the year round.

Do you mean to say that with your present boats you cannot go into deep sea? If so, will you please tell us how far you are able to go into the sea with such boats?—The boats that we have at present are only canoes. We can fish with these boats only in creeks. We never go into

deep sea. There are fishermen called Vada people who go into deep sea. They also cannot go very deep. People belonging to that caste are very few in my village. Vada people in Uppada go up to seven or eight miles in the sea. They remain in the sea for three or four days. Agnikula Kshatriyas are Pallis. Vadas are different. Vadas are not Agnikula Kshatriyas. Pallis are Pallavas. Fish sold in the local market includes fish got by the Vada people in deep sea. People belonging to Vada caste go very long distances. Pallis cannot go to such distances as they have not got boats of the required measurement.

Is there any difficulty in finding sale for the fish caught?—They experience difficulty in selling the stock.

• If there are good roads all the fish caught can be sold?—Yes.

Where will you take them?—We will take them into towns.

At what distance into towns?—Nine or ten miles.

When you do not get a purchaser for the fish, what do you do with it?—We take it to the bazaar.

So there is a market for your fish?—Surplus fish cannot be sold owing to lack of organizing capacity on the part of fishermen and also owing to dearth of salt. Salt ought to be considerably cheapened.

Is it possible to improve communications?—Yes. But the Fisheries Department have not yet opened roads.

So, if facilities are given for purchase of salt, then you think you will be able to sell the extra quantity of fish?—Yes.

Then, you want some co-operative societies?—Yes.

Is there any fish-curing yard in the neighbourhood of your village?—No.

Would you like a fish-curing yard to be established in your village or where do you like it to be established?—I think it would be advisable to open fish-curing yards at Gadimuga and Pandi.

How many miles distant are they from Uppada?—Both these places are 25 miles away from Uppada. They occupy central positions in the district.

You say that some fishes are being salted. Do you find good sale for salted fish?—Yes, we find a good sale.

Where do you sell them?—To sowcars.

To which place do they belong?—They come from the neighbouring villages. In some cases the fishermen themselves go to sowcars and offer their fishes. I saw many cases with my own eyes in which large quantities of fish perished owing to the poverty of fishermen and their consequent inability to purchase salt on account of its high cost.

Mr. Tampoe: Which is more important, earning or education? Do you think that by education you will be able to better the condition of fishermen?—Yes, they will become better men.

Mr. R. S. Nayudu: Do they cultivate lands in addition to fishing?—They are not now doing that.

Mr. Tampoe: In July, August, September and October the rivers are flooded and that is the time when communications are at their worst?—Ruiny season is the worst season for communication.

(The witness at this stage complained of the heaviness of the tax levied on boats by the Forest Department when fishing is carried on within the jurisdiction of the forest reserve. He also complained that the Port authorities charged Rs. 3 per boat from fishermen who fished within port limits.)

Mr. Tampoe: Do they take from every fisherman who goes to the sea or from only some fishermen?—From those people who go to fish.

From every one who goes to fish?—From all who go into the deep sea.

Do they put number on the boat?—Yes. The boats are licensed for fishing within certain limits.

Dr. Sundara Raj: You say that in certain villages there is a large number of fishermen and in your village there are as many as 2,000 fishermen?—Not in my village.

How many in your village?—There are 200 houses including both Pallis and Vadas.

They are not cultivating. They are not living on coolie hire. How then are they living from year to year?—By fishing.

So the fish they catch is sufficient for their living?—No.

With difficulty they manage?—Yes.

If nets and boats are made available larger catches are possible?—Yes.

Among the fisherfolk in your village how many people have gone to Rangoon?—Ten persons.

How many out of these have returned?—There are some people who have returned.

If they want money they have to borrow at As. 4 per rupee per month and so they migrate to Rangoon. Talrev and Coringa are practically denuded of earning male members of the fishermen caste because all of them have migrated to Rangoon or some other place.

Mr. Tampoe: Do Coringa and Yenam fishermen constantly fight between themselves?—No.

(The witness then withdrew.)

Friday, May 3rd, 1929.

UPPADA.

PRESENT :

M.R.Ry. S. ARPUDASWAMI UDAYAR AVARGAL, M.L.C.

„ R. S. NAYUDU AVARGAL.

(Dr. B. SUNDARA RAJ, M.A., Ph.D., the Director of Fisheries, was also present.)

A deputation consisting of the following inhabitants of Uppada (including its hamlet, Mayapatnam) and Subbampeta then waited on the Committee and presented a memorial :—(1) Varipalli Nukayya, (2) Dasari Jogiraju, (3) Surada Appanna, (4) Perumalla Ammoru, (5) Perumalla Sattiraju, (6) Chokka Jogiraju, (7) Nakka Nukayya, (8) Yajjala Jogiraju, (9) Perumalla Musalayya, (10) Nakka Suranna, (11) Dasipatti Appanna, (12) Mayilipalli Kannayya, (13) Surada Yellayya, (14) Jami Ammoru, (15) Pikka Bandayya, (16) Vasipalli Appayya, (17) Vasipalli Rajanna, (18) Yikkada Appanna, (19) Koviri Peddayya, (20) Chokka China Yellayya, (21) Rasipalli Yellayya, (22) Mylipalli Kannayya, (23) Sodipalli Kasamma and some other females. Sodipalli Kasamma was then examined by the Committee on behalf of the deputation. All the deputationists belonged to the Vadabalija sect.

Mr. Arpudaswami Udayar: Will you mention your main grievances to the Committee?—Our first and important grievance is that even women who carry on petty trade in fish have to pay a profession tax of Rs. 4 for a year.

To whom have you to pay this profession tax?—To the Pithapuram Taluk Board.

Have you got any boat or catamaran?—No.

What kind of fish do you catch?—We purchase fish from fishermen and salt this fish.

What profession-tax do you pay?—We pay a profession-tax of Rs. 2 for every six months.

How long have you been paying the price of Rs. 2-8-0 per bag of two maunds of salt?—We have been paying that rate for the last four years.

You want a co-operative society for granting you loans at a decent or easy rate of interest. What is the current rate of interest that you pay on money borrowed by you?—We now pay interest at the rate of Rs. 2 or Rs. 2-8-0 per cent per month.

How many fresh water wells have you got now?—We have no fresh water wells at all.

Have you any separate schools for boys and girls of the fishing classes?—There are no separate schools for these classes.

You say you want house-sites as the sea is encroaching upon your kuppams. Is Government poramboke available for this purpose in the village?—There is no Government poramboke available for house-sites in the villages (Uppada and Subbampeta). There are estate lands and ryotwari lands but not Government porambokes.

Have you any hospital in your neighbourhood?—No. There is no hospital near by.

Which is the nearest hospital to which you take your patients?—The nearest hospital is in Pithapuram which is six or seven miles from this place.

Mr. R. S. Nagudu: Which are the fishing months in this part of the country, that is, the period when big catches are obtained?—January, February and March.

What do you do with the fish you get?—We sell it to merchants. We salt the fish taken by purchase from the fishermen. And we sell this fish to these women (showing a number of them who were present) who are ticket-holders (ticket-dars).

For how many years have you been doing the business of salting the fish?—For a very long time.

What is the average monthly income of each of these women?—I cannot say.

What is the profit which you would get for a year?—We cannot say. Sometimes we lose in these transactions.

Will you get at least Rs. 7 or Rs. 10 a month?—On an average there would be a clear profit of Rs. 6 or Rs. 7, for a month.

When you salt fish and before you sell it to the merchants, what quantity of fish would you have stored?—We cannot say.

Have you any separate store-house for storing this fish?—We keep the fish in the Government store-house but not in any other place.

Has the number of curers increased or decreased within the last four or five years?—Even now it has decreased and is decreasing. This is due to the dearness of salt and the levy of this profession tax by the taluk board.

Why should you not increase the price of fish in view of the universal increase in the price of salt?—People would not buy fish as usual if we increase the price, and we will have no sales.

At what price do you want the salt to be issued at the fish-curing yards?—The old rate of Rs. 1-4-0 per bag which was in operation for over forty years.

Do you really feel that you cannot now borrow money from other people at a cheap rate of interest?—We cannot get money at a reasonable rate of interest.

Why?—We are very poor people and have no lands to give the lenders as security for the loans.

If a co-operative society is established for your benefit, you will have to give some security for loans taken from the society. Then, how can you furnish such security?—The co-operative societies only require personal security, and we hope to furnish such security.

Do the taluk board schools really prevent the pupils belonging to your community from attending those schools?—The pupils of our community are allowed admission into those schools, but the pupils are not able to pay the school fees and the schools also are not near enough.

You have a school close by. Are all your boys attending this school?—Our boys cannot go to the school because even a small boy can earn something by working along with the older men and helping them.

So, you want a school to be established in which the teaching should be given outside the ordinary school hours?—Yes.

At what hours do you want the schools to work?—Say, from 3 o'clock in the afternoon.

Would you like to have education in fishing imparted to your children?—We shall be very glad to have our boys educated in such a way, and it is also their desire to be so educated.

So you would like them to learn improved methods of curing, salting, etc.?—Yes, it would be profitable and beneficial to them. It would be better to impart the ordinary kind of education as also the special type of education in fishing methods, etc.

(At this stage the witness complained that the tatties or drying flakes which they were compelled to use in the fish-curing yard were not useful or desirable, as they would give scope for worms to gather round the fish and so on.)

How would worms gather there, as the flakes would enable the fish to be dried better than the old apparatus (rubbish, etc.)?—The worms are gathering.

Suppose the Government supplies the tatties (drying flakes) free. Then will you agree to use such tatties?—Yes. If they supply, we have no objection.

(The witness and the deputation then withdrew.)

Then a deputation consisting of the following inhabitants of Konapapeta waited on the Committee and presented a memorial*:—(1) Pukkalla Lakshmayya, (2) Chintakayala Mutyalu, (3) Pukkalla Narasimhulu, (4) Ramiseti Narayanamurti, (5) Komati Nukayya, (6) Koda Yellayya, (7) Komati Nukayya, (8) Pukkalla Tammayya, (9) Mosa Jogi, (10) Vasipalli Appanna, (11) Koda Bhulokam, (12) Jami Narayudu, (13) Pukkalla Appayya, (14) Chodipalli Ammoru, (15) Mayilipalli Gangayya, (16) Vasipalli Kasi, (17) Mayilipalli Bangari, (18) Chintakayala Kasi, (19) Pukkalla Bodiyya, (20) Mosa Yellayya, (21) Benugu Papayya, (22) Vummidi Appayya, (23) Variipalli Sattiraju, (24) Chepala Danayya, (25) Perumalla Danayya, (26) Kuppiri Venkatarreddi, (27) Koda Yellayya, (28) Vasipalli Yellamma, (29) Vasipalli Polamma, (30) Vasipalli Mullaramma, (31) Gosala Sattemma, (32) Gosala Appanna, (33) Koda Bandi, (34) Koda Bapanayya, (35) Kuppiri Sattemma, (36) Mylipalli Tatalu, (37) Bayiseti Narayanawami, (38) Bayiseti Lakshminarayana, (39) Rayavarapu Venkataraju and (40) Telagamseti Sitaramaswami.

All the deputationists belong to the Vadabaliya sect of fishermen; Vasipalli Yellamma was examined on behalf of the deputation, as a curer.

Mr. Arpudaswami Udayar: Which is the nearest road to Konapapeta?—The nearest road is the Mallavaram road which is three miles away.

If that road is taken to Konapapeta, will it connect Konapapeta with other fishing villages?—It will benefit some villages near by, namely, Ramanakkapeta, Mummidiyari Kodu, Ravivari Kodu and other villages.

In addition to the points raised by the Uppada fishermen in their memorial regarding wells, schools, co-operative society, reduction of the issue price of salt, hospital, house-sites, etc., have you any other representation to make?—We submit that the co-operative society would not be beneficial to us because we are very poor people and would not be able to satisfy the rules. We are in very bad need of roads and hospitals. The Uppada people are not so particular about roads.

Mr. R. S. Nagudu: Can your people now easily get loans from other people?—No. We cannot get them easily.

Then what is your objection to the co-operative system? If the Government gives you an institution from which you can get loans easily it will solve your difficulty?—The Government institutions (co-operative societies) give loans only in small amounts which will not be useful for our trade.

What is the maximum amount of money which each of you would want as a loan?—We want at least Rs. 500 for each person.

Is there any other reason why you think that the co-operative society would not benefit you?—The co-operative society demands penal interest (in case of default), whereas the sower does not demand anything like that, even though the repayment of the loan is delayed for a long time. Therefore the co-operative society would not benefit us.

Supposing provision is made for easy payments, would you welcome a co-operative society?—Yes, provided the loans are given at 6 per cent per annum.

Would the present rules of the co-operative societies work very hard on you in the matter of repayment of loans?—Yes, to some extent, and the

reason is this. We get money seasonally, as large catches and sales could be had only a few months in the year. So we can repay the sowcar at any time when we get ample money, whereas the co-operative society would require regular repayments every month or so, in default of which penal interest is levied.

(The deputation then withdrew.)

A deputation of Mylapalli Swamulu, Kanchala Somanna and Vembala Kanakayya, inhabitants of Mulapeta, then waited on the Committee and presented a memorial*. They are also Vadabalijas. Mylapalli Swamulu was examined on behalf of the deputation.

Mr. Arpudaswami Udayar: With regard to your request about the issue price of salt, opening of elementary schools and working them at hours convenient for the children of the fisherfolk, etc., have you anything to say more than what was mentioned by the Uppada people in their memorial and deputation?—Our grievances also are the same. In addition to what they want, we want roads. There is a small creek between the sea and the village (Mulapeta). A bridge is necessary over the creek and also a road. That is our special request. Our other grievances are common to those of the Uppada people. We would also like to have a road connecting Mulapeta with Yendapalli and Nagulapalli. There is also much difficulty regarding privies in Mulapeta. The fish-curing yards there are very narrow and should be widened.

(The deputation then withdrew.)

M.R.Ry. CHINTAKAYALA MUTYALU of Kuppirivanipeta.

Oral Evidence.

Mr. Arpudaswami Udayar: Have you anything special to represent to the Committee?—We want facilities to learn something about the methods of catching big fish; by these facilities I mean deep sea fishing. We are now catching fish within a distance of about two miles from the coast.

What are the kinds of larger fish you are referring to?—Pedda Sorralu, Pedda Konemulu, Pedda Vonjeramulu, Pedda Ganumulu, Yelavulu and so on.

Do you capture such kinds of fish occasionally now?—Yes, very rarely. But when such fish are dragged to the shore, the nets become torn and cut up; such nets would be useless afterwards.

Do you get a good price for them when you are able to catch such fish at all?—At times we get good price, but at other times we do not get such prices. It all depends on the state of the market, on the demand existing in the market. Some of the intending purchasers are deterred from coming to the place of fishing owing to want of road communications; otherwise some more purchasers may come.

Why are you not able to catch more big fish now?—We are not aware of the new and improved methods. We have no money also to enable us to purchase or construct bigger boats. If the proper methods are taught to us, we may be in a position to catch big fish. So we want a school of a special kind wherein these improved methods of fishing, net-making, boat construction, etc., are taught to the boys. We make the same requests as those made by Uppada people regarding schools, roads, fish-curing yards, issue price of salt, taluk board tax, hospital, wells, etc. There is no special grievance we are subject to which I can remember now.

(The witness then withdrew.)

Bavisetti Narayanaswami, Bavisetti Lakshminarayana and Pukkalla Narasimham were next examined and they cordially endorsed everything that had been elicited from the previous witnesses and earnestly requested the Committee to consider the grievances of their villagers. Perumalla Ammoru of Uppada and Varipalli Nukayya of Subbampeta, both Vadabalijas, also similarly endorsed what had been stated by the previous witnesses.

The following inhabitants of Uppada belonging to the *Palli* community among fishermen similarly endorsed the above grievances, and made a special request about the abolition of the taluk board tax and the construction of roads to reach the beach, as at present they had to pass through ryotwari lands. Some of them also mentioned that this taluk board tax was a burden weighing very heavily on them, as it is levied without any reference to their economic condition (which is very miserable) and also in some cases on each member of the family. These witnesses were:—(1) Suramalla Gurayya, (2) Matchu Dhanaraju, (3) Marada Appalaswami, (4) Vanamadi Desayya, (5) Penupotula Musalayya, and (6) Kari Gurayya. They also represented that two fresh-water wells were submerged owing to the encroachment of the sea.

* Not printed.

Saturday, May 4th, 1929.

WALTAIR.

PRESENT :

M.R.Ry. S. ARPUDASWAMI UDAYAR AVARGAL, M.L.C.

„ R. S. NAYUDU AVARGAL.

Mr. A. McG. C. TAMPOE, I.C.S., M.L.C. (Secretary).

(Dr. B. SUNDARA RAJ, M.A., Ph.D., the Director of Fisheries, was also present.)

M.R.Ry. ACHANTA KAMESWARA RAO PANTULU Garu of Vizagapatam.

Oral Evidence.

Mr. Tampoe: Do you take interest in the catches made by the fishermen here?—Now and then I enquire of those people for oysters, chanks, etc. Now and then they get chanks, mostly of small size.

How much do they sell them for?—I do not know.

What do you think are the needs of the fishermen?—There is no proper training or education for these fishermen. The municipality is imparting primary education, but as the fishermen do not take interest in education they do not attend the schools. They require such kind of education as would enable them to earn their livelihood. If in addition to general education, some sort of practical education is imparted to these people, many boys would attend the schools. The Government should come to their help by advancing some money. They should help them that way.

You speak of help being given to them. What do you want Government to do?—The Government can help them by opening co-operative banks or something of that sort. If the Government help these people in that way, it would be very beneficial to them. This help may be rendered by means of advances or loans.

On what security? Is it on their properties, or house-sites or what?—They will have their own boats, each costing from Rs. 800 to Rs. 1,000. On that security loans may be given to them.

Mr. Arpudaswami Udayar: Do fishermen use big boats here?—Yes. They use big boats and small boats also.

Are these boats the property of the poor fishermen? How do they get the boats?—They borrow some money from other people at a high rate of interest and build boats for themselves. Whatever money they get by sale of their fish will be used up for clearing such debts. Generally a number of people collect together and take these loans, and they will repay it collectively. If these fishermen are taught better methods of net making, boat construction, etc., this will prove very useful to them. Some of them have big nets, and if they are taught to make such nets, it will be very advantageous to them.

Do these big nets you speak of belong to individuals or groups of fishermen?—Some four or five people combine together and purchase them. One man cannot own a boat.

If to these groups money is advanced on the security of their boats or nets, you say the amount can be recovered in small instalments?—Yes. The nets can be insured as a precaution and security for the loans.

Have you any other suggestions to make about these fishermen, their mode of life and improvement in status or social position, etc.?—Drunkenness is common amongst them, and steps should be taken to reduce it and to wean them from drink. They have to work in the water from 7 o'clock to 1 o'clock, and so, in order to keep themselves fit for work, they take to some liquid stimulant or other. They generally spend more than half of their earnings on drink, give one-fourth to the money-lender towards repayment of loans, and with the balance of about one-fourth they will have to maintain themselves and their families.

Mr. Tampoe: How do you propose to overcome this evil of drink?—I think they will themselves gradually give up drink.

Is there no temperance league or association to wean them from this habit?—Some temperance workers have been trying to wean them from drink, but there has been no tangible result, I think. That is, however, a political question and we cannot deal with it.

Do you think education is likely to improve matters?—Yes, it is likely to improve them.

Would it surprise you to hear that our educated classes drink more?—They are not accustomed to drink toddy. They take only foreign liquors.

So your proposal is to make fishermen drink foreign liquors?—It is only when they are highly educated they will drink foreign liquors.

(At this stage Dr. Sundara Raj brought to the notice of the Committee that on the West Coast the people had been addicted to drink, but after some educational work was initiated and accomplished, the reform was very marvellous and even girls have been holding temperance meetings.)

Mr. R. S. Nayudu: How long have you been in Vizagapatam?—For the last 25 years and more.

What is your line of business?—First of all I worked under Government as a Revenue Inspector and also as Sub-Assistant Inspector of Schools. Afterwards I was attached as Sarishtadar to the Zamindar of Merangi; after that I retired from service. My son is a graduate and passed the Survey Test and worked under Government for seven or eight years as a head surveyor. Now he is working in the Vizagapatam District Court as Commissioner.

Have you moved largely with these fisherfolk?—Whenever I go that side (to their hamlet) and whenever I meet these people, I feel sympathy for them. I feel that want of education is responsible for their present miserable condition, and their squandering away money on drink.

Has the population of fishermen increased within the last twenty years?—I do not know.

You may have seen their condition previously; is their condition now improved in any way for the better or have they gone down?—They seem to have gone down. Their condition has deteriorated.

Do you think their earnings are not sufficient for their maintenance?—Yes. They are not sufficient.

Do you mean to say they are not catching sufficient quantities of fish to keep them going?—I cannot speak about that. Formerly I used to see the females of these fishermen wearing a number of jewels and going through the streets. Now they are devoid of all those jewels. This shows that they are deteriorating.

Has the population of these fishermen increased or decreased?—I cannot say.

Are these people migrating to Rangoon and other places from this district?—Some of them are going. Four or five persons are going at a time and they are returning here after four or five years' stay in Rangoon. After their return, they induce some other people also to go to Rangoon.

Supposing we introduce co-operative societies, do you think there will be sufficient number of them who will be prompt in their repayments and who will carry out the rules regularly?—In these co-operative societies or

banks security will also be demanded side by side with loans, so that the Government will never be a loser. The responsibility for collecting the amount is equally on the shoulders of the person who stands as surety. He will see to it that these debtors work hard and clear off the loans.

Therefore you think that by introducing co-operative societies their condition will be much improved?—Yes.

There is no such society for them now?—No. There is no co-operative society specially intended for these people. There are general co-operative societies, and they give loans to each and every person on the strength of security which he is asked to furnish.

Have you come across any case of any of these fishermen buying property, lands or houses?—I do not know. I have not established any close touch with them.

Do they live in rented houses?—The huts in which they live are their own. The land on which the huts are constructed also belongs to them.

Do you think in the case of the Vizagapatam fishermen that there are some assets against which loans can be granted to them? Yes.

Mr. Tampoe: When were you a Revenue Inspector? In 1897 in the Parvatipuram taluk. I worked also as a head accountant in the same taluk office.

You have never been in charge of any firka on the sea coast?—No.

(Then the witness produced a small black pearl and stated that a Parsi gentleman offered Rs. 2,600 for it, but that he did not part with it.)

Did you get the pearl from the oyster yourself?—Yes. I got it from an oyster and have also taken its specific gravity, weight, etc.

How much did you spend on pearls?—I spent about Rs. 700 on these pearls. As for the profit, if I can get the real value of these pearls from the purchasers, I should get a large amount in return; but I did not get the full value for these pearls.

(The witness then withdrew.)

M R. Ry. NOLLY SATYARAJU of Srirangapuram.

Oral Evidence.

Mr. Arpadaswami Udayar: May I know what is your name?—My name is Nolly Satyaraju.

Which is your native place?—My native place is Srirangapuram.

Mr. R. S. Nagula: You are a fisherman by caste?—Yes.

Mr. Tampoe: Do you actually catch fish?—Though I do not actually catch fish, I am the headman of my caste which consists of people who catch fish.

Mr. Arpadaswami Udayar: Have you got any house or lands or any other property?—I have got only one house. I have also got two boats which carry cargo from the steamers to the shore.

Do people on this coast get good catches?—Yes.

Have they good catches throughout the year or only in certain seasons?—In June, July and August we get the poorest catches, whereas in winter we get very good catches.

Do the fishermen sell all the fish themselves or do people come and buy the fish?—People come to us and purchase fish and that is why we do not derive so much profit.

Do they advance loans to you and take away the fish?—They do not advance money but they purchase and take the fish.

What do you do with the surplus quantity of fish?—Owing to high price of salt and municipal regulations about fish-curing, we are unable to salt the fish. Whatever quantity we can dry without salt we dry and the balance we throw away.

Mr. Tampoe: What do you pay for a bag of salt?—We purchase in retail and we do not know the wholesale price of a bag. We pay one anna per seer.

How much quantity of fish would be salted with one seer of salt?—One-fourth of a maund of fish.

So you would require 4 seers to the maund?—If the fishes are big, for one maund we may require 5 to 6 seers.

Mr. Arpadaswami Udayar: Do they catch big fish often?—Not frequently but occasionally we do catch big fish.

Mr. Tampoe: What weight of dry fish will you get when you salt a maund of fish with 4 seers of salt?—It will be half a maund.

Mr. Arpadaswami Udayar: How far do they go into the sea with these boats?—Twenty miles from the coast we go into the sea to catch big fish. Dolphin's nose will appear as a small dot and we are guided by it.

What kind of boats do they use?—We use catamaran.

Mr. Tampoe: What is the price of these boats. I want to know the price of a boat consisting of three logs put together, another four logs put together, and the third five put together?—A catamaran consisting of three logs, costs Rs. 100.

Mr. Arpadaswami Udayar: In the village of which you are the headman, how many boats are owned by fishermen?—Seventeen boats are owned by persons who use big nets. These boats are registered in the port office. We pay Re. 1 as licence fees or port fees.

Are they asked to pay any tax by the local bodies?—No tax is levied here by the local boards.

No municipal tax too?—No municipal tax also.

To Mr. Tampoe: If fishermen dried fish the municipality charged them for nuisance and fined them even to the extent of Rs. 20. The municipality did not provide these people with latrines.

Mr. Arpudasicami Udayar: Has the municipality opened any schools for fishermen? What was visited this morning by the Committee is the only school opened by the municipality.

Is it well attended?—Yes. Jalaris, Vada Baligas and Pallis attend it.

What is the difference in their profession?—No difference. All these three castes have the same profession, viz., fishing.

Do some of the children of the fisherfolk go in for higher studies?—Yes. One of them has passed Matriculation, Banking, Typewriting and Book-keeping. Another man has also studied up to the school-final standard.

Are fishermen who subsist by fishing able to read and write? There is no educated man among these people who actually live by fishing.

Are they able to read and write? They can only sign their names. They can read vernacular a little. They cannot write except signing their names.

Do your people find it easy or difficult to raise loans for the purpose of constructing boats or catamarans?—They find it difficult to raise loans.

Mr. Tampoe: Wherefrom do you take these loans?—From Kabulis at the rate of one anna per rupee per month.

Dr. Sundara Raj: Does the absence of a fish-curing yard affect the fishermen very much economically?—Yes. Owing to the absence of a yard the middlemen are profiting much.

Mr. Arpudasicami Udayar: Where do you like a fish-curing yard to be located?—Near to our village.

Mr. Tampoe: If the municipality objects to it, what will you do? Supposing we put it somewhere here, viz., Waltair, would it serve your purpose?—This is 6 miles away from our place, and if a fish-curing yard is started here, it will be of no use to us, because our caste-women will find it difficult to go such a long distance. It is only families that cure the fish.

From what kind of wood do you make these catamarans?—From a kind of tree called Reyakkara, the wood of which is obtainable in the Agency tracts. It is somewhat a rare tree and it is found in the Agency alone.

Do you think that the fishing population will become boatmen after the harbour is opened? Even if they get educated they will not leave this profession, viz., fishing. Probably if asked by the Agent of the "Coramandel" we will stop fishing and will become boatmen.

How much do you charge per trip?—Rupees 2-10-0 per trip for loading and Rs. 2-10-0 for unloading. If there is heavy work on a certain day, we make nine or ten trips.

Mr. R. S. Naguduz: Is there very good market for fresh fish?—If there is a big catch, some of the fish remains unsold and we salt it.

What becomes of the salted fish?—Sowears come and take it. They take it to Jeypore and other places.

How many fishermen houses are there in your place?—Six hundred families.

Do you really feel the want of a fish-curing yard?—Yes. Sometimes we can sell our fresh fish and sometimes we cannot. So if there is a fish-curing yard, we can retain the fish for a longer time.

For how many months do you get big catches?—February, March and April. In June, July and August when people cannot go into the sea frequently owing to its roughness, they get smaller catches and they are disposed of easily, locally.

Does the municipality levy any kind of fee? No.

Has the fisher population increased or decreased?—The population has gone down owing to plague in which about 600 people died. At that time a yard which had been in existence was removed.

Do people go to Rangoon?—Jalaris will not go generally to Rangoon, but others go. They serve there as lascars in steamers.

What do you really want the Fisheries Department to do for you?—A fishery school and a yard are absolutely essential, so that at least our children may lead a better life. The present school teaches only up to the fourth standard. It should be raised to a higher grade.

Would you like that school to teach you fishing?—Yes.

Or would you prefer that school to teach you English and Telugu?—We prefer an improvement in our own profession and such professional education as would develop it would be welcome to us.

What kind of security can these fishermen give for any loans they may take?—They can give their huts as security.

So I take it that their demands are (1) a fish-curing yard, (2) a fishery school and (3) a co-operative credit society.—Yes. We should be quite satisfied with such education as would give us better means and better methods of fishing and also with a small amount of ordinary education.

Which is the next fishing village to the south of this?—Gangavaram and Chippurapalle. In Chippurapalle there is a fish-curing yard.

Mr. Tampoe: Their position is better, you say, why? There is no town for them to sell their fish?—They dry their fish.

(The witness then withdrew.)

M.R.Ry. Ch. APPALA NARASAYYA of Vizagapata

Oral Evidence.

Mr. Arpuduswami Udayar: Which is your native place?—I belong to Vizagapatam.

Are you a fisherman by caste?—Yes. I am a Jallaru.

Are you a trained schoolmaster?—I studied with the help of a stipend given by the Labour Department.

Up to what class did you read?—Up to the second form.

In what school?—In a mission school in the town of Vizagapatam.

Mr. Tampoe: Were there many boys belonging to the fishermen caste in your school when you studied?—Yes. There were some who studied with me and who went up to the Matriculation standard.

What occupation are they following now? They are employed as clerks.

Is anyone who studied with you now actually following fishing as a profession? No.

Did any of the boys give up his education earlier than Matriculation?—Yes; after reading up to third form some of them gave up their studies.

Such pupils are also working in the boats?—They are working as tally clerks.

Do you know of any man who went up to the mission school who is actually following fishing as a profession?—No.

Up to what standard is instruction imparted in your school?—Only up to the second standard. Next year the third standard will be opened.

Mr. Arpuduswami Udayar: How many teachers are there?—Only one.

Since how long has it been going?—From the year 1900 it has been going on.

All these years has there been only one teacher in that school? Sometimes it was dragging on up to fourth standard.

Mr. Tampoe: Is there any member of your community who is a municipal councillor?—No.

Mr. R. S. Nayudu: Do the fisherfolk drink?—They are addicted to drinking.

Are there total abstainers?—Three-fourths of them do not drink. One-fourth drink.

Mr. Arpuduswami Udayar: Do those who receive some kind of education drink?—They do not.

Mr. R. S. Nayudu: Do they take opium?—They are not taking it.

Are not your people better off than they were some years ago? They are in reduced circumstances. After the construction of the harbour they are not allowed to fish in the creeks. They used to get catches in the creeks. Now they are prevented from doing so.

Mr. Tampoe: Do they get employment in the harbour works?—Yes.

How much do they get per mensem? Rupees 15, Rs. 16 and Rs. 18.

Is that not a better source of income than fishing? It pays the same in both cases.

Mr. R. S. Nayudu: You are a schoolmaster. What sort of a change do you want to be introduced?—Our school should be taken over by the Government and general education should be given there for one period every day. In other periods the boys should be trained in professional branches of work, such as repairing of nets, boats, etc.

Who will teach them all that?—Some teachers must come from outside.

Mr. Tampoe: Have you done fishing yourself?—I can repair nets, but I have never fished myself. My father was a Police Inspector.

Have you any educated brothers?—I have got an educated brother-in-law.

How far was your father educated?—Up to the Matriculation standard.

What do you get now?—Rupees 12 as pay and Rs. 4 as allowance. If the authorities like they can stop this allowance.

Mr. R. S. Nayudu: Is that the scale of pay that you will have throughout?—Yes.

Mr. Sundara Raj: Is it a fact that owing to the absence of a fish-curing yard much inconvenience is being felt and much fish is being wasted?—Yes.

If a fish-curing yard is opened outside your municipal limits, would it not serve your needs?—It would be very difficult for us to go and work in a yard opened far away from our village outside the municipal limits.

Mr. R. S. Nayudu: Would they like to have a fish-curing yard opened beyond Dolphin's nose?—Even that is far away. They will have to cross a mountain or a stream and so it would be inconvenient.

Is it desirable that Rs. 35,000 should be spent for opening a fish-curing yard within the municipal limits without an adequate return for the investment?

(The witness made no reply.)

Mr. Tampoe: The interest alone comes to about Rs. 200 a month.

(The witness then withdrew.)

M.R.Ry. VASUPALLI DASUDU of Waltair.**Oral Evidence.**

Mr. Arpudaswami Udayar: Are you the headman of your village (fishing colony)?—Yes.

Have you got a fish-curing yard?—Yes. It is very near the village.

Do many people resort to the yard?—Yes, people of five villages.

How far is it from your village?—It is within a mile from my village.

Have you got a school in your village?—No, there is no school.

Do you want one?—Yes.

Of what use will education be to your boys?—They will learn to read and write and get knowledge.

Do you want a school in which improved methods of fishing, net making, boat making, etc., are taught?—Yes.

How many maunds of fish are cured in the yard for a year?—I cannot say.

Mr. Tampoe: Do you salt any fish yourself?—Yes.

How much did you pay for salt last year?—I do not know. I cannot say.

Did you yourself buy the salt in the yard?—No. Ticket-holders who are females purchase salt.

Mr. R. S. Nagudu: Where do you find sale for your fresh fish?—If it is a small quantity which they catch, they sell it then and there. But if it is large, they sell a portion there only, and take the surplus to the yard.

Don't you sell your fish in the neighbouring villages?—No. We store fish in the yard.

Do you sell big fish in the Vizagapatam market?—No. We sell it on the beach only.

How many times in the week do you take fish to the fish-curing yard?—We take fish every day there.

What is the population of your village?—Our village consists of 80 huts.

Which is the nearest village to yours in which there is a school?—There is no school in any village near by.

If you want money, where do you get it from?—I very rarely go in for loans.

What is the rate of interest which your people ordinarily pay on loans taken by them?—It is three pies per rupee per month.

M.R.Ry. POLISETTI TATAYYA of Waltair.**Oral Evidence.**

Mr. Arpudaswami Udayar: Have you got a fish-curing yard?—Yes. It is called Lawson's Bay Fish-curing Yard.

What is the quantity of fish which people of your village take to the fish-curing yard per day?—We take five or six rupees worth of fish to the fish-curing yard; and we take one rupee worth of fish to the Vizagapatam market.

How many boats have you in your village?—We have got about 400 catamarans (teppalu) and 8 boats in our village.

Have you any tiled houses built with masonry in your village?—No. We have only huts with palmyra roofs.

Do you want a school for your village?—I must enquire and let you know.

M.R.Ry. UMMIDI SOMULU of Moolapalem.**Oral Evidence.**

Mr. Tampoe: Do you fish?—Yes.

Have you a boat or a catamaran?—We have boats, nets and catamarans.

Where do you send your fish for curing?—We send our fish to the fish-curing yard which is close to our village. It is called Lawson's Bay Fish-curing Yard.

To whom do you sell your fish?—I sell the fish to the merchants who come to our place.

What price do you get for the fish sold?—I get at the rate of 8 annas a viss.

What is the population of boys and girls in your village?—There are twenty boys and girls in our village.

How many houses are there in your village?—There are thirty houses in our village.

Do any of the boys and girls in your village attend any school?—They have no school to attend.

Have you any lands of your own?—No. I have not got any lands.

How many maunds of dried fish did you sell last year?—I cannot say. Sometimes we get a rupee and sometimes half a rupee a day.

You have said you own a big net. What is its value?—It is worth Rs. 500.

Do you make any profit by fishing in the village? We get no profit. We get barely sufficient for our food.

Where did you purchase your net and boat? We wove the net ourselves. We purchased the boat for Rs. 100. A big new boat will be worth Rs. 600.

Where did you get the Rs. 100 with which you purchased the boat?—I borrowed the amount on interest, and have been repaying the debt gradually.

If you lose your nets or boats, where do you get loans to purchase them again?—Generally the nets get torn here and there and the boats broken in places. We borrow small amounts of Rs. 10 or Rs. 20 and repair the boats and nets. Afterwards we repay the amounts gradually.

What do you want for your improvement and the improvement of your community?—I cannot say.

M.R.Ry. GARIKINA YELLAYYA, Vizagapatam.**Oral Evidence.**

Mr. Tampoe: Do you own a net and boat?—I own catamarans (teppalu).

Have you no boat?—I am a joint owner of a boat along with seven other people. I am a partner.

Are you the headman of your caste?—Yes.

How far do you go into the sea for fishing?—About 20 cros.

What net do you take?—For net fishing we do not go far. When we go far from the coast, we take to angling.

What quantity of fish do you get for a day if there is a good catch?—We get Rs. 20 worth of fish if there is a good catch. By good catch I mean the fish caught by net fishing. If there is no good catch, we get about Rs. 2 to Rs. 3 worth of fish.

What do you do with all that fish?—We give it to the women who take it to the yard. We do not sell fish fresh. We sell the big fish to merchants, and the small fish we salt.

What is the value of a viss of dried and salted fish?—Eight annas.

Are there people who purchase fresh fish from you and sell them in other villages?—The town people come and buy the fish from us here, and then they take that fish to the market at Vizagapatam.

How do they carry the fish to the Vizagapatam market?—People carry them in baskets on their heads. They carry the fish as headloads. The persons who carry the fish are generally women.

What do you want to be done for your village and for yourselves?—We want money on loans at a low rate of interest.

What interest do you pay now on the amounts you borrow?—We pay an interest of 3 to 4 pies per rupee per month.

(The witness then withdrew.)

Saturday, May 19th, 1929

KRUSADAI ISLAND.

PRESENT:

M.R.Ry. Diwan Bahadur S. KUMARASWAMI REDDIYAR Avargal, M.L.C.
(President).

M.R.Ry. S. ARUDASWAMI UDAYAR Avargal, M.L.C.

Khan Bahadur S. K. ABDUL RAZACK SAHIB Bahadur, M.L.C.

M.R.Ry. R. S. NAYUDU Avargal.

Mr. A. MCG. C. TAMPOE, I.C.S., M.L.C. (Secretary).

(Dr. B. SUNDARA RAJ, M.A., PH.D., the Director of Fisheries,
was also present.)

Captain T. G. CRIBB, Assistant Director of Fisheries (Marine).

Oral Evidence.

Sailing ships cannot by themselves be entrusted with the whole of the work of transport of salt to the West Coast yards. If they work either too early in the season or too late in the season, they are liable to accidents which may result in the loss of the ship and the cargo. They can work safely only from November to March. The number of trips which they make during this period will depend chiefly on the loading and discharge, if towed. If, however, they go under their own sail, wind is also a matter of consequence. Last year there was a case of a schooner which left Tuticorin and for six weeks did not reach the West Coast port. I was then asked to go in search of her and pick her up, and I found her off the coast of Cochin, 12 miles off Cochin harbour. This was in March, a favourable season. This shows the uncertainty in transporting salt by schooners under their own sails. Even towing is not possible during the south-west monsoon, as cargo cannot be landed at that time of the year on the West Coast ports. It is practically impossible to supply salt between June and October. This is the best time ordinarily for conducting research with the trawler on the East Coast.

Even in this season the trawler can without any hindrance do any research work even on the West Coast. This is the time sardine breeds off the West Coast, and if the habits of that fish are to be studied, it must be done between June and October, and this the trawler can do. We know now what its food is but we do not yet know where it comes from. I am very anxious to study the whole routine of the life of this fish, to know exactly when it appears and where it disappears, and the reasons for these. On one occasion in Calicut I went down to meet the boats fishing sardines. They came in with catches varying from half a hundred weight to 2 cwt. In one boat the fish were small and thin, and I knew that it must have been fishing in about 5½ fathoms of water. In another boat the fish were larger and fatter and contained oil. I thought it must have been fishing in 10 to 15 fathoms of water where I knew there was more food at that time. On questioning the respective tindals I found that my surmises were correct. Such daily observations have to be recorded, verified and correlated with all concomitant hydrographical and biological observations.

From 1st July 1927 the trawler worked 165½ days. Now, when I am trawling or making observations during that period, I am working all the 24 hours of the day. We are at work day and night. If after having the nets out trawling, they come out damaged, we proceed at once to repair them and having repaired them we again shoot the gear, commence work with them and we work continuously studying the hauls, attending to the hauls, making other observations and navigating the ship until we get

back into harbour again. So, if we have been out for three days on that trip we have worked for 72 hours. Our trips vary from 4 days to 12 days at a time. To tabulate, chart and do all the clerical work connected with the observations made, say in four days, would require an equal number of days ashore. I have two charts now to tabulate the results of my last trip and I have not had the time to touch them yet. It has to be remembered that I have to anchor in the open roads off Tuticorin where the rolling and the motion of the vessel make it impossible for me to do any delicate clerical or chart work. So I have to go ashore for it and return before the wind gets up and the sea becomes bad. This will give me only about 5 hours on shore per day. Off Tuticorin, for instance, the bottom of the sea is hard rock on which the anchor can get no grip. If therefore the wind and sea get up, she begins to drag as the only thing that is holding her to her position is the weight of the anchor and the anchor chain. As soon as the pressure of the weather exceeds this, she begins to drift towards the reef on the shore. Often I have to get up in the middle of the night, get up steam and get her out to sea to avert a disaster. It is no use my issuing orders to my serang or the man on the watch to let me know when she is dragging her anchor. They have no sense of responsibility and they never tell me. The result is that I have to sleep with only one eye shut. The only work that has been done off this coast was done in 1851 by the Royal Navy and that merely gives the depths up to the 20 fathom limit solely for navigation purposes. I use these observations as a basis, partly checking them occasionally but chiefly working from them to greater depths. Full details of these are written down by me then and there and reduced to the chart when I go ashore. I have made a preliminary survey of the Cape Comorin bank and the area opposite Calicut and Mangalore. I have spotted also several good fishing grounds. The local fishermen from Cape Comorin to Manappad go out, at the most, ten miles. On the journey itself they spend roughly twelve hours and perhaps do a couple of hours fishing. They do this because the big fish are only to be found at that distance beyond the ten-fathom limit. What is caught even there is small. I have had pretty frequent conversations with the fishermen round the coast wherever I have worked. From my verifications or information they have given me, I should say their knowledge was crude to the lowest degree. They are very easily discouraged and one or two empty hauls seem to deprive them of all enthusiasm for work for the rest of the day. They do come upon the vessel and examine my nets and gear and ask questions, but as a rule they have very great confidence in their own local knowledge and seem to think that I can know nothing to teach them. I think it will be a good thing to take one or two men from a village out in the trawler and teach them my methods and the results. It will be a very good way of enlightening them. I have five fishermen among my crew. I could train a keen and intelligent fisherman such as can be found on this coast enough to improve his fishing within a month. These fishermen can see the greater success we get by improved methods, improved nets, better selection of fishing grounds and better methods of working generally, but all this require, as a preliminary, fishing boats and tackle. With improved nets, I can demonstrate to them even on shore how they will work better, in a manner to convince them. I have been working at improving the nets and I hope to have the opportunity, if Government gives me the permission I have asked for, to travel in England during my leave, to study improved nets, tackle and boats. I have a fair idea of what is now the scope of the work that can be done. If the improvements that I think are easily possible in nets, tackle and boats are introduced, I am convinced that the material condition of the fishermen can be very much improved. I am all in favour of encouraging fishermen to come and learn from the trawler about nets and fishing generally by giving them a bonus at the end of the course if they have profited by it. In one year I can go over about 850 miles of the coast and have a fair idea of the nature of the bottom and the banks, and the fish to be found there at that particular time of the year. So it will take two years to do the whole coast in this manner from Kanara to Gaviann. But each portion of the coast will have also to be observed in each month of the year. So it will necessitate going over the same portions of this area at different times in the following years. By this process of overlapping the same areas at different times of the year, it should be

possible in the course of about twelve years to have an absolutely detailed knowledge of half the coast line with one trawler. By the end of that time it should be possible to prepare a fisherman's chart which would give him ample details of the kind given in Close's chart of the North Sea. The area round our coast is a much easier one to work over than, say, the North Sea, for the simple reason that there are not the same number of banks and hollows and variations of weather conditions as well. This would include a belt from the shore up to the over-fall, that is to say, beyond a depth of 100 fathoms. This will be co-ordinated with a study of the habits, food and life history of fish. My present assistant who is a zoological graduate on Rs. 75 per mensem does not take a keen enough interest in the fish we catch. He should at each haul examine the contents of the stomachs of the fish to see what they have been eating, what their food is, and make a real and careful study of each catch. We want a better qualified and better-paid research man. All the work we have done so far has had to be done under difficulties and with makeshifts. When the trawler comes back after being refitted we shall be in a very much better position, especially when we are getting all other appliances and gear as well. Up till now the work that has been done has been poor, not on account of lack of opportunities for other work but solely because the equipment was not sufficient. My estimate of 850 miles area is on the assumption that the trawler is fully equipped. The refrigerator is required only to preserve the fish fresh, so that it may be fit for human consumption when landed. As far as observations themselves are concerned, it is a matter of very minor importance.

**Lient.-Col. R. B. SEYMOUR SEWELL, I.M.S., M.A.,
F.A.S.B., F.L.S., F.Z.S., Director, Zoological
Survey of India, Calcutta.**

Questions 11—12. Whether supply can create a demand for more food is an academic problem, to answer which would entail a knowledge of the conditions of life of the poorer classes of India, which I do not possess, but in other countries, such as America and South Africa, it has been found that a greatly increased supply of fish will be absorbed and it is certain that in the long run the supply will fall short of the demand once people resident away from the sea realize that sea fish can be obtained at a fair price. This process takes a certain amount of time, since it necessitates the education, either by experience or by propaganda, of the masses and possibly also a change of habit; but once this has been effected the demand in every country, where sea fisheries have been exploited, has been found eventually to exceed the supply and Fishery Departments in these countries have, each in turn, been faced with the problem of making the supply equal to the demand without overfishing those areas that are found to be most productive. Some idea of the possible progress of the supply of fish to areas inland may be gained from a consideration of the results attained in South Africa within recent years. I have selected South Africa for two reasons, firstly because, like India, a great deal of her sea-board fringes the Indian Ocean and therefore conditions as regards fish supply are likely to be more comparable to those of Indian waters, and, secondly, because, also like India, a large bulk of the population is indigenous to the country and there is only a comparatively small white population.

In 1895 the South Africa Government commenced a marine biological survey in order to investigate trawling grounds, fishing areas, etc. Most of these areas were found to be at a distance of some 150 miles from the nearest port that presented railway facilities for transport inland. It was found, however, that even with the use of ice as a preservative, a means which is now replaced by the cheaper and more efficient method of refrigeration, fish could be landed in Cape Town at a clear profit. In 1904, which was the first year, in which fresh or frozen fish was sent inland, the market value of this fish was estimated to be £4,194; five years later, in 1909, the amount of fish thus sent inland had risen in value to £81,684. Subsequently in addition to this import of fresh fish a large industry developed in preserved and dried fish. In 1913 three trawlers working from Cape Town landed at that port 47,380 cwt. of fish of an approximate value of £25,000. In 1922 the total value of the fish landed in the Cape Province was £369,099, of which £210,551 was landed by trawlers and in the same year the total export trade of cured, preserved and dried fish was £304,946. These figures should, I think, be sufficient to show the possibilities of developing a fishing industry in this country.

Question 37.—A very small part of the area round the Indian coasts is suitable for sea-fishery by means of the present methods. Indian fishermen in their small craft rarely venture out of sight of land. The most prolific fishing ground for trawling, however, will probably prove to be certain areas lying at a considerable distance. Such areas as the estuarine regions of the continental shelf, isolated banks such as Wadge Bank and Pedro Bank, the edge of the continental shelf and the upper part of the continental slope are areas, which so far as present experience goes, will prove to be the most prolific from the point of view of fish supply; and fishing in such areas can only be done by means of trawlers or similar craft. From time to time various Provincial or other Governments have engaged trawlers for a short period for experimental work. In this connexion I may cite the "Golden Crown" employed by the Bengal Government, the "William Carrick" employed by the Bombay Government, the "Nautilus" employed by the Ceylon Government and the "Pickle" employed by the South African Government; and, in addition to these trawlers, a very considerable amount

of work and investigation of the bottom fauna, including fish, has been carried out by the "Investigator." From a study of the results obtained by these vessels it seems clear that the most prolific trawling grounds will be found to lie in moderately shallow water from the coast line down to a depth of 30 to 40 fathoms or on isolated banks such as the Wadge and Pedro Banks, along the edge of the continental shelf and on the upper part of the continental slope down to a depth of some 230 fathoms. Other grounds that would be within reach of sea-going trawlers or other similar fishing vessels are the prolific areas of the Maldivic and Laccadive Archipelagoes, where 'long-line' fishing for such species as the "Bonito" should prove to be profitable.

Question 77.—Ultimately sea-fisheries are bound to be far more important than inland fisheries. The canned and dried fish industry, which should grow up *pari passu* with developments in trawling, will enable Indian fisheries to compete with commercial companies in other parts of the world; and even as close as Ceylon there is a very extensive market for the supply of dry fish and fish manure: for Ceylon annually imports 11,000 tons of dried fish and 9,000 tons of fish manure, and the development of the fishing industry should enable India to secure the bulk of this trade.

Question 98.—With regard to the problems that require attention in connexion with sea-fisheries and their development—(a) from the commercial point of view one of the most important is the discovery of breeding grounds or other areas where fish congregate for breeding purposes. In every country it has been found that certain regions are far more prolific than others, the reason being that at certain times of the year and in certain areas fish congregate for breeding purposes and it is of the greatest importance therefore that these areas should be discovered, and this could only be done under present conditions in India by employing a research trawler and an expert research staff. (b) In connexion with the above it is of the greatest importance that the causes that lead to the selection of these areas by the shoals of fish should be investigated. Among such causes I may cite—

- (1) Temperature of the sea-water.
- (2) Total salinity and chemical composition of the sea-water.
- (3) Hydrogen-ion concentration.
- (4) Prevalence of plankton, more particularly smaller crustacea such as entomostraca.
- (5) Abundance or otherwise of fish food on the bottom.
- (6) Directly correlated with No. (5) is the proportion of organic matter in the bottom deposit, particularly the prevalence of vegetable detritus from weed-beds in the vicinity or of vegetable detritus carried down by rivers.
- (7) The nature of the sea bottom.

(c) The life-history and particularly the larval development of the edible fishes. At present one may safely say that there is not a single fish in Indian waters, the life-history of which has been completely worked out. (d) The effect on development and life-history of parasites. (e) Occurrence of natural enemies. (f) Possibility of transplantation of young fish, especially of such a type as soles from one area to another. This question of the transplantation of young fish from the locality in which they are hatched to another is an extremely important line of research. In other countries it has been proved that although the fish may spawn and the young be hatched in certain areas, these young fish can be transplanted to and will grow much more rapidly in other areas, if these are more suitable for development. When this is achieved the fish become marketable at an earlier age than if left to themselves in the area in which they were spawned. As an example of this type of work I may quote the results attained by the Fishery Department of Denmark. As a result of the work done by the late Dr. Peterson transplanting of young plaice was carried out and at the present time the annual cost of this transplanting is 20,000 Kroner, while the increased revenue from the same as a result of this transplantation has been 200,000 Kr. annually. Similar possibilities probably exist in the case of the soles of Indian Seas.

Questions 140-147.—These questions from my point of view may be taken together. A study of the "Note on the history, present condition and future development of the Fisheries Department" by Dr. Sundara Raj, Director of Fisheries, Madras, reveals that out of the total of 39 officers and subordinates employed in the Department of Fisheries, Madras, with the single exception of the Director himself, there at present appears to be not a single officer sufficiently qualified to be able to supervise and direct scientific research work. From the list given by the Director, the only officers that have had a zoological training are one with an M.A. degree and three with B.A. degrees. In order to supervise and direct fishery research it is essential that the officer should hold at least a D.Sc. degree and all should be first-class Honours graduates. One difficulty that will be experienced in conducting fishery research will be found to be the very long coastal line that surrounds the Madras Presidency; a coastal line in which conditions are bound to vary very considerably from region to region. This will probably necessitate the erection ultimately of several research stations, each with its own research staff, at certain definite points, these points being selected with a view to the nature of the sea coast and the conditions of the sea water itself—conditions which are vastly different on the east and west sides of the Presidency. In England and other countries it has been found most convenient that every fishery research station should have its own named collections for easy reference and identification of fish or other marine animals, and a reference library containing the more important works dealing with fishery problems as well as the purely scientific side of the work. This, however, would entail a considerable degree of expense owing to the necessity of duplication of libraries and reserve collections. I recommend that the institution of such libraries and reserve collections in each research station ultimately be aimed at, but it would, I think, be more convenient if, at the commencement of such investigation and the inauguration of a research side to the department, each fishery station be provided only with a sufficient research collection and library to enable routine problems to be undertaken on the spot and that more abstruse investigations should be carried out in a central research laboratory established in close connexion with the Madras Museum and the headquarters of the Fishery Department.

Question 183.—Another point that requires considerable attention is the effect on the fishing population of Madras of the sociological work that has been commenced and the attempts that are being made to raise the standard of education among the fishing population. One effect of this will ultimately be to lower the number of people employed in fishing under such fishery methods and conditions as are practised at the present day. The life of an Indian fisherman, such as those who at present earn a precarious livelihood by fishing from small boats round the coast, is one of great hardship; they are, moreover, exploited by traders and middlemen who retain most, if not all, of the profits of the trade. With increasing education, fishing people will attempt to secure employment elsewhere and in other walks of life where conditions of life are easier and rates of pay are higher, and the result will be a diminution in numbers of the actual fishermen. This problem has already been experienced in Ceylon where there is a steady diminution going on at the present day in the number of men employed in fishery work and in years to come, in order to ensure the supply of fish both for the Indian population and for export trading purposes, it seems certain that the employment of sea-going trawlers and other vessels will become absolutely essential.

Finally with regard to the question of finance there seems little doubt from the experience of trawlers that have been working round India and those working in other countries that trawling will be a reasonably profitable undertaking. Even in scientific circles the view has somehow or other gained ground that tropical waters such as those of India are unprofitable and that the catches that a trawler can make would be small in comparison with those made by trawlers working in sub-tropical or temperate seas. This view I believe to be entirely unfounded and the average catch of the trawlers that have been engaged round India and Ceylon coasts, for experimental work, compares quite favourably with the catches made by trawlers working on a commercial basis in some of the most prolific regions round the coasts of Europe and elsewhere. The average catch of the "Golden Crown" in

the Bay of Bengal for the year 1909 was 25.6 cwt. per day's fishing; in the case of the "William Carrick" working off the Bombay coast, the results were not so good, being only 19.04 cwt., but this latter figure does not represent the total catch made by the trawler, but only gives the actual weight that was sold in the market. The Ceylon fishing trawler "Nautilus" working on the Wadge Bank and Pedro Bank proved that the average catch per day's trawling is about 30 cwt. for the former and 25 cwt. for the latter. Catches such as these will enable the trawler to work at a considerable profit if the wholesale price of this fish sold in the market was maintained at an average of As. 5-6 per pound. The average retail price of fish in the Calcutta market at the present day in the case of sea-fish is As. 6-6 per pound, while some of the more esteemed fish such as *bhetkee* fetches As. 9-6 per pound.

With regard to the possibilities of trawling in Indian waters being a commercial success I would recommend to the Committee the perusal of the Ceylon Administration Report for 1925, Section 3—The Prospects of Trawling in Ceylon.

M.R.Ry. Rao Bahadur CRUZ FERNANDEZ Avargal, Tuticorin.

1. AIMS OF THE DEPARTMENT.

1. The objects as seen from Government publications are—

(a) To increase the fish food supply of the people by developing both the marine and fresh-water fisheries of the country to their utmost capacity.

(b) To improve the material and moral condition of the fishermen community by introducing better methods and improved gear, by demonstration to them of the value of thrift, co-operation, education and temperance, and by gradual enlightenment to lead them by degrees to become happier men and better citizens.

(c) To introduce new fishery industries and to develop old ones.

(d) To fight mosquito-borne diseases by the breeding and supply of larvicidal fishes into waters in malarial localities.

(e) To popularize interest in the fisheries operations and incidentally in marine and fresh-water biology by means of public aquaria, and the publication of popular zoological literature; also to facilitate the study of zoology throughout India by the provision of zoological specimens suitable for teaching purposes.

(f) To carry on such scientific study of the bionomics of the food fishes of the Presidency and of the animals on which they feed as the limited means of the department will permit, bearing in mind that the fisheries resources must be utilized in the first instance for strictly practical and economic ends.

2. (1) With regard to object (a), some attempts have been made by the Fisheries Department to develop the marine and fresh-water fisheries as a result of which the net profit has almost doubled itself in the year 1918-19, but later on, the revenue has fallen far below the original limit. This gradual fall is attributed to unfavourable market, weather and transient labour shortage. A comparative study of the figures for the past years would show that the activities of the department in this matter are not sufficiently remunerative.

(2) In respect of subject (b), something has been done to improve the moral and material condition of the fisherfolk; but the result so far has not been encouraging. Most of the people are in a chronic state of poverty; many are indebted to middlemen capitalists, who are taking away a lion's share of their earnings. The fisherfolk are most ignorant of the elementary principles of sanitation and many of their villages are, to say the least, uninhabitable owing to their filthy state. What little was done by the department in respect of education and co-operation has been to the benefit of the West Coast and its activities have not been extended to the East Coast during the last two decades of its existence.

(3) As for object (c), a very substantial work has been done by the department in this direction. The success in this matter has been much more than what was anticipated. The development has been more rapid and extensive in the matter of establishment of oil and guano factories. Here also the West Coast is more favoured than the East Coast. It is because the West Coast has ample materials for such industries that the department has directed its sole attention to that coast. It is in this branch of work that the department has succeeded more than in any other and the marvellous success achieved by the department in this branch alone would justify its existence.

(4) So far as object (d) is concerned, much appreciable work has been done but the result is not commensurate with the heavy expenditure incurred in the upkeep of the staff. The work turned out by the department is no doubt useful and should be continued in the interest of public health; however, the existence of a separate department is not justified.

(5) As regards object (c), the educated portion have profited to a certain extent but not the fisher community for whose benefit the work is primarily intended. The literature is published mostly in English and is not so useful to the vernacular-knowing classes. The existence of a separate department is not necessary and the work may be entrusted to the Superintendent of the Museum.

(6) Regarding object (f), the utility of this branch of work is doubtful, unless intensive propaganda is carried on to impress on the people the results of the researches made. The work connected with this branch does not require a separate agency.

II. FISH FOOD SUPPLY.

8. Yes; in some places more than what is required for local consumption.

9. Fish food is certainly cheaper than other kinds of non-vegetarian food.

10. No.

11. It is doubtful whether a greater supply will create an effective demand.

12. It will be difficult to absorb if there is any material increase in the supply of fish food, as there is no further demand for it.

III. IMPROVED METHODS OF FISHING.

13. The present methods of catching fish are effective so far as the demand is concerned.

14 & 15. The efforts of the Fisheries Department to introduce improved methods and appliances have not been successful in the majority of the cases tried. This failure is attributable largely to the conservatism of the fisherfolk and the difficulty of getting teachers and demonstrators conversant with the new methods.

16. The fisherfolk should be taught, by actual demonstration, the advantages of using improved methods and appliances; a number of them should be selected and trained; State aid should be freely given to enable them to build better crafts and purchase new appliances.

IV. DEEP SEA FISHING.

17—19. The general opinion in regard to deep sea fishing is that the attempt is a thorough failure; the trawler purchased by the department has not answered the purpose and its work has not been as efficient as anticipated. Other details as to its working are not available in any of the Government publications.

V. FISH-CURING YARDS.

23. The main object in transferring the fish-curing yards to the Fisheries Department was to enable the curers to adopt the improved methods experimented on by the department and to improve the general conditions under which the curing is done, especially in regard to cleanliness and sanitation.

24. The results have justified the transfer from the Salt Department. The progress in the improvement of this industry has been steady though slow. A certain amount of difficulty has first to be overcome in introducing the improvements owing to the innate and ignorant conservatism of the curers and to factors of opposition.

VI. FISHERIES CANNERY, CHALIAM.

61. I visited the cannery in 1924 along with the then Development Minister, Diwan Bahadur Sir T. N. Sivagnanam Pillai.

62. It is true that it is producing certain amount of canning work; sardines, mackerel and prawns are canned nicely. The department has reason to be proud of its work in this matter.

63. Not at all; the reason assigned for not training any outsider is that no suitable candidate is forthcoming.

66. Yes; there is no ready market for the Malabar product.

67—69. The chief reason is that the consumers are mostly Europeans, who prefer Home-canned fish to local products, however much the department may proclaim that the quality of the goods canned locally is equal in quality to similar European products.

X. PEARL FISHERIES.

99. The history of the pearl fisheries is given in the departmental publications.

100. The most important problem connected with the pearl fishery is the question of labour supply. Diving is attended with risk in many ways. Very few people go in for diving. The remuneration they get is not commensurate with the risk and hard labour involved in the operation. As it is, the present system is that Government take *two-thirds* of the catches and give one-third to the divers who divide their share among the boat-owners, line-men or manducks and themselves. On an average, a fishing boat having a crew of ten divers, ten line-men and two boatmen (one tindal and his assistant) fishes about 4,000 oysters. Of this number two-thirds share, viz., about 2,600 oysters, go to Government and the remaining one-third share, viz., 1,400 oysters, to divers, etc. This latter is further distributed as follows:—

Boat-owners—one-fifth share or	...	...	...	...	280
Boatmen (tindal and his assistant)	...	...	...	...	200
Line men—ten	...	...	...	...	180
Divers—ten	...	...	...	...	740
					1,400

This works out to an average of 74 oysters per diver. The normal rate at which the oysters are sold by divers, etc., is 25 per rupee. The divers make only just about Rs. 3 per head. But the Government realize more than Rs. 10 over the earnings of a single diver. In view of the danger to life to which he is exposed and the expenses he has to incur in order to prepare himself for the hard labour connected with diving, the remuneration of Rs. 3 per day of fishing is hardly attractive. But for the prospect of finding a good pearl of some value, the divers would be unwilling to enlist themselves for the work.

104 & 105. The use of mechanical appliances was tried some time ago in Ceylon and the experiment was declared to be a failure. The result was more disastrous. The oysters are liable to be removed root and branch including the young and immature ones and the bed is exposed to the risk of being completely destroyed.

106. The existence of a separate staff is absolutely necessary to watch the growth of oysters in the pearl banks spread over a vast area. Constant inspection and close watch are likely to be more fruitful than occasional visits by experts from distant places; but the control and supervision of the staff may be left to the Port or Revenue Department as before.

107. The relative merits of the contract system cannot be accurately ascertained without actual experiment. It may, however, be said that the contract system is not likely to be more profitable in view of the difficulty of getting contractors with requisite scientific and expert knowledge.

108. Vide reply to Question No. 100 supra.

109. The remuneration given to the divers is inadequate and should be increased in such a way as to be attractive. The catches should be shared *equally* between Government and the divers. This will certainly be an inducement to them to enlist themselves in greater numbers. The labour supply will then be ample.

XI. CHANK FISHERIES.

112—125. The reply given under pearl fisheries would hold good to chank fisheries *mutatis mutandis*. The staff employed for the supervision of the chank fisheries is understood to attend to the pearl fishery work as well and there is thus a large saving to Government in controlling the pearl fisheries.

XIV. Socio-Economic Work.

(a) Co-operation.

173. The Fisheries Department has hitherto confined its activities to the West Coast alone and has been successful in establishing a good number of societies with the help of the Co-operative Department in spite of the conservatism and suspicion of the fisherfolk. But the East Coast has been completely ignored up to this time. There is no justification for this indifferent treatment.

174. A special section of the Co-operative Department may be created to promote and organize co-operative movement among the fisherfolk on the East and West Coasts.

175 & 176. The Co-operative Department will be the suitable agency for the work, as they will have the requisite knowledge and experience in co-operative work.

177 & 178. Vide reply to Question No. 173 above.

179. Vide reply to Question No. 174 above.

180. Certainly.

181 & 182. Yes. Vide replies to Questions Nos. 173 and 174 supra.

(b) Education.

183 & 184. The present general system of education is not suitable to the needs of the fisherfolk. It has only helped them to discard fishing and to swell the number of the unemployed. Education in the technics of fishing industry is very essential and instruction should be imparted by specially trained men in organizing and managing fishermen's co-operative societies, in sanitation, hygiene and first aid and in the improved methods of fish-curing, manufacture of oil, guano and meal and other technical work connected with the industry. Fisher-pupils should also be given a practical insight into the chief methods of catching fish.

185. It should be directed and controlled by the Educational Department.

189. Yes, even the primary duty of educating the fishermen has not been attempted on the East Coast.

190. In addition to what is suggested in the reply to Questions Nos. 183 and 184 above, the following recommendations are made:—

(a) Practical training should be given in net-making.

(b) Fishermen should be employed as teachers.

(c) Each school may be provided with a fishing boat and gear for practical training.

M.R.Ry. A. V. ACHUTHAN Avargal, Calicut.

II. FISH FOOD SUPPLY.

The present system of catching fish is not in any way different from the good old methods. And being unable to combat the natural inclemencies of weather, etc., the supply of fish food has not been a thing within the control of fishermen. So it is difficult to ascertain whether sufficient quantity of fish is caught for local consumption at all times. But, when fish is available in sea, no hesitation is shown in catching all that could be had, even if it is more than what people would consume. On this coast fish food is undoubtedly cheaper than other kinds of non-vegetarian food. The creation of an effective demand for more fish food means the adoption of better methods of preservation. In other words refrigeration should be made practicable and at the same time sufficiently cheap for the laymen. An earnest effort to supply more depends upon a truly felt demand and in my opinion merely a greater supply will not create such a demand. A material increase in the supply is likely to be absorbed without difficulty provided the demand arises out of new areas opened.

III. IMPROVED METHODS OF FISHING.

The methods of fishing in different parts on the coast vary considerably and the effectiveness of each can be tested only by comparison and transferred adoption, which I fear was scarcely experimented upon. I should like to see some more enterprise in the direction of experiments in this line. Time and distance, the main drawbacks that prevent the ordinary fisherman, should cease to be such with the help of science.

V. FISH-CURING YARDS.

The production of improved kinds of salted fish will be easier after the demonstrations have proved successful in rousing the confidence of the public. Issue price of salt in the curing yards should be reduced and the Government should not aim at profit-making at all. But the advantage derived therefrom (I mean from such a reduction) cannot solely be that of fishermen and curers alone, even though they might take it as an encouragement to carry on the industry; the consumers and the middlemen too are in a position to make their own out of the margin of profit allowed by such a concession.

VI. FISHERIES CANNERY, CHALIAM; AND VII. EXPERIMENTAL STATION, TANUR.

The very existence of these institutions is not sufficiently well known to the fisherfolk and I hope the Government will extend the applicability, availability and scope of these establishments in order to enable enterprising men to come forward and take up these as workable enterprises. I shall be glad if steps are taken to shift the experimental station either to Calicut or Tellicherry as these places are more central and as there are educated young fishermen to take advantage of the improved methods.

IX. KINDS OF FISH.

The kinds of fish that are of utmost economic interest in my district and should receive attention are (1) sardine, (2) mackerel, (3) catfish (big variety) and (4) shark (big variety).

XII. RESEARCH.

By all means research and higher study should be conducted by the department and the Government should select candidates from the fisher community for advanced course of fisheries in foreign places and be employed to improve the condition of the fisherfolk. Report of research work

conducted and results achieved from time to time should be published in pamphlets and circulated among fishermen. There were abnormal cases of appearance and disappearance of sardine and mackerel which were capable of investigation. But nothing worth mentioning has been effected by way of research. The literature on these subjects ought to form a part of the curricula of the fisheries schools.

XIV. Socio-Economic Work.

(a) Co-operation and (b) Education.

Based on an understanding of the local conditions and special needs of the people, the organization of co-operative societies should be effected on more useful lines. Mere credit facilities will not be a proper solution especially when the societies are on the limited liability basis. The purchase and sale societies and stores on small scales should be run and supervised by a special inspector of the regular Co-operative Department who is thoroughly conversant with the different aspects of co-operation but whose services ought to be lent temporarily to the Fisheries Department to do intensive work as is the case with the Government Labour Department and societies under it. This inspector should be a member of the fisher community, when such a one is available and thus natural inclination, real sympathy and honest co-operation can be well secured.

Education for fisher boys and girls should not be on general lines as in ordinary primary schools. Together with the imparting of the 3 R's the elementary principles of fishing industry should also be taught. To encourage the education of a larger number of pupils, scholarships should be awarded and other facilities given until the proportion of illiterate people falls down to an appreciable extent. In any case the staff should invariably belong to the fisher community.

XVI. STAFF.

Administrative work and research work need not be combined. It is better to appoint men of special aptitude for controlling either section of the department. As far as possible, men belonging to the fisher community should be entertained. The inspection of schools, yards and co-operative societies should be entrusted to adequately trained men with special knowledge in each branch separately and the inspectors ought not to continue as at present as jacks of all trade.

M.R.Ry. N. UNNI Avargal, Municipal Councillor, Calicut.

III. IMPROVED METHODS OF FISHING.

The present methods of fishing on the West Coast are to a very large extent effective. No sudden jump to fishing by trawlers is needed. Of late, there have been introduced three destructive methods of fishing. I mean here ayilachalavala (അയിലച്ചാളവല), mathichalavala (മത്തിച്ചാളവല) and mathikolli (മത്തിക്കൊല്ലി). These kinds of fishing make a lot of noise and disturbance in the sea and there is every reason to believe that it is on account of the introduction of these methods of fishing that mackerel and sardine have almost begun to disappear. The fishermen themselves know that these methods are highly destructive but it is very difficult for them to put an effective stop to them. For even among fishermen there are some who wish to see these methods continue; for in the case of ayilachalavala and mathichalavala one boat and three or four men can do the fishing work and in the case of mathikolli the catches made occasionally are very large. The fishermen who have no vision for the future take to these methods and bring about loss to themselves and the neighbouring workers. When one boat-owner takes to these methods, no one has any right to prevent him from so doing and naturally others also are tempted to follow him. Government must stop these three methods of fishing by legislation and I am sure there will then be an increased prosperity among fisherfolk in Malabar.

V. FISH-CURING YARDS.

The price of salt must be reduced to the former rate, viz., 10 annas per maund. The rules governing the issue of salt at the fish-curing yards must be relaxed to some extent in order to prevent corruption among yard officials. Adequate supervision must be made by higher officers to see that no "mamul" is collected by the yard officers from the curers. If necessary, a small and effective committee consisting of officials and non-officials may be instituted for the special purpose of conducting enquiry regarding the collection of mamul. The hygienic condition of the yards must be improved. There should be proper drainage to send off the filthy refuse water to the sea. The department must provide for adequate lighting arrangements in the yards. At present improved methods of curing are not taught to the fish-curers. In every yard there should be a demonstration-shed wherein a specially trained yard officer will demonstrate to the curers the improved methods of curing. The Government must see that the curers have a good market for the products of improved methods of curing or else the curers will be tempted to follow their own old methods of curing. An advisory board of qualified non-official fishermen must be instituted to visit yards, schools and co-operative societies of the Fisheries Department. In several fish-curing yards there are many women ticket-holders. Care must be taken to see that yard officials behave respectfully towards them instead of considering them as coolies or menial servants.

XII. RESEARCH.

Research is well and good but the results achieved must be published in vernaculars. There must be a bulletin for this purpose issued by the Fisheries Department every now and then and distributed especially among the fisheries school teachers and the workers of co-operative societies and these people may be asked to read the contents to illiterate fishermen and explain the matter to them. Deep sea fishing is good provided it does not bring in capitalists who may reduce the actual fishermen to the condition of mere wage-earners.

XIV. Socio-Economic Work.

(a) Co-operation.

The co-operative movement among the fisherfolk is not at present in a satisfactory condition. The supervision by the Fisheries Department over the working of the fishermen co-operative societies must certainly be continued. The fishermen at present are in a deplorable condition mainly because of the fact that no adequate provision is made to prevent them from the necessity of borrowing rice in the rainy season at most abnormal rates from middlemen. When the price of a bag of rice is about Rs. 11 the fishermen borrow a bag for often not less than Rs. 19 or Rs. 20. If effective arrangements can be made by proper working of co-operative societies to secure rice at normal rates and enable fishermen to pay off the debts by small and convenient instalments, the economic condition of the fisherfolk can be improved to a very great extent. The officers who organize and work co-operative societies among fisherfolk must be men full of sympathy for them. Officers who will consider their work as a religious mission must be employed to go among the fisherfolk and patiently and persistently help to advance their economic condition. The one thing required is the employment of sufficiently qualified young men belonging to the fishing community as co-operative officers who will take it as their mission in life to work out the economic salvation of their brethren through legitimate means. Officers who do not believe in the improvement of the condition of the fisherfolk must not be entrusted with such kinds of work.

(b) Education.

It is really gratifying to note that in several fishing villages elementary schools have been opened by the Fisheries Department, but I must say only a beginning has been made in this line. There are many places where schools are most urgently required. Even if there are municipal or board schools near by, fisheries elementary schools must be opened in all fishing villages. Education must be made compulsory in all fishing villages at least in the primary classes. If elementary education is more widely diffused among fisherfolk, the ideas of co-operation, thrift, temperance, etc., can be more easily inculcated into them. In each fishing village there must be a "village hall" constructed at Government expense. This will very considerably improve the educational and moral condition of the fisherfolk. Attention must be paid to adult education. At present there are toddy shops situated just in the centre of fishing hamlets. Care must be taken to shift them to far-off places. Promising students should be given scholarships for higher studies. Now that the fishermen are removed from the list of communities protected by the Labour Department, special provision must be made in this line by the Fisheries Department. The supervision of fisheries schools must be entrusted to qualified fishermen officials if available. In some places fishermen suffer from great social indignities. Propaganda work must be undertaken to relieve them of this social oppression. Qualified young men belonging to the fishing community must be sent to Japan, Germany and other places for higher expert studies regarding fisheries, educational, and socio-economic subjects. The existing Fisheries Training Institute must continue. As far as possible only students belonging to the fishing community must be selected to undergo training at the Institute. More practical knowledge should be imparted to the students in co-operation.

XVI. STAFF.

As far as possible, in all the different branches of the Fisheries Department, only qualified men belonging to the fishing community should be employed. A large number of young men belonging to the community who have got some higher education are unemployed. They should be absorbed in the technical or educational section of the department.

M.R.Ry. ANDY SANKARAN Avargal,
Merchant, Cannanore.

I am a member of the Arya (Hindu fisherman) community. I have been for the past ten years engaged in dry fish export trade. I also own in Cannanore a fish oil factory.

My personal opinion is that the fish caught on this coast is more than sufficient not only for local consumption but is also in sufficient quantity dried and cured for exportation from the curing yards of the coast to Colombo, Arkonam, Villupuram, Trichinopoly, Coorg and other places. There is also a brisk demand for dry fish.

The methods adopted and prevalent in different parts of this coast with regard to the catching of fish vary considerably. The nets used and the methods employed also depend entirely on the fish to be caught.

The 'mathichalavala' and 'mathikolli,' 'ayilachalavala' and 'ayilakolli' are some of the recently introduced kinds of nets for catching 'sardines' and 'mackerels' respectively. But these cannot be said to have effected any improvement in the economic condition of the fisherfolk. The introduction of these nets is not at the instance of the Government Fisheries Department, but mainly through the exertion and influence of the South Malabar fishermen with their kinsmen in North Malabar. These nets have done more harm than good. The nets used, from time immemorial, for the purpose and with greater benefit were called 'payithamvala.'

The practice in vogue at the present time is that when a shoal of sardines is sighted by any fisherman, the fishing party at once cast the 'mathichalavala' or 'mathikolli' and by producing a loud noise by striking on the side of the boats with sticks and splashing water with iron bulbs, the shoal of fish is driven into the nets. In that way large quantities of sardines are caught at a time. As the supply of fish is very great, the market value of the haul goes down proportionately.

The principal defect in this method is that the sardines get terrified beyond measure by the loud noise produced by fisherfolk, and leave the shore for distant beds. This is the main reason for the disappearance of sardines from the coast for a considerable length of time, as in recent years. The same remarks apply with equal force to the nets now set apart for catching mackerels. The Government Fisheries Department, it is said, is now engaged in carrying on their investigations on the subject and their decisions are awaited with keen interest by the fisherfolk on the coast. The mature opinion arrived at by myself and other important fishermen engaged in the trade and operation is that if Government were to take immediate steps to discourage the use of the nets named above for catching sardines and mackerels, the scarcity and famine now prevalent among the fisherfolk can be effectively averted.

Ever since the introduction of the Government Fisheries Department on this coast, the fisherfolk have been obtaining valuable instructions and suggestions in the art of catching fish from the departmental experts. Despite this fact the methods of catching fish have not yet undergone any improvement or change.

V. FISH-CURING YARDS.

The only improvement effected under this head is the construction of sheds in some of the yards. The issue price of salt should be reduced to the rate of 10 annas per maund, the rate at which it was supplied to the curers by the Salt Department before the transfer of the yards to the Fisheries Department. The enhancement of rate has adversely affected the dry fish industry and trade. In addition to the increase of rate the fisherfolk are compelled to pay 8 annas per bag of salt (two maunds) by way of manul. The Committee will certainly earn the thanks of the curers if steps are forthwith taken to put a stop to the manul system now in vogue and thus reduce the price of salt issued to them.

In this connexion I bring to your notice the Government's promise in 1884 when the earth salt most popularly used was done away with, that the Government salt would be issued at the fish-curing yard duty free for the betterment of the fishing community.

XIV. Socio-Economic Work.

(b) Education.

As it was found that the fisher community was really backward in the matter of education, to grant an impetus to it, the Labour Department had been awarding scholarships to deserving fisherfolk young boys to get education in the elementary and secondary schools till 1928. Even these inducements have been ordered to be withheld from them from the current educational year, much to the disappointment of a large number of deserving young boys. Under these circumstances it becomes the imperative duty of the Fisheries Department to take up the question of the educational betterment of the community in its charge, and introduce the much-needed system in schools, which erstwhile had been so nobly conducted by the Labour Department.

Improvements in the methods of catching and curing fish are necessary. As there are no men of technical knowledge on the subject in the Fisheries Department, the primitive courses are being followed now. Students must be recruited from among the educated children of the fisherfolk with a view to give them a course of study in a technical college, on stipendiary system such as is being done in agricultural and other colleges.

It is true that the Fisheries Department have started primary schools in a few villages among fisherfolk community and they are worked satisfactorily, but as the supervisors of these schools are not professional men, the course of education suffers much and the improvements that are needed from time to time are not effected. There should be improvement in the scale of pay of the teachers of those schools. Both in the secondary and primary schools, trained teachers are of course differentiated. A special curriculum of study should be drawn up for these schools different from that which exists for the ordinary primary schools, as this alone will improve the religious and socio-economic condition of the community in the future.

**M.R.Ry. B. KORAGAPPA, Fish merchant, Boka Patna,
Mangalore.**

Memorandum.

Salt which was selling at Re. 1-4-0 per bag is now selling at Rs. 2-8-0 and it is absolutely necessary to reduce it to the former figure.

**M.R.Ry. K. KUNDARAN of Pallikkare Village,
Kasaragod Taluk, South Kanara District.**

V. FISH-CURING YARDS.

43. With the main object of reducing the price of salt.
 46. The issue price of salt now supplied is extremely high and as a result of this, the demand has fallen, and thus the labouring community is undergoing many a hard struggle in life; so it is essential to reduce the prevailing issue price of salt.
 49. The curers will be chiefly benefited.
 52. If the issue price of salt is reduced, it will require no great ingenuity to say that there will be demand for more.

VI. CHALIYAM CANNERY.

61. Yes.
 62. To a greater extent than at present.
 63. Outsiders were trained.
 65. Yes; there is one, started at Mahe, on the model of the Chaliyam Cannery. Now it is working well and is in a good condition.
 68. My suggestion is to stop exports, so that this may be improved.

VII. TANUR EXPERIMENTAL STATION.

70. Yes.
 71. For the organization of fish trade, fish-curing, oil and guano and etc.
 72. All the organized systems and methods are beyond the means of the average fisherman.

XIV. Socio-Economic Work.

(b) Education.

184. In my opinion, a modified system of education is required. A few elementary schools are only seen in the midst of a thick population of fishermen. Better, if new schools are opened in places, such as Bekal and Kottikulam, which are inhabited by a number of fishermen.

M.R.Ry. M. C. MADHAVAN, formerly a travelling representative of the Government Cannery, Chaliyam.

66. Yes, it is a fact that canned fish from Malabar does not find a ready market in competition with imported canned fish.

67. In my opinion the reasons are as follows :—

(1) Imported canned fish is available in all markets at cheaper rate than canned fish from Government Cannery. Below I give an extract from a letter of Messrs. Balthazar & Son, Ltd., Rangoon, dated 27th August 1927, to whom I sold 800 cases of canned fish at Rs. 14 per case of 100 tins of 7 oz. size, c.i.f. Rangoon which itself is below the average cost price. From this extract it will be clear that foreign canned fish is imported into India and Burma at a rate much lower than that of canned fish from Government Cannery.

Extract from letter No. (India) 1/139, dated 27th August 1927, from Messrs. Balthazar & Son, Ltd., Rangoon, to M. C. Madhavan, representative, Madras Government Cannery.

"We thank you for your letter of the 16th instant and note the object of your visit to Rangoon, and regret to learn that you should be out of pocket in the disposal of the quantity of your sardines in this market through our medium. Your visit was long enough in Rangoon to convince you that American and Canadian packings of sardines, notwithstanding freight charges and 15 per cent duty levied on shipment, cost at this port a little over Rs. 11-8-0 per case and therefore if Rs. 14 is charged for sardines packed by the Madras Government Cannery, who are at a greater advantage than their competitors, this should be considered very satisfactory."

(2) The size of the tins manufactured by the Government Cannery is not the size which finds a ready sale in the markets. In almost all the places where canned fish is in great demand, people often go in only for quarter size (3½ oz.) tins. But the smallest tin manufactured by Government Cannery is of half size (7 oz.). Though among foreign canned fish both quarter size and half size tins are found the greatest demand is for quarter size tins only.

(3) The labels used by the Government Cannery are not at all attractive to the customers; on the other hand the labels found on imported canned fish are so nice and attractive that any one is tempted to buy a tin.

(4) The Government Cannery does not sufficiently advertise the canned fish manufactured.

(5) The Government Cannery is not in a position to reduce the price of canned fish in competition with imported canned fish for—

(a) The plant and machinery used in Chaliyam Cannery for the manufacture of cans are such that only thick and very costly tin plates can be used to prepare cans. When cheap and thin tin plates are used most of the cans manufactured are damaged and as such only thick and costly tin plates have to be used.

(b) The oil used for packing sardines is also very costly.

(c) The Director of Fisheries is not authorized to buy tin plates, salad oil and other things from the cheapest market and to raise or reduce the price of canned fish according to the fluctuation of the market.

68. My suggestions are—

(a) If Government can supply the canned fish at a rate lower than that of foreign canned fish, any number of cases of canned fish can be sold in almost all markets in India, Burma and Ceylon; but in my opinion the Government will not be able to lower the rates to compete with foreign canned fish.

(b) From my experience as a travelling representative of Malabar Canneries, Mahe, and subsequently of Government Cannery, Chaliyam, I have realized the fact that customers throughout India and other places have a

general contempt for Indian canned fish and they go in only for foreign canned fish. I would suggest that the first thing the Government should do is to bring down the sale price as low as possible and enhance the price gradually after a few years when they find that Government canned fish are in great demand everywhere, the quality of the stuff manufactured remaining the same throughout.

69. Foreign canned fish is imported into Burma alone on an average of about 2,000 cases per month; whereas in India and other places the demand is not so very great. Such imported canned fish is consumed largely by Europeans, Anglo-Indians, soldiers, Burmese, Chinese and a few Indians.

**M.R.Ry. B. MOHANAPPA THINGALAYA, Secretary, The
South Kanara Mogaveera (Fishermen) Mahajana
Sabha, Hoige Bazaar, Mangalore.**

Memorandum.

Fish industry, a cottage industry.—That industry which is run by the conjoint and co-operative efforts of the inmates of a house, whether males or females, young or old, able or disabled, is called a cottage industry. In the communities among whom such an industry has taken firm root it has fostered self-dependence and conferred an independent status upon them in no small degree, and made them prominent for their upright character and hatred of vice. To these people the very idea of supporting life by begging would seem a sort of death and the constant occupation which they find is assuredly an effective barrier against the inroads of evil thoughts into their minds. There were many such household industries in our land once upon a time, but as years have rolled by, they have disappeared gradually. Fishing industry is one of these. This industry comprises and includes fishing, fish-curing, drying of fish, fish selling, hemp cultivation, spinning and weaving of nets. If these activities are carried on in a co-operative spirit by the members of a house, then only will they contribute to material advancement and a life of comfort and happiness.

Fish-curing is a very important branch of the fishing industry. Indeed the importance of this branch of the industry cannot be overrated. The appearance of shoals of fish off the sea shore and their availability to capture depend on the conditions of the season and of the weather. Large supplies of fish may be had at such times only and the necessity is therefore apparent of curing and preserving this fish from damage for future use. On the supplies thus preserved the fishermen generally rely for their maintenance during the monsoon period which is a slack season, and during times of scarcity of fish as also for the outlay required for purchase, repair and renewal of their nets and boats. Nature has stored in large quantities earth-salt by the sea and river-sides and this used to be freely applied once upon a time for salting fish. The fish so salted was particularly good to the taste and possessed great preservative powers. Upon the introduction of the Salt Act the utilization of this salt for purposes of curing fish was prohibited and a number of poor fisherfolk were convicted of offences under the Act. To them the purchase of high priced market salt for the purpose of curing fish meant heavy pecuniary loss. The aggrieved fishermen made several representations and submitted many memorials to the Collector, the Board of Revenue, Local and Imperial Governments and finally took their case even before the Parliament, but all in vain. The Government, however, in due time came to recognize that a real wrong had been done to the poor fishermen and came to their rescue by a scheme for the supply of a cheap and inferior sort of salt exclusively for curing purposes to fishermen only at a cost of Rs. 6-8 (at present Re. 1-4-0) per maund, its actual cost price. In accordance with this scheme fish-curing yards were opened at principal centres in the district. But the rules governing these yards were such as to render it prohibitive to poor fishermen lacking in capital to procure supplies of salt. The fisherfolk also lost under the new scheme the facilities they formerly possessed by which they could attend to their household or domestic activities and along with them attend to fish-curing also. This naturally caused a revulsion of feeling against both the yard and its salt. Previous experience had shown that representations to the Government were of no avail, hence the poor fisherfolk remained quiet. The one result of this was that the fishermen were forced to give up their age-long hereditary profession of fish-curing and had to confine their activities solely to fishing and thus support themselves and their families by the meagre profits derived thereby. The facilities provided by the Government by spending thousands of rupees in creating fish-curing yards were seized and availed of by middlemen from other communities and in time the holders of tickets for salt in all these fish-curing yards came to be all people other than

fishermen! And finally these have come to attend to the curing of fish themselves after purchasing raw fish from fishermen. Not only thus have the benevolent intentions of the Government in creating fish-curing yards to throw open to fishermen those facilities which they once enjoyed, been frustrated, but also those fishermen, who could find ready and independent labour and with it an independent living when earth-salt was freely accessible, have been compelled to give up all activities connected with fish-curing and have lost all chances of supporting themselves and their families independently. In consequence of this the struggle for existence has become more acute and the large number of fisherwomen doing coolie work under outsiders and of fishermen held down by loan bonds executed by the former are standing witnesses to this keen struggle that has been going on among them. In fact such fishermen as are under obligation of debt feel bound to hand over their catches of fish to their creditors at prices much lower than the market rates.

Prior to the opening of the fish-curing yards, as soon as fishes were brought to the shore by men and women, children and old people in the house would gather together. Each contributing his or her labour, they would all soon, with the help of the earth-salt available at hand, attend to its curing in the vicinity of their houses, making considerable profits thereby. This of course permitted the members of the house, while engaged in the process of curing the fish, also side by side with it to ply the duties of the house—to cook the food, attend to the nursing of children, to care and minister to the sick and suffering. The fish-curing yards of the present day are situated at a distance of about two to nine miles from one another and it may just be imagined how it will ever be possible for the poor fishermen to go over all the distance at night time with their fish supplies of the evenings to the fish-curing yards and then conduct themselves in keeping with the rules and to the satisfaction of the staff in charge. Such a state of things being impossible, it is clear that fishermen gradually lost hold over this important industry.

From the above, it will be clear how the generous intentions of the Government to distribute salt free of duty to fishermen, through the fish-curing yards for fish-curing purposes have actually failed in their object and how this home industry instead of gaining strength and vigour has actually passed into the hands of middlemen, under the factory system in force and how thereby the position of the fishermen and the chances of an independent living to them have been materially affected.

If in fact the present supply of salt free of duty for fish-curing purposes is to be interpreted as an honest piece of an act on the part of the Government, it should repair the wrongs done to the fisherfolk by the withdrawal of the manul rights enjoyed by them by the use of earth-salt, by providing each fisher family with a supply of salt at the lowest possible rates in the vicinity of their dwellings.

To secure this object, arrangements must be made to open a co-operative society in every hamlet having ten or more fisher families. Salt of the fish-curing yards must be supplied free of duty to these co-operative societies through the agency of the Co-operative or the Fisheries Department. The salt should be distributed to the members through the panchayat members of the society and the fish thus cured should be sold collectively. If this suggestion is adopted, then indeed the annually recurring expenditure of thousands of rupees now incurred by the Government in respect of fish-curing yards in the shape of pay, travelling allowance, pension, outlay on buildings, etc., might well be avoided resulting in much savings. Fish-curing salt will then become available to fishermen at their very doors at 75 per cent less than what it is at present. And the concessions provided by the Government in the matter of salt will then go to those very people for whom it is particularly meant, contributing without doubt to their great material progress.

A possible objection to this system might be raised on the ground that the salt supplied free of duty might be diverted and used for outside objects, thus causing loss to the Government. An answer to this objection will be found in the fact that the salt supplied by the fish-curing yards is much inferior in quality to the ordinary salt and is much bitter to taste. It is impossible to apply it to purposes other than that of fish curing. To avert the chances of such loss, a committee may well be appointed to consider the

restrictions with which to hedge this arrangement. On this Committee the Salt, Fishery, Co-operative Department and the fisher community must be represented. On the lines indicated by the by-laws suggested by this committee a few experimental societies may be started and their working watched before final orders are passed on this question.

Fish guano and oil—Their manufacture.—These also, once upon a time, were home industries. Every fisher family used to extract oil from oily sardines by baking them in convenient vessels. The advent of the factory system put down this home industry also. The workers of the present-day factories are subject to frequent and occasional losses. The factories need to be manned by fishermen, workmen, maistris and clerks, and their charges in the shape of pay and advances have to be defrayed. The factory owners then have to wait for the fish, and when their supply fails in any year, they incur heavy losses. If this is done by fishermen only as a home industry, then they do not require much outlay, the work of clerks, maistris and labourers, being attended to by the members of the house, thus resulting in much savings and profits. It therefore behoves that the Government should concert measures to foster and establish this industry on a home industry basis.

Fish guano is an excellent and nutritious manure and used to be shipped to Japan from this coast in Japanese coasting steamers. The guano factories being mostly owned by irresponsible and half-educated businessmen, as the demand for guano increased, the practice of mixing up dirt and soil with it during its manufacture became more and more prevalent. The result was that the traders incurred a heavy loss in this line, and the Japanese traders discontinued their dealings altogether. This industry is thus on the brink of complete destruction and the only method of reviving it seems to be to enact a rule penalizing all such manufacturers using more than five per cent admixture of dirt or soil in the guano produced by them.

Fish oil. In years when there is abundant sardine fish, the price of fish oil would fall so low as Rs. 50 to Rs. 100 a ton and would cause heavy loss to fishermen and factory owners. The foreign traders on the other hand would derive enormous profits. The tallow required by soap factories can be prepared from the fish oil, and may yield profit as the tallow imported from European markets costs Rs. 700 to Rs. 800 a ton. It therefore behoves that the Fisheries Department should find out an easy method of manufacturing tallow.

14. As I said above, the Fisheries Department has not been able to effect any improvement so far as the catching of fish is concerned. But economic pressure chiefly has very slowly introduced some very slight improvements. Twenty-five years ago the long line and the large seine improved locally as '**Kollivala**' were unknown on this coast. The Ram-net known locally as '**Ramnet**', was introduced into South Kanara from the mini net, a large shore seine, was introduced into South Kanara from the Bombay Presidency. To suit the new tackle, the size of the fishing canoes has also undergone some slight improvement; for instance, formerly they used to go out two in a canoe in canoes of an average length of 20 feet and a breadth of 2½ feet. Now the largest canoes are 30 feet long and 3¼ feet broad, and they take four men. Formerly the Calicut fishermen

seldom went beyond a depth of 15 fathoms; now they go up to 25 fathoms. Formerly they never stayed out at sea for more than a few hours; now the linesmen at least stay nearly 24 hours passing the night at sea. The larger canoes now used in line-fishing use three sails instead of one as they used to do before.

15 & 16. I am firmly convinced that any further improvement of the fishing industry depends solely upon the introduction and widespread use of a larger and more efficient type of fishing boat. Sir Frederick Nicholson has, in his various letters and reports, emphasised again and again the absolute necessity for larger sized boats if the fishing industry is to improve. The use of such boats would (a) take the crew safely and comfortably into the further waters of the fishing grounds and allow them to stay there for some days following and catching the shoals, (b) allow the use of better and more powerful nets and lines, (c) save time by covering the distance to the fishing grounds more rapidly, (d) increase the efficiency of labour employed, since to row an ordinary canoe as many, if not more, men are required as to work a much larger vessel mechanically propelled, (e) increase the freedom of action on board and permit the use of mechanical appliances to save labour and increase efficiency, and (f) enable means to be taken by the fishermen to ensure the proper preservation of fish from taint from catch to shore.

The department did try to popularise a bigger type of fishing vessel, the Ratnagiri machwa, at Calicut, but the experiment was a failure. It is obvious that the widespread use of large trawlers is out of the question. A fairly large type of boat adapted to the work and to the nature of the coast, working with wind power, supplemented whenever necessary by a small detachable motor engine, might prove suitable.

Anyhow it is clear that the future of the industry depends upon the use of larger boats. The exact size and shape of such a boat is a matter for technological research. It seems to me that of all the varied lines of research the department might take up, this is by far the most urgent and the most important.

160. Technological research is by far more important than biological research. The former is of immediate economic importance, e.g., research connected with boats, nets, fish oil and other by-products, fish-preservation industries, etc.

Much of biological research is on the contrary of purely academic interest. Even that part of it which has an economic bearing will give results only in the distant future. Particularly in connection with marine fisheries, biological research cannot be expected to lead to any economic results of importance in the near future. It is in fact one of the conditions of successful research that the research worker should not be tied down to a purely utilitarian purpose. This truth has been recognized by all the authorities on the question. Mr. James Johnstone, writing about the work of the German Kiel Kommission, says: "Instead of being restricted to the investigation of particular practical questions they are given a free hand in relation to the subjects which they may investigate. It is to these conditions no doubt that the success of their work is to be attributed." (British Fisheries, pages 137-38). "It is necessary to mention that a large proportion of it has been of academic rather than of, what we speak of in England as, 'practical' interest. . . . In Germany fisheries scientific work has always been approached in a different spirit from that which prevails in England where we are continually confronted with a desire on the part of the official people that scientific work on which public money is to be spent should have a direct economic or practical object or outcome; and where scientific men are compelled to make this an excuse for official encouragement and support (page 140)." Similarly referring to the work of the United States Bureau of Fisheries, Bulletin Vol. XXVIII of the Bureau says: "The first duties undertaken by the Bureau after its organization involved biological investigations and the operations up to this present time have continued to have a distinctly scientific basis. In making his original plans for the systematic investigation of the waters of the United States and the biological and physical problems they present, Commissioner Baird insisted that to study

only the food fishes would be of little importance and that useful conclusions must needs rest upon a broad foundation of investigations purely scientific in character" (page 1383).

What is said above should not be misunderstood. Scientific investigations have their own value. What is merely of academic interest to-day may be of supreme practical importance to-morrow. Nevertheless it is true that compared to technological research the discoveries of the biologist will be of less practical importance. I do not think that anywhere in the world, Europe, America or Japan, biological discoveries have directly helped marine fisheries in any considerable way, whatever its use in pisciculture and in supplying data for protective legislation might be. This is not because the biologist cannot make discoveries about marine fishes, but because the vastness of the ocean prevents him from easily upsetting the balance of nature. For instance, the investigations of European biologists seem to have proved that the quantity of marine plankton is less in tropical waters than in temperate ones. But this knowledge does not help us in any way to increase the amount of plankton in the Indian seas. Similarly investigations, very useful from a scientific point of view, are now being carried on about the life history of the sardine and the mackerel. Even if these investigations are entirely successful, they will not help us to bring in sardine shoals in a year in which they are absent. The scientist may explain the causes of their presence or absence, but to manipulate the forces in Nature so as to bring them to our coast at will is not an easy proposition. The United States of America have long been carrying on biological research in connection with fisheries. Yet the menhaden shoals, which are the mainstay of the American fish oil and guano industry, are as irregular and capricious in visiting their shores as the sardine shoals are on our West Coast.

Therefore I repeat that technological research is by far the more important. In fact it would be a very desirable thing if the University authorities would organize a research branch in marine zoology. Then the Fisheries Department could altogether give up biological work and devote itself to the more urgent questions of technology. Biological work could be much better carried on in the academic atmosphere of a University Research institution than in a Fisheries Departmental laboratory where utilitarian motives are sure to intrude. The Kiel Kommission in Germany, referred to before as carrying on important research in marine biology, is a committee of University professors. In Japan, marine biological research is mainly carried on by the Tokio University. The proper functions of the department, so far as the progress of the industry is concerned, are (1) technological research and (2) popularising the results of such research.

161. The present state of the research staff seems to indicate that greater attention is paid to biology than to technology.

162. I would reverse the proportions—not by reducing the research staff (this cannot be done until the University or some other similar body takes up the work) but by adding a large and efficient staff for technological work. A suitable agency for disseminating the results of technological research in this as well as other countries has to be devised at the same time.

170. It appears to me that Calicut is a very suitable place for an aquarium. The one now existing and the two others proposed to be established are all on the East Coast. West Coast should certainly have one. And Calicut, the largest city on the West Coast, is the most suitable centre. If it is made a part of the Fisheries Training Institute or the Research Institute at Westhill, the overhead charges of maintenance will be very low.

173 & 174. I have already said in answer to questions 2 and 3 that the spread of co-operation among the fishermen of the West Coast is not very unsatisfactory compared with its condition among other communities in India. But a good many of the societies are moribund and some are only alive spasmodically.

The following figures will show how the movement has been declining in the last few years. (For purposes of comparison I take the amount of loans disbursed each year as the best data available, because the number

of societies and the number of members are not of any value for this purpose. Liquidation work is very slow and a dead society with the total number of members it had when it functioned last will figure in statistics for years after it has ceased to do any work.)

Year.	Total of loans disbursed.
	Rs.
1918-19	40,511 *
1919-20	1,17,520 *
1920-21	1,69,103 *
1921-22	2,53,303
1922-23	3,14,101
1923-24	3,11,392
1924-25	3,11,377
1925-26	2,31,668
1926-27	81,138
1927-28	83,200

* Includes figures for the East Coast fishermen societies also.

This decay may be partly explained as the natural result of starting societies before the ground was properly prepared and suitable material ready. But I do not think this reason is adequate to explain not only the decay of old societies, but the absence of expansion by the organization of new societies. Bad fishing seasons are sometimes stated to be another reason for the decline. This again is not a satisfactory explanation. The figures I have quoted refer only to loans disbursed. If the societies were functioning efficiently, it is precisely in a bad fishing season that we should expect the borrowing to increase instead of decreasing.

I think the annual reports of the department are right in attributing the general decline to lack of effective supervision. The figures quoted above show that the decay of the societies began in 1924. It was on the 1st April 1924 that all the fish-curing yards in the Presidency were transferred to the control of the Fisheries Department. The fact that the beginning of the decline of the co-operative movement among fishermen synchronizes with the taking up of the yards is significant. The officers who were looking after the co-operative societies were also entrusted with the work of supervising the yards. The latter is a very responsible task entailing monetary transactions of huge volume. It is therefore not to be wondered at that their attention after 1924 was chiefly concentrated on the fish-curing yards and that the co-operative societies fell into the background. The only remedy possible is intense and efficient supervision. The question whether this supervision should be done by departmental officials or by any non-official agency requires consideration. My view is that, as far as possible, direct supervision of the societies should not be undertaken by department.

In the name of efficiency, we should not betray the fundamental principles underlying the movement. There cannot be any healthy development of the co-operative spirit unless we put our chief reliance on mutual supervision. Supervision by a union should not be replaced by supervision by departmental officials. The difference may not, perhaps, be very appreciable now, but there is between the two all the difference that exists and will exist between democracy and bureaucracy. I would strongly recommend that a large number of local supervising unions should be organized among fishermen societies. Each union might have between five and ten constituent primary societies. The organization of such unions by non-official effort alone is now impossible because the transactions of this number of fishermen's societies will not give enough funds to pay a supervisor. But they can be organized by non-officials if Government would give financial aid. The Government acting through the Fisheries Department might give a grant-in-aid to each union to enable it to keep a supervisor on Rs. 25-1-50 with a consolidated monthly travelling allowance of Rs. 10 extra. As

the transactions of the societies affiliated to the union increase, Government contribution may be gradually reduced. Government may not raise any serious objection to such a grant-in-aid system. Such State aid is recommended by the Agricultural Commission as the following extract from their report shows :—

"... it must be remembered that supervision by an authority outside the society is equally detrimental to the growth of a proper spirit of self-help, whether it is performed by a paid official or by an honorary worker. The ideal aimed at in some provinces has been to organize a supervising agency from within by federating primary societies into special unions. . . . Public funds may also reasonably be spent in assisting institutions whose object is to spread education in the application of co-operative principles to various objects and also. . . in assisting unions for supervision. . . . In consideration of the prevailing illiteracy and the consequent difficulty in reaching the people by paper or by pamphlet, we think that the Government have a special interest in promoting organizations on a co-operative basis. . . and that assistance should, therefore, be given freely to ventures of a novel nature.

"The extent to which State aid is required outside these limits must depend upon the success of the educational side of the movement; but the overwhelming interest of Government in any measure which contributes to the welfare and prosperity of the poorer classes justifies a larger contribution than is at present made to the expenses of the movement in backward tracts. . . where the people are unable to find funds for themselves. In the early stages, liberal assistance should also be given in all provinces to the more specialized forms of co-operative activity. . . ."

These arguments amply justify State aid to fishery societies and particularly to the supervision fund of the local unions of fishery societies. But the work of these supervisors and unions should itself be carefully supervised. A great defect in the existing system is that the supervision and help of the Fisheries Department to these societies is administered by the inspectors of fisheries. As pointed out above these inspectors have to do very responsible work connected with the fish-curing yards. Even if the number of these inspectors is increased and thereby the work of each reduced in quantity, the responsibility will remain and I am afraid the business connected with the yards will always take the first place in their minds. Moreover the combination of socio-economic work with fish-curing yard work is not a happy one. The qualities that go to make an efficient inspector of fish-curing yards are not necessarily those of a successful socio-economic worker. Hence it is preferable to have a separate officer for socio-economic work. His duties may cover the entire field of socio-economic work. So far as co-operation is concerned, his work will be to oversee the work of the union supervisors and help and advise them.

A possible objection is that since the supervisors are not the direct subordinates of this socio-economic Superintendent, they might not act according to his wishes. Such an objection might be raised even to the appointment of a Government supervisor; for what guarantee is there that the village society which is a democratic body will always take his advice? But in practice such contingencies will be rare. I anticipate that the moral influence of the socio-economic officer will enable him to have his advice respected. But if the Government officer finds that his advice is always disregarded and that the work of the union and that of the supervisor are absolutely inefficient, there is always at hand the remedy to be applied in the last resort to such hopelessly recalcitrant unions—that of withholding the Government grant which would bring the union automatically to an end.

One such socio-economic officer would be sufficient, at least in the beginning, for the two districts of South Kanara and Malabar. An officer of the grade of a Deputy Registrar in the Co-operative Department would be necessary. A man of lower status may not be able to exercise that moral pressure by means of which much of his work will have to be carried out.

So far with regard to the revival of the co-operative credit movement. But I am not convinced that the credit type of society is the best for the vast majority of the fishing population. It seems to me that the credit societies were started for fishermen under the influence of a wrong analogy.

The co-operative movement was first introduced into India under Government auspices as a panacea for the deep indebtedness of the great majority of the Indian agriculturists. But when we talk of agriculture we always think of the peasant. Now the peasant himself is to some extent an employer of labour, a middleman. When we talk of relieving the indebtedness of the Indian agriculturist we do not think of the agricultural field labourer. It has been shown by the experience of the working of co-operative societies in Central Europe where they originated, as well as in other lands which copied the Central European model, that credit co-operation is very successful in helping the small scale agriculturist. The credit societies of Germany were never intended for the labourer, but mainly for the lowest strata of the middle classes. The Schulze Delitzsch societies are exclusively for them, their huge share amount preventing the entrance of poor men. Even the Raiffeissen societies are for the small farmer and not for the field labourer. In the frame work of agricultural organization the farmer is the keystone and therefore to improve agriculture means to better his economic condition. The position is entirely different in fisheries. When we talk of improving the economic condition of the fishing classes, we are thinking of the actual fisherman corresponding to the agricultural field labourer and not of any small scale capitalist corresponding to the farmer. It is true that in fisheries also there are middlemen. But we desire not to help but to eliminate them. The difference between the economic position of fishermen and that of agriculturists was to some extent recognized in organizing credit societies among them. Sir Frederick Nicholson's report, dated 14th December 1917, paragraphs 4 to 11, make this clear, but sufficient weight does not seem to have been attached to this fundamental difference between the organization of agriculture and that of fisheries in organizing co-operative societies for fishermen. It seems to have been thought that because the credit society was useful in agriculture it would be equally useful in fisheries.

The history of co-operation shows that nowhere in the world has credit co-operation been of much use to the labouring wage-earning classes. Credit is useful to a capitalist. It may be useful to a labourer to convert him into a capitalist of some sort. But so long as he remains a labourer, what is he to do with credit? Cheap credit is, in fact, dangerous to such men. In England, for instance, the co-operative credit movement has never made much headway. The reason is that the vast majority of the population are wage-earners to whom such credit was of no use. The English mind working at the co-operative idea evolved the distribution society or the store which is primarily a wage-earner's business. Therefore I am convinced that if the economic condition of our fishermen is to be bettered the credit society is not the best means. The right type for them seems to be the producer's society—working men joining together, securing capital and tools on their joint security, engaging expert overseers if necessary and sharing the profits in proportion to the work done by each member. The two "industrial societies" mentioned in the last administration report, as working at Palapatty and Blangad are of this type. The future of fishermen co-operation lies in the expansion of this producer's movement. These two societies were started as experiments. Their work for little more than a year shows that the experiment is likely to prove quite successful.

I recognize the difficulties. First the capital—the Malabar District Co-operative Bank has refused—curiously enough at the initiative, I am informed, of two fishermen members of the Board of Directors—to help them. Therefore the Government should step in with financial aid more or less on the terms on which loans are now advanced under the Agricultural Improvement Act. Secondly, in organizing these producers' societies we are descending to a lower strata of the population. Hence the difficulties due to illiteracy, etc., will be more pronounced. But given intensive supervision, this difficulty will not seriously impede the work of the society.

I ended the answer to question 160 by stating that the main work of the department should be (1) technological research and (2) popularizing the result of such research. The co-operative society will be very useful for realizing the second of these objects. In various European countries, methods of agricultural improvement, which the people could not be persuaded to take up by any amount of propaganda by Government officials, were easily propagated through the medium of the co-operative society.

The co-operative society conveys to its members the necessary information about the improved methods and also helps them financially to bring about the improvements.

For instance, in answer to questions 15 and 16, I said that the introduction of a larger fishing boat was an urgent need. The department tried to introduce some kinds of large boats. Nobody followed the example and the experiment was abandoned. This is attributed in the departmental publications (Bulletin XV—Report No. 5) to the innate conservatism of the fishfolk. I do not think that the fishing classes are so much wedded to ancient ways as is generally supposed. The history of the oil and guano industry disproves it. This industry, which started with one oil and guano factory in 1908, is now carried on in over 600 factories. As regards the large-sized fishing boat, if the technological research section of the department would find out a suitable type of vessel and if a reorganized Fisheries Training Institute would train up fishermen in its use and if the Government would finance the fishing classes for buying such vessels, I think the widespread use of it would result within a short time. It is here that the producers' co-operative society can come in. I said in answer to question 162 that "a suitable agency for disseminating the results of technological research should be devised." The co-operative system gives the agency required; and, so far as I can see, this is the only agency possible. The Government can supply finance either to individual fishermen or to producers' co-operative societies of fishermen. By dealing with individuals the Government would be helping to perpetuate a class of middlemen, for they alone would be able to give sufficient security for such loans and naturally they would swallow up all the profits. The condition of the ordinary fishermen will not be much bettered. It is even conceivable that it would be worsened. Therefore the loan should be advanced to societies of working fishermen of the type now working at Palapatty and Blangad.

175. The position just at present seems to be that the Co-operative Department expects the Fisheries Department to do most of the work and the Fisheries Department expects that the Co-operative Department would do most of it. The activities of each department with reference to these societies should be more clearly defined. The annual audit may remain with the co-operative official. But organization and supervision may be done by the socio-economic official of the Fisheries Department working chiefly through the non-officials, paid as well as honorary.

180. For the time being it appears that since the Central Bank does not give loans to producers' societies of fishermen, such as those at Blangad and Palapatty, the Government will have to advance funds if the movement is to spread. If the Government has any apprehension that the risks will be too great—for large sums of money will have to be advanced—I would throw out a suggestion that would minimise the risk. The local unions may be organized not merely as "supervising" unions, but also as what is known as "guaranteeing" unions.

181. Yes, since 1921.

182. If the socio-economic work of the Fisheries Department is good for the West Coast fishermen, we have to presume that it will be equally useful to the fishermen on the East Coast. The Labour Department cannot be in much intimate touch with fishermen as the Fisheries Department will necessarily be.

It will also be of great use to the Fisheries Department to have control of the socio-economic work among the East Coast fishermen. The co-operative societies and schools will be the chief means of popularizing the results of the technological work of the department. If these societies and schools are under the control of the Labour Department, opportunities for such industrial improvement will have to be unavoidably wasted.

183. The general system of elementary education in the country is not suited to the fishermen for two reasons: (1) A system of education not intimately related to the life of the community is bad on principle. "It is essential to the happiness and efficiency of children . . . that their up-bringing should be in harmony with their environment." (Agricultural Commission's Report, page 513.) Hence the elementary education of fisher children should be in intimate relationship with life in a fishing village.

It should be able to touch the chord of interest in a fisherman mentality. (2) The principle mentioned above is being gradually recognized and consequent changes are being introduced by the Education Department. Now agriculture is the occupation of the vast majority of the people of India. Therefore when the Education Department introduces changes to relate the education imparted in the elementary school to the life of the people generally, it means that the educational system is given a greater agricultural bias. An examination of the syllabuses of various elementary as well as training schools in the subject called Rural Science will prove this tendency. In most of our ordinary schools Natural Science is practically synonymous with Botany. Zoology is mainly ignored. It is not included in the C group subjects of the S.S.L.C. course whereas Botany is. If a "neutralised" syllabus teaching the 3 R's more or less in an abstract way and not related to environment is unsuitable to fisher children, still more unsuitable would be a syllabus of education heavily biased in favour of agriculture. The progress of this tendency in the ordinary system of education is a conclusive argument for organizing a different system of education for the fisher community. The fishing population lives mostly in hamlets detached from the residential quarters of other communities. This geographical isolation justifies separate schools for them. The fishing communities follow a highly specialized profession quite different in nature from those followed by other communities. This justifies special instruction.

It should be understood that the adaptation of the general educational subjects to suit the special needs of the fishing community is not primarily intended to serve a vocational end—vocational instruction in the ordinary elementary schools teaching up to the 5th standard being not a practicable or a desirable aim on account of the extreme youth of the pupils. The main idea in making such an adaptation is to follow the correct method in education, to adhere as closely as possible to the principle of connectedness and continuity in the pupils' life and training in the school and at home. But it is also worth remembering that a specially adapted form of general education of young pupils will prepare them for specialized vocational instruction later on.

185. These specialized schools should be directed and controlled by the Fisheries Department. *In the first place* the Education Department is not in a position to supervise the working of these schools since the curriculum of these schools will include many topics relating to the fishing industry and the related industries with which Educational officers cannot be expected to be in touch. It must have been for such a reason that the management of the Agricultural School at Taliparamba which was originally in the hands of the Education Department was later on transferred to the Agricultural Department.

Secondly, the curriculum will have to be drawn up with special reference not only to the fishing industries but also to life in a fishing village. And obviously Fisheries officers are in a much better position to know its distinctive features than Educational officers.

Thirdly, the management of Fisheries schools requires not only knowledge of the fishing industry and of the conditions of the fishermen's life but also sympathy with fishermen. The Educational officers in a district like Malabar where there are 3,199 elementary schools cannot be expected to display a special interest in or sympathy with the Fisheries schools which form barely one per cent of the total number of schools under their charge. The Labour Department runs Adi-Dravida schools mainly for this reason, I believe.

Fourthly, the Educational Department which does not as a rule run elementary schools (except the few model schools attached to the training schools) has no agency to manage or to supervise them. The Deputy Inspector of Schools who is put in charge of all elementary schools in a range (the number of schools in a range may run up to 150 or thereabouts) will not be able to pay more than a visit or two in the course of the year. On the other hand, as Fisheries officials of various grades are constantly moving up and down the coast going from village to village, the schoolmaster has a wholesome fear that if he does not attend to his work he will soon be discovered. Therefore if the schools are handed over to the Education

Department, even the teaching of the 3 R's may suffer. It should be remembered that fishing villages are mostly situated in out-of-the-way places which are not convenient to pay visits to.

Fifthly, unless fisheries education maintains a close relationship with the Fisheries Department, the school will not benefit from the progress made in technical and scientific research made by the department.

Sixthly, Fisheries schools form only one item in an extensive programme of welfare work. The Fisheries schoolmaster is expected to do much more than teach in his school. (This point is developed at greater length in answer to question 188.) To put the schools under a different department will render the realization of the programme of general welfare work difficult, if not impossible, since the schoolmaster principally is the channel through which other socio-economic work is carried on.

Therefore it is clear that the special Fisheries schools should be under the management of the Fisheries Department. All the arguments adduced above against the management of these schools by the Education Department apply with equal, if not greater, force to their management by taluk boards or municipalities. On the other hand, I would strongly urge that those elementary schools which are now run by taluk boards or municipalities in rural or urban areas occupied by fishermen should be handed over to the Fisheries Department.

I can conceive of only one argument that can reasonably be brought against the management of these schools by the Fisheries Department. That argument is that these schools are now supervised by Fisheries officers who are incompetent to do the work properly. It is not to be wondered at if an inspector of fish-curing yards is not capable of helpful criticism and right guidance to a schoolmaster.

This rather serious weakness in our present organization will be removed if the socio-economic work of the department is converted into a separate section, as suggested above, provided that the socio-economic officer happens to be a trained and experienced teacher. The combining of educational and co-operative work is quite natural, while the combining of both or any one of these with fish-curing yards work seems to be decidedly unnatural.

187. These schools have produced a general intellectual awakening in villages where they are situated. But in most places they have not become the 'community centres' which they were expected to become. The reason is that the elementary schoolmaster when left to himself is rarely capable of initiating any movement in the village for welfare work. He has to be inspired and directed. Up to this time, since these officers are working under the fish-curing yard officers, this inspiration and guidance have been lacking. If the suggestions made above about appointing a special officer for socio-economic work is accepted and if a really capable man is appointed to the post, I am sure the original ideals which inspired the foundation of these schools will be realized.

188. I am emphatically of opinion that the system is in consonance with true educational principles and has already produced good results and is capable, under right management, of producing much better results and therefore that it should be continued and developed. I would briefly indicate the chief lines of development—

(1) The elaboration of a specialised system of elementary education heavily biased in favour of Fisheries has more or less been attained. If the Fisheries elementary schools do not come up to the standard, it is mainly to be attributed to the defect in organization referred to in the last paragraph of the answer to the question 185. If the suggestion made there to put all the Fishery schools including the Fisheries Training Institute under a special officer is accepted, this defect will be removed.

(2) It is necessary to establish a much closer relationship between the Fisheries Training Institute and Fisheries elementary schools. At present the chief connection between them is that they are under the same department. This weakness also will be removed to some extent if a special officer is appointed for socio-economic work and he is put in charge of both the Fisheries Training Institute and the elementary schools. But even this is not enough. The teachers in the Fisheries Training Institute, especially the Headmaster, should be afforded opportunities of visiting the elementary

schools and learning first hand the difficulties and problems. Otherwise the work in the training school has a tendency to become more or less doctrinaire and unrelated to realities. On the other hand, the ex-students trained in the Fisheries Training Institute should occasionally be brought to the Fisheries Training Institute to keep themselves in touch with the progress made there since they left school. For instance, the teaching of fisheries techniques as now in the Fisheries Training Institute is quite different from what it was in the earlier years after its foundation, so much so in fact that the teachers trained in the earlier years have some difficulty in teaching according to the syllabus now framed for Fisheries elementary schools. This defect may be removed by holding "refresher" classes for these ex-students during one month every three years. Sir Frederick Nicholson foresaw in 1918 the necessity for such courses and he has suggested the holding of occasional sessional classes for such ex-students.

(3) When the scheme of education for the fishing communities was elaborated in 1918-19, it was distinctly laid down that schools were to be only one item in an ambitious scheme of social reform, that the school was to be a 'community centre' and that the schoolmasters were to be the channels for all kinds of welfare work. At present a good deal is being said about the organization of elementary education and of adult education in the Punjab. The Madras Government has felt the necessity of deputing a special officer to study the educational system in the Punjab. The Agricultural Commission Report says: "The new scheme of training teachers, which has been worked out by the Presbyterian Mission at Moga, has been adopted and extended by the Punjab Education Department and now prevails in every training institution for vernacular teachers in the province. The teachers are trained in community work and service; they are taught to participate in the healthful activities of village life and to put their hands to practical use in whatever way they can. We visited the training school at Gurgaon and were favourably impressed with the results of the attempt to evolve a new type of teacher for village schools who would be looked up to as a source of help and advice outside as well as inside the school room. If in the past the deficiencies of the teacher have been an important cause of the failure of the expensive efforts to spread primary education, it may well be that the training of his successor on new lines may prove to be an important factor in achieving success." (Report, page 528.) It is curious that there is no part of the Punjab system which had not been anticipated by the Fisheries Department when the Fisheries elementary education system was elaborated in 1918-19.

These ideals are to some extent being actually carried out in the Fisheries Training Institute. The pupils are trained both practically and theoretically in co-operation and other forms of social service. Some of the ex-students are actually now doing co-operative work in their various villages; but if it be asked why they have not risen to the height of the expectations originally formed, I would again repeat the reply already given, viz., want of wise direction. As I said already, except in rare instances, the elementary school teacher left to himself has not the initiative to organize welfare centres in the villages. He has to be inspired from above and this inspiration has been lacking ever since the schools were put under the fishery inspectors.

I would suggest the following items of social service for the immediate consideration of the department:—

(a) Making the school a real social centre by organizing evening clubs and reading-rooms for the parents of the children and the young men of the village. It does not matter even if they are uneducated. In one of the working men's clubs organized by the Servants of India Society in a village of weavers near Tanur, I found that one of the most interesting items was the reading of the newspaper. One of the literate members or the schoolmaster would read and the others would listen. I thought the illiterate members were even more interested in this than the literate ones. To add greater interest music, amateur, theatricals, etc., may be added. To quote again the experience of the Servants of India Society the member who is now working the scheme told me that in a certain village they started a night school, but the attendance was very meagre; then they began to rehearse some musical drama among the pupils for celebrating

some anniversary function. Immediately considerable interest was aroused and many young men joined the school as pupils in order that they might take part in the theatricals. I would even suggest that a music teacher might be appointed in the Fisheries Training Institute to train those pupil teachers who have a taste for music.

(b) *Adult education.*—In the earlier years more attention seems to have been paid to adult schools than is done now. In 1919 there were 20 schools—10 day schools for children and 10 night schools mainly for adults. Now there are 37 schools, of which only 4 or 5 are for adults. Adult schools should be a very important feature of any system of rural education. Sir Frederick Nicholson in one of the letters referred to above says: "I do not consider the children's school as at present the most important item. I prefer to tackle the adults at first start. Not the elderly adults who are hidebound by custom and prejudice, but the young men who, as I have already seen in several places, are beginning to perceive their trammels (social and economic) and are even eager to escape from them. When I can get a number of teachers, intelligent, zealous, trained in modern progressive ideas and aspirations including those of our own department, we can move the fisherfolk by acting first on the younger adults, secondly on the children, but the younger adults first. To teach the children the 3 R's and a little manual and other knowledge is good, but unless the ground is prepared by cultivating those next above them, the immediate actual or potential fathers of the children, then the children's education will go for naught and be neither desired nor practicable among such backward or prejudiced folk who have such a poor chance, left to themselves, of bettering themselves: we want to excite a useful discontent and struggle among those who will count during the next 20 years."

These ideas are repeated by the Agricultural Commission Report, which says about the adult education movement in the Punjab:—

"We are much attracted by the possibilities which a development of adult education on a large scale holds out. Such a development would antedate by at least a generation that great advance in literacy, which, in our own view, is essential to progress in all directions. Its influence in enlarging the scope of the cultivator's horizon and in increasing his willingness to adopt agricultural improvements and his capacity to watch over his own interests in buying and selling commodities and produce would be immense. Valuable time would thus be gained at a somewhat critical period, since conditions may not remain as favourable as they have been and still are. . . . Even more important is the stimulus which would be given to the spread of primary education amongst the youth of both sexes. As we have seen, a great obstacle to educational advance is presented by the apathy of the parents and no better method of overcoming this can be devised than by inducing them to realize in their own persons the benefits of education. . . . Again, what may be described as the 'aftercare' of the literacy won at the primary school stage will be immensely facilitated, for the spread of literacy amongst the parents will create a demand for the supply of the printed matter which is still seldom met with in rural districts in India and will thus give to the village libraries which now require fostering care from educational and other official authorities the secure basis of popular support."

Unfortunately many of the night schools organized by the Fisheries Department in the earlier years had to be closed for want of attendance. This is due to some radical defect in the nature of the education imparted. Work in adult schools must always be harder than in children's schools. But by adding attractions like music, etc., by altering the curriculum to suit the tastes of grown up people, by making the school a part of the work of a working men's club, etc., such difficulties have to be overcome.

I would offer one more suggestion about adult education. The fishermen on the West Coast have light work during the three monsoon months from June to August. It is not impossible, I think, to induce adults to attend schools during those months. Therefore sessional schools of three months may be held for adults. But in this case it would be necessary in some way, as, for instance, by membership in a reading club, to keep up the connection with education during the remaining nine months until the next session begins. Another practical difficulty would be to get teachers for

these three months only. If they are engaged as temporary hands, it is doubtful whether they will take sufficient interest in the work. One way out of this difficulty is to lengthen the monsoon vacation of the Fisheries Training Institute which is now $1\frac{1}{2}$ months to the full length of the monsoon and carry on the adult education scheme with the help of the pupil teachers. The employment of the pupil teachers as teachers of adult schools would also give a very good training to themselves. This plan would be facilitated further if the suggestion made in answer to question 190 (d) are taken up; for then the students of the Fisheries Training Institute would not be raw hands but teachers who had already undergone training in an ordinary training school. One objection would be that the training period of the students would be reduced by $1\frac{1}{2}$ months each year, probably even $2\frac{1}{2}$ months because these pupil teachers should be given a vacation of at least one month. In three years this would amount to a loss of $7\frac{1}{2}$ months. If the suggestion made below about training in first aid is adopted, another $2\frac{1}{2}$ months will be taken away from the period now devoted to training and teaching them. This objection can be met by increasing the training course to four years. I see no objection to this except that the expenditure on the training institute will increase by about Rs. 2,000 per annum. But considering the great value of a successful system of adult education, this expenditure will be inconsiderable. It should be remembered that direct expenditure on adult education in this scheme will be very little—the teachers will only receive the stipends they are paid as students of the Fisheries Training Institute; no capital expenditure on buildings or furniture or apparatus will be required as the children's school will be utilized.

(c) *Medical aid*.—The vast majority of fishing villages are now entirely beyond civilized medical aid. Some help in this direction will not only be immensely useful in improving the health of fishing hamlets, but such medical aid is one of the surest means of approach to the villager's heart. The benefits of education are more or less intangible and lie in a distant future which the illiterate fishermen cannot distinctly visualize. Benefits of medical aid, on the other hand, are immediate, and hence more easily appreciated. I suggest that the village schoolmaster be made the channel for giving medical aid to fishermen's villages.

This is really not a novel scheme. When drawing up the curriculum of the Fisheries Training Institute in 1919, practical training in first aid to be given by a doctor was actually included. But this had to be dropped as the Government would not sanction the payment of an allowance to a doctor.

More recently in the Bombay Presidency such a scheme has been worked out. A full account of the scheme is given in the Proceedings of the Madras Legislative Council, Vol. XXXVIII, No. 5.—page 503—Appendix XVII, relating to question 1258. I would earnestly request the Committee to go through that report on village medical aid. It appears that during the first 16 months the scheme was in operation these upacharakas, as they are called, dealt with 120,000 cases and Collectors, Civil Surgeons, etc., have borne testimony to the great value of their services.

The essence of the scheme is that capable village schoolmasters, preferably headmasters, are to be given a sound practical training in a hospital in first-aid work. They are taught how to recognize ordinary ailments and to dispense standard remedies. All difficult cases they are instructed to send on to the nearest qualified medical man. This scheme does not contemplate the creation of an inferior class of medical men. On the contrary, one of the advantages of the scheme is that as these men are already employed in a different profession they will not set up as professional medical men.

It may be asked how our village teacher is to find time for all this work, medical, co-operative, etc., in addition to his own proper work in the school. It is not necessary that the same teacher should shoulder all the responsibility. In most schools there are two or three teachers, in many of the large schools five and six. If the work is distributed among them, no single individual is likely to be overburdened.

189. Certainly—I believe there is an insistent demand from East Coast fishermen for the extension of the scheme to their coast. As a matter of fact, the work of the Fishery schools has attracted the attention of the fishermen in the States of Cochin and Travancore. A fisherman student deputed

by the Travancore Darbar is now undergoing training in the Fisheries Training Institute. I understand that the Cochin Government is about to ask the permission of the Madras Government to depute four fishermen students immediately for training in the Fisheries Training Institute.

190. (a) A curriculum for the Fishery elementary schools was recently drawn up by me. I believe it has been sent to the District Educational Council, Malabar. Suitable alterations will be made in it from time to time.

(b) The staff should be usually trained in the Fisheries Training Institute. I do not think the selection of teachers should be exclusively from among fishermen. I find that some non-fishermen teachers are turning out very fine work in some of the Fisheries elementary schools, but only such people—whatever may be their caste—who have no caste-spirit should be recruited. In the Fisheries Training Institute hostel all the students live together and a rigid observer of caste rules will not come for training. What is important is not that the teachers should belong to the fisherman caste, but that they should be inspired with a high ideal of social service. But as a rule teachers from among fishing castes are more likely to be interested in the uplift of fishermen than teachers drawn from other classes. Non-fishermen teachers generally find it somewhat difficult to move as intimately with the inhabitants of the fishing village as fishermen teachers. Occasionally this is an advantage, because in many fishing villages there are bitter factions and fishermen teachers find it very difficult to keep out of them. This evil prevails to such an extent that fishermen have put in petitions requesting that non-fishermen teachers should be sent to the schools in their villages and Muhammadan fishermen have petitioned that only Hindus should be sent to their schools. Therefore in recruiting teachers fishermen should, as a rule, be preferred, but other classes need not be rigidly excluded. It must not be supposed that non-fishermen pupil teachers will find it more difficult to pick up the technics of the industry than fishermen teachers. As a matter of fact, many of the fishermen teachers are only fishermen in name. They are "fishermen" in the sense that they are born in a caste whose ancestral occupation was fishing; not in the sense that they or their fathers were ever engaged in the industry. A good many of these "fishermen" students give agriculture as the occupation of their family. Many of them have to be taught swimming when they join the Fisheries Training Institute.

(c) The equipment in the Fisheries elementary schools does not differ much from what is generally seen in an ordinary elementary school. Some pictures, models and specimens to illustrate marine life and the fishing industry are supplied. I consider these sufficient since these elementary schools are not institutions for vocational training.

(d) The Fisheries Training Institute at Calicut was started in 1919 to provide teachers for the Fisheries elementary schools. The training of these teachers differs from that of ordinary teachers in two respects—

(i) Among the subjects which they are taught during their training course are included Zoology with special reference to marine life forms and fisheries technics which is a comprehensive subject dealing with every department of Fisheries. The principal heads in which this subject is divided are (1) the great fisheries of the world, (2) the chief food fishes and other marine animals of economic importance with special reference to India, (3) fishing craft, (4) fishing tackle, (5) fish food industries—fish-curing, fish canning, fish refrigeration, etc., (6) fisheries by-products, oil, guano, fish meal, etc., (7) pisciculture, (8) fisheries research, (9) fisheries legislation, (10) fish in relation to health, hygiene and sanitation, (11) fisheries economics.

(ii) These teachers are trained not only in teaching work but also in general social service. They are taught the elements of economics, co-operation, sanitation, temperance work, etc.

So far as circumstances permit, the training is made as efficient as possible. I say "so far as circumstances permit" because for the teaching of fisheries technics our apparatus is, as yet, very rudimentary. But this is being gradually improved. In the meanwhile we are doing the best we can. The students are taken out regularly for fishing work. They are taught to cure fish in the neighbouring fish-curing yard. They are taken

to Tanur to learn improved methods of fish-curing, and also oil and guano work, the smoking and mealing of fish, etc.; in the Institute workshop they are taught how to carry out simple repairs to boats.

I hope it will be clear from the above description that teachers trained in the Fisheries Training Institute are likely to turn out better teachers of fishermen children than those trained in ordinary training schools.

But it must be admitted that the training of teachers in the Fisheries Training Institute also suffers from certain defects. The most important of these defects is that as a training school the Fisheries Training Institute is not as well equipped as most Government training schools. Of course if some more money is spent, it could be made as well equipped as any other training school. But the difficulty is that the number of trained teachers sent out of the Fisheries Training Institute every year is very small, generally about a dozen. The number admitted in an ordinary training school class is 40. Therefore the cost of training a pupil teacher in the Fisheries Training Institute is about three times the cost of training in an ordinary training school. The reluctance of the Government to spend as much money on the training of 12 teachers as on the training of 40 is therefore natural and intelligible. The smallness of the number annually trained is not due to any difficulty in training them but to the difficulty of finding them employment after training. Teachers trained in ordinary training schools can get employed in any elementary school—as there are about 3,000 of them in this district alone. Our teachers with their specialized fisheries training can get employed only in the fisheries schools under the management of this department. When Sir Frederick Nicholson organized this system of fishermen's education he expected that eight new elementary schools would be started by the department every year. Therefore he thought that for many years to come the Fisheries Training Institute would have to turn out 30 or 40 trained teachers per annum to supply teachers to the new schools. But this part of the scheme has not been carried out; in some years only one or two new schools are started. Hence admission to the Fisheries Training Institute has to be restricted.

There appears also to be another difficulty in training teachers in the Fisheries Training Institute. Sir Frederick Nicholson's idea was to take pupil teachers from all parts of the Presidency and train them in the Fisheries Training Institute. He overlooked the language difficulty. It is possible to teach fisheries technics to students from all parts of the Presidency at Calicut, but to give them a teacher's training in a language area different from their own is an impossibility. On the other hand, to have Fisheries Training Institute in each language area would be quadrupling the cost of training fisheries teachers, which, as I said, appears to be already excessive. Thus fishermen in South Kanara want a Fisheries Institute at Mangalore. The maximum number of suitable candidates we have been able to get from South Kanara in a year has never exceeded four. If the Government open a Fisheries Training Institute at Mangalore to train four candidates, the cost would be practically the same as that of the Fisheries Training Institute at Calicut. To avoid this, what is now done is to send the South Kanara candidates for two years' course in the ordinary Higher Elementary Training School at Mangalore and then take them to Calicut for one year's special training in fisheries and socio-economic subjects at the Fisheries Training Institute. The question is naturally asked why if such a system suits the Kanarese fishermen teachers, a similar system will not do for the Malayali fishermen teachers.

There are three courses of action open to us: (1) The ideal thing would be to have Fisheries Training Institutes in each language area in which there are Fisheries schools. But at present the cost would be prohibitive. (2) An alternative is the present system which, as pointed out above, benefits the Malayali fishermen most—Malayalis being trained for full three years in the Fisheries Training Institute and non-Malayalis only for one year after they have completed the usual two years' training in an ordinary training school. (3) Still another alternative—to avoid showing a partiality to Malayalis—is to get all Fisheries teachers, Malayalis as well as non-Malayalis, trained for two years in ordinary training schools and then send them for the extra fisheries training to the Fisheries Training Institute at Calicut. In this case I feel that one year's extra training at the Fisheries

Training Institute would not be enough. It ought to be extended to two years. I was personally not at all satisfied with the one year's training even at the Fisheries Training Institute to our Kanarese teachers though most of them passed the final examination. If the course could be extended four years, I think the third alternative preferable to the second.

This training for four years would on the whole be cheaper to the department than the present training for three years and I think it would be equally efficient. It would be cheaper because as these pupil teachers could be attending ordinary training schools they would naturally be paid stipends by the Educational Department and thus the Fisheries budget would have to provide for their stipends for two years only instead of for three years as now. Moreover if teacher's training be altogether removed from the Fisheries Training Institute the staff could be reduced and thus some reduction of the present expenditure effected. As regards efficiency I think Fisheries teachers will lose nothing but gain considerably by coming to contact with non-fishermen teachers and non-fisheries educational institutions.

A question that is now under the consideration of the department is the raising of the Fisheries Training Institute to the grade of a secondary training school. When the Fisheries Training Institute was first started by Sir Frederick Nicholson laid down clearly that it should train men of the secondary grade also. But at that time no fishermen candidates of that grade were forthcoming and hence the Fisheries Training Institute was recognized by the Educational Department as a training school of the higher elementary grade. Recently, however, S.S.L.C. holding students have been admitted. There are now eight of them in the Fisheries Training Institute. They are now (i.e., since the beginning of this year) regularly taught all subjects laid down in the scheme of training for secondary grade teachers, but they cannot appear for the Secondary Grade Teachers' Examination because the Fisheries Training Institute is only a higher elementary training school. At the same time secondary trained teachers are badly needed in Fisheries higher elementary schools. At present ordinary trained secondary teachers are appointed as headmasters of the Fisheries higher elementary schools. It is in the bigger schools that we particularly require fisheries trained headmaster; yet now it is in such schools that we are compelled to appoint non-fisheries trained men. There are only two ways out of the difficulty. One is to raise the Fisheries Training Institute to the secondary grade. This means more expenditure. The other way is the third alternative suggested above. That is, to remove all teachers' training of a technical nature from the Fisheries Training Institute which will concentrate on fisheries training and socio-economics. Then these secondary grade teachers can go to an ordinary secondary grade training school for two years and after completing that course be placed in the special Fisheries Training Institute for another two years.

Another subject that is now engaging the attention of the Government is the training of the subordinate officers of the Fisheries Department in the Fisheries Training Institute. It seems that the lack of some such training is badly felt. They will of course require only technical training in fisheries. One full year's training would, I think, be sufficient. But to train them efficiently the Fisheries Training Institute should be considerably strengthened on the technical side. The following would be the chief additional requirements:—

(1) Demonstration plants for canning, refrigeration, oil and guano work, manufacture of fish meal and apparatus for smoking fish. I have already submitted proposals to the Director to provide the most important of these. They are required for the effective teaching of fisheries technics even to our teachers.

(2) A fairly large tank for practical work in pisciculture.

(3) A large sized fishing boat fitted with a detachable motor engine.

(4) The work in the Fisheries Training Institute should be closely associated with the work of the Research Assistants on the West Coast. This can be easily effected without much extra cost. For instance, there is a Research Assistant now carrying on biological research at Westhill,

about 10 furlongs north of the Fisheries Training Institute. If accommodation is provided for his laboratory and office in the Fisheries Training Institute building, he can work as well there as in the place where he is now stationed. Similarly there is a Research Assistant at Tanur who is expected to carry on chemical research. If a separate manager is appointed for the Tanur experimental station he could work at Calicut. As a matter of fact, I think his researches would then get on much better, because he would not have his attention distracted by the commercial needs of the Tanur factory. Research and administration should be always kept separate. The presence of these Research officers in the Fisheries Training Institute would be of immense help to the students in the Fisheries Training Institute as they would be put in touch with the latest developments in fisheries science.

191 & 192. I do not think there would be a steady number of students offering themselves for technological training in fisheries. Agriculture is a much better developed industry in India than fisheries. It is in the hands of men, richer, more educated and of higher social status than fishermen generally are. Yet we find that when the Government opened two Agricultural middle schools in this Presidency, one of them had to be closed for want of students and to keep the other going, I understand, the officers of the Agricultural Department have to put forth Herculean efforts to get students. Students trained in these Agricultural schools are wandering about looking for jobs. The condition of men trained in fisheries technology would be worse. The fact is that the fishing industry and the connected food-preservation and by-products industries are carried on generally by the poor who are not in a position to keep well-paid managers or foremen. They themselves are their own managers and their own foremen. Of course, the case would be different if rich men belonging to the community would send their sons for such training. Then they could start factories of their own. But as things stand at present, the rich men prefer to send their sons to the high schools and the colleges for a mere literary education.

But there may be somewhat rare instances of men coming forward for technological training. I suppose most of them would be the sons of rich men who find it difficult to pass the school and college examinations, and who have had to stop their education half way. Such men may be provided for by existing institutions. If they wish to get an all-round knowledge of fisheries they might undergo a year's course in the Fisheries Training Institute like that suggested for the subordinates of the department. Or if, as is more probable, they wish to study some particular industry connected with fisheries, they might be taken as apprentices at Tanur or at Chaliyam (if it is decided to re-open the factory there).

204. I would draw the attention of the Committee to this question only so far as it relates to the Fisheries Training Institute.

It seems to me that the pay now given to most of the members of the Fisheries Training Institute staff is very inadequate. I shall deal with the cases of the different members one by one—

(1) *The Headmaster.*—The present scale of salary is Rs. 75—5—100—10—150. In other sections of the Fisheries Department the pay of the members of the subordinate service is Rs. 70—5—100—10—250. In the subordinate service of the Education Department the pay is Rs. 75—5—100—10—150—10—250. Therefore compared with the scale of salary in force in the Fisheries Department as well as that in the Education Department, the salary fixed for the Headmaster must be considered to be inadequate.

But really the work of the Headmaster in the Fisheries Training Institute is much more arduous and one that demands much greater initiative than work in an ordinary school under the Education Department. He has to do all the work, teaching as well as supervision that a Headmaster does in an ordinary school and in addition teaching the special fisheries and the socio-economic subjects. Moreover, this school is the first of its kind in India and the only one at the present time. The Headmaster has also frequently to act as a sort of advisor to the department on all sorts of educational questions. Naturally therefore the work of the headmaster is much harder than in an ordinary school where everything has long been reduced to a routine. Moreover, in big departments like that of Education the chances for men in the subordinate service to be promoted to the

etted rank are much more numerous than in very small departments. Fisheries where the number of higher posts is limited. In the Education Department the Headmasters of schools for special education like the Government Commercial School at Calicut are paid at a special rate. The scale of pay of the Headmaster of the Government Commercial School is Rs. 200—10—300. It is suggested that a similar scale may be fixed for the Headmaster of the Government Fisheries Training Institute.

(2) *Graduate Assistants.*—At present there is only one such assistant. The school is raised to the secondary grade, one more B.A., L.T. assistant will be required. The present L.T. assistant, who is a Mukkuvaherman graduate, gets a pay of Rs. 75—5—100. There is no prospect of any promotion for him after he reaches the maximum in this scale. I would therefore suggest that the graduate assistant or assistants in the Fisheries Training Institute should be paid the scale generally allowed in the subordinate service of the Education Department, viz., Rs. 75—5—100—150—10—250.

(3) *Secondary grade Assistants.*—At present these assistants are paid the same rate as in the Educational Department, viz., Rs. 35—1½—50—160. But in the Fisheries Training Institute they may suffer from the disadvantage that all their prospects end at Rs. 60 whereas in the Education Department at least some of the men in this grade may expect to be promoted as junior deputy inspectors whose pay is Rs. 50—2½—75. In the Fisheries Department the sub-inspectors of fish-curing yards, most of whom are S.S.L.C. holders or Intermediates, go up to Rs. 80. But S.S.L.C. and Intermediate teachers are penalised for their extra training and have to stop at Rs. 60. This acts very detrimentally to the interests of the Fisheries Training Institute because capable teachers try to get transferred to other sections of the Fisheries Department so that they may get better prospects. The Fisheries Training Institute thus lost one of its best teachers this year. He is now Head clerk in the office of the Assistant Director of Fisheries (Coast), Calicut, where his starting salary is the maximum he would have got in the Fisheries Training Institute if he had remained here till 1939 or thereabouts. Therefore I would suggest for all secondary grade teachers in the Fisheries Training Institute a salary of Rs. 40—2—60—1—100.

(4) *Carpentry Instructor.*—The scale of salary now in force in the Education Department is Rs. 40—4—60. Our carpentry instructor is paid Rs. 25—1—50. The injustice is patent.

(5) *The Drill Master.*—The usual scale in the Education Department is Rs. 25—1—50. The scale here is Rs. 25—1—35. This drill master is also doing the work of a clerk here. The usual clerk's pay is Rs. 35—1½—50—1—60. But he is not an S.S.L.C. Still considering the work he does, I would suggest that a special scale of Rs. 30—1—55 may be given to him.

If most of the members of the staff are underpaid like this, there is sure to be a want of enthusiasm for the work. This is bad for any school but especially for the Fisheries Training Institute which, as a pioneer institution, demands enthusiasm and initiative.



Handwritten notes and signatures in the right margin. At the top right, there is a signature 'R'. Below it, the number '122,321' is written. At the bottom right, the date '1/29/39' is written.