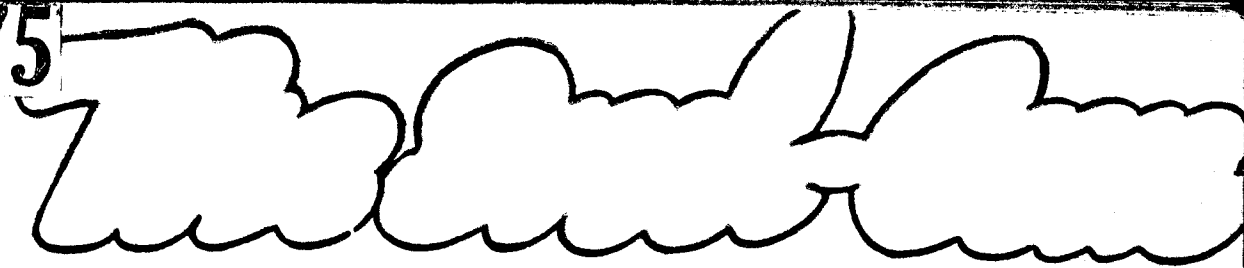


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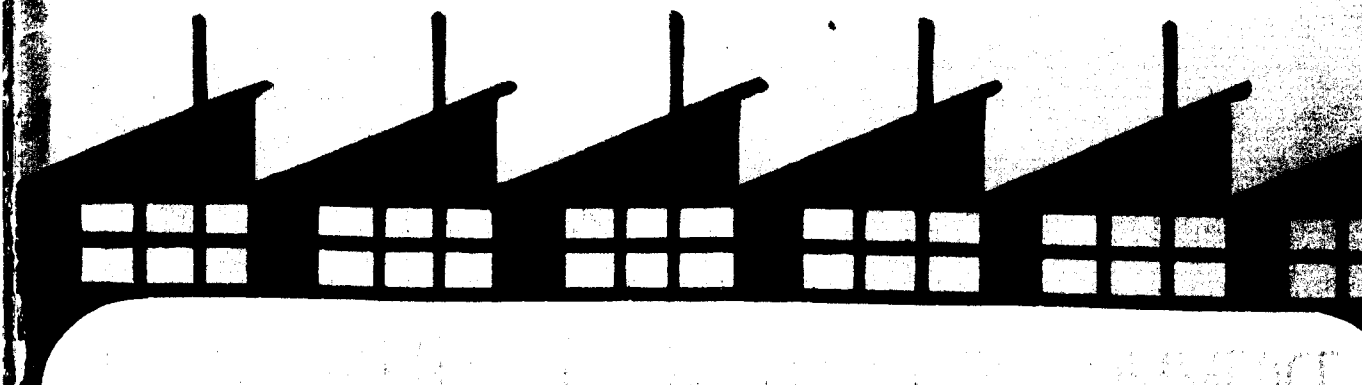
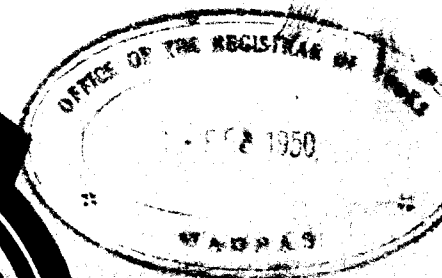
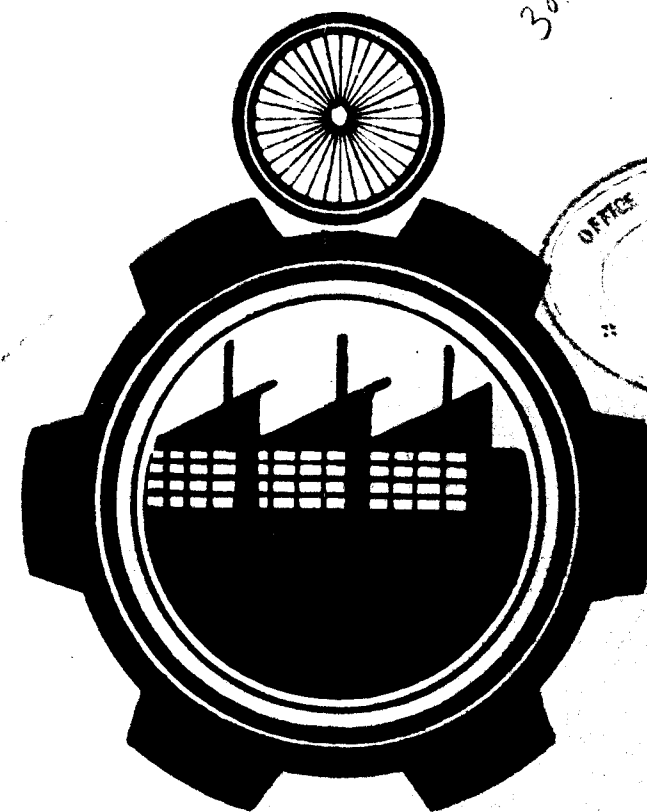


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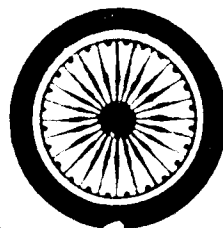
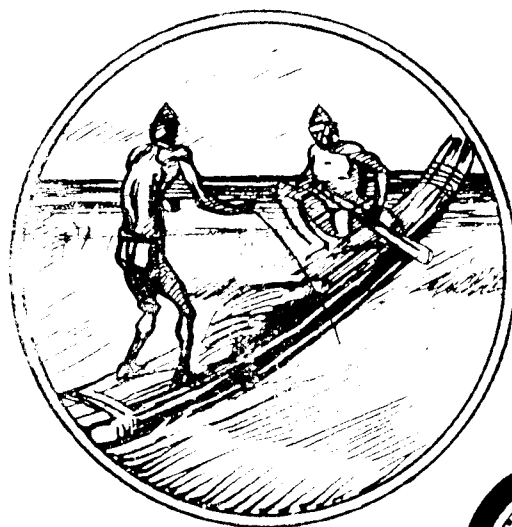
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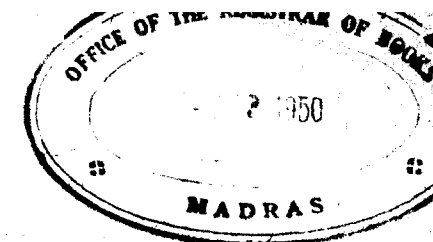


IND-COM JOURNAL



DEPT. OF INDUSTRIES & COMMERCE

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The Ind-Com Journal
Wishes all its readers Health and
Happiness Throughout the **NEW YEAR**

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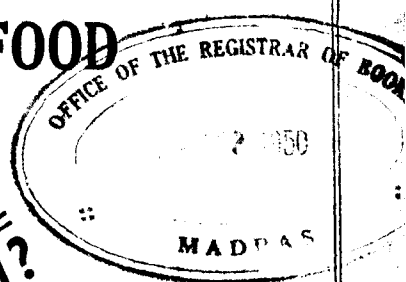
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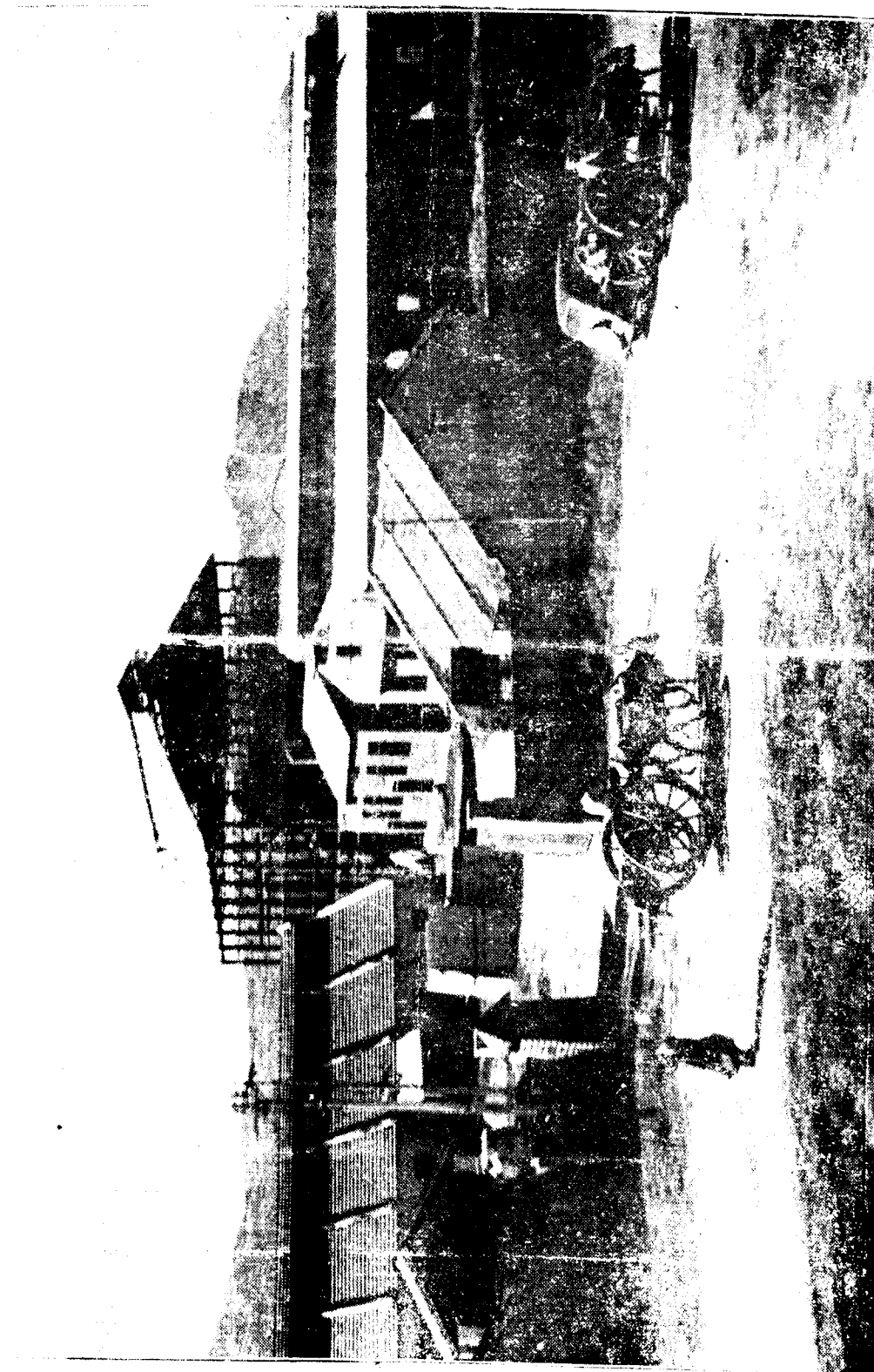
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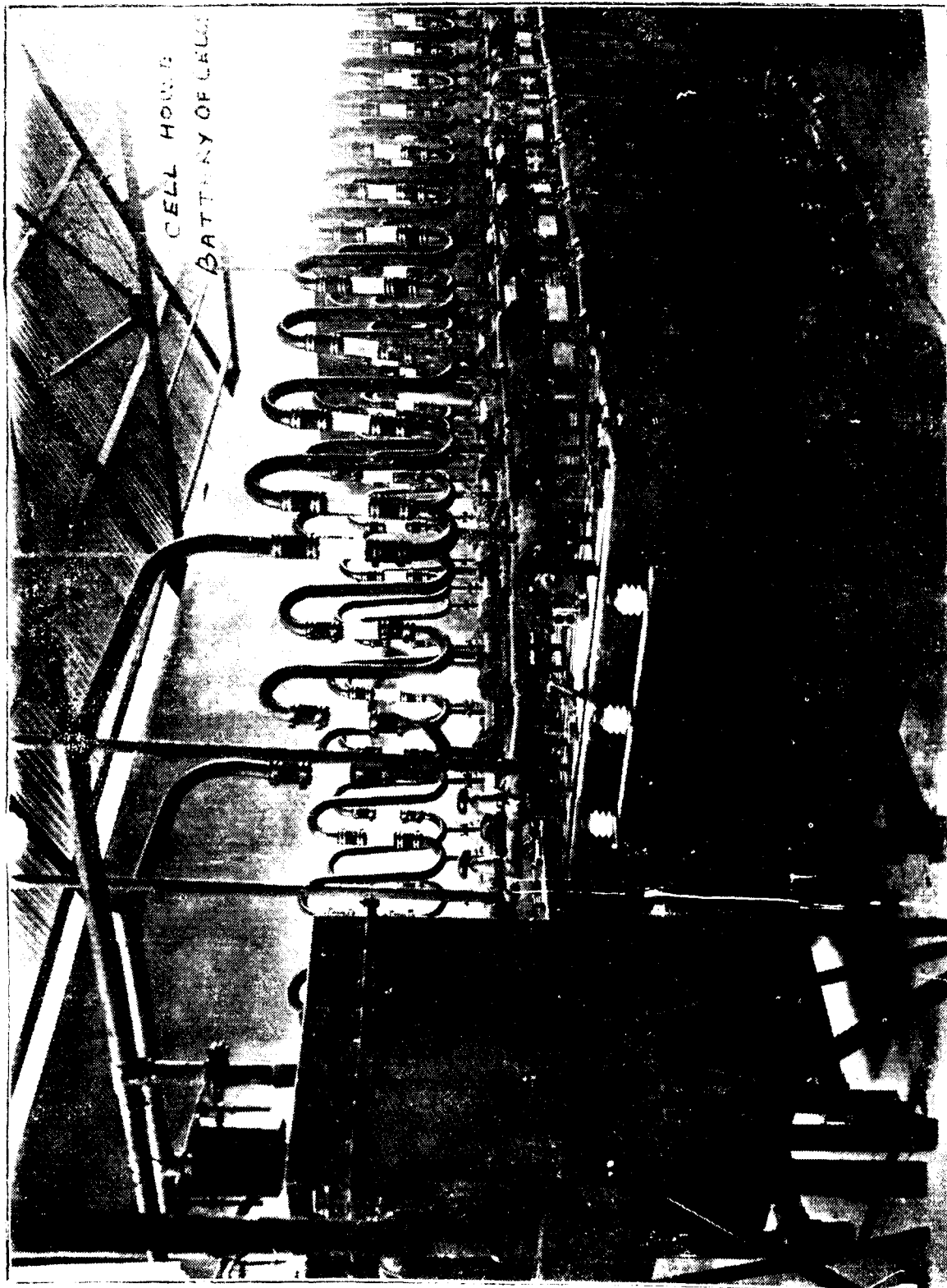
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VANASPATI MANUFACTURE IN MADRAS—A SURVEY

By SRI V. DATTATREYAN, B.E.,
Deputy DIRECTOR (General)

Oils and fats are essential constituents of human food. The Nutrition Advisory Committee of the Indian Research Fund Association has recommended a per capita consumption of 45½ lbs. of oils and fats. The requirements of the Indian Union alone, reckoned on the above basis, works out to about 54,00,000 tons and of the Madras Province 9,00,000 tons.

2. Oils and fats also constitute the basic raw materials for the manufacture of such essential commodities as soap, paints and varnishes, etc. Groundnut oil has been used as fuel in place of diesel oil during war time. Castor oil finds use as a component of high grade lubricants and brake-fluid.

3. Of the oilseeds grown in the province, groundnuts constitute by far the bulk, the average annual production being of the order of 16,00,000 tons of unshelled groundnuts. With the existing methods of extraction, the yield of oil from groundnuts works out to about 5,00,000 tons per annum. Groundnuts alone are therefore capable of meeting over 50% of the oil and fat requirements of the people of this province. If the high production figures attained in 1937-38 and 1944-45 (20,00,000) tons are more commonly realised and if solvent extraction methods are employed to treat the cake produced in expellers and make it yield up all its residual oil content, groundnuts can meet the entire oil requirements of this province for human consumption namely 9,00,000 tons.

4. If we turn our attention to the utilisation of the groundnut grown in this province we find that the bulk of the ground-

nuts produced in this province (50-60%) was being exported outside the country during pre-war days. Apart from the colossal direct loss in food which this constituted, it has to be pointed out that there was also an equally big indirect loss in as much as the groundnut cake which accounts for more than 50% of the weight of kernel went to fertilise the lands of France, the Netherlands, Germany and Italy instead of serving to enrich the impoverished soil of our own country. Groundnut cake could also be utilised to feed the semi-starved cattle of this country. There was also the further indirect drain of wealth constituted by the loss of opportunities for employment of the people of this province in industries for the milling of the oil seed and the refining and hydrogenation of the oil extracted from the seed. It is only since the rise of the national liberation movement that our countrymen have awakened to this huge drain of the wealth of this land and conscious attempts have been made to prevent it. It is in the light of the above that the importance of the development of oil milling, refining and hydrogenation industries has to be assessed.

5. The Oil extracted by milling of the groundnut kernel is not as fit for edible purposes direct as for example, the oil extracted from gingelly or copra. Further, the raw groundnut oil invariably contains small amounts of free fatty acids which detract from the keeping qualities of the oil and render it liable to turn rancid rapidly. The oil refining process consists essentially of neutralising the free fatty acids found in groundnut oil and their elimination. The

resultant oil after being subjected to further treatment with superheated steam is rendered completely free of any unpleasant odours associated with the raw groundnut oil and keeps well for appreciable periods without turning rancid. For all ordinary purposes, the process described briefly above is all that is needed to render groundnut oil edible.

6. The production of ghee and butter in India has been estimated to be about 7,00,000 tons per annum, which works out to a per capita consumption of only 7 lbs. Apart from the inadequacy of the production of butter and ghee, the price of these commodities is such as to keep it out of reach of the bulk of our countrymen with the low standard of living conditions prevalent in this country. Thanks to a process perfected in Western countries, it has been found that a product closely resembling ghee or butter could be manufactured from groundnut oil and cotton seed oil by the catalytic hydrogenation of these oils. The resulting product has only to be fortified with certain vitamins to render them as nutritious as butter and ghee and withal the cost of production is low enough to bring the product within the reach of a greater proportion of the people of this country who cannot afford to consume either ghee or butter. This in essence is the case for Vanaspati as the hydrogenated groundnut oil resembling ghee is termed.

7. To prevent mis-use of Vanaspati to adulterate with ghee, the Government of India are taking the following measures:

(i) Colouration of Vanaspati to enable people to distinguish it easily from ghee.

(ii) Addition of a small percentage of gingelly oil to the oil mixture from which Vanaspati is made to enable detection of Vanaspati in any product which has been adulterated with it.

8. The incentive for the development of the Vanaspati industry in this province first arose during the recent war-period. Of the principal Margarine manufacturing countries in Europe, Germany and Italy

were enemy countries and the industries of France and Netherlands also fell under the control of the Axis Powers. The industries in the United Kingdom were disorganised, if not put out of action, by air-raids, and war-time restrictions in shipping made it difficult both to export groundnut kernels from this country to United Kingdom and to import margarine from United Kingdom to this country to meet the requirements of armed forces stationed here and in the neighbouring theatres of war. All these factors made it imperative in the interests of the successful prosecution of the war by the allied powers to develop the production of margarine and vanaspati in this country itself. The Central Government and the Government of Madras therefore gave every encouragement to industrialists to establish factories for the production of vanaspati and/or margarine in this country in general and in the Madras Province in particular in view of its importance as a grower of groundnuts. A plan was accordingly drawn up for the establishment in this province of eight Vanaspati manufacturing plants, six of 10 tons daily production capacity and two of 20 tons daily production capacity. Of the former six, one was proposed to be erected by the Government of Madras themselves at Calicut. There were already in existence, two factories for the production of Vanaspati, one at Mettur and the other at Madras. The total production of Vanaspati in all the factories, both existing and proposed, was estimated to be 35,400 tons per annum. The erection of two additional plants, not contemplated in the plan referred to above, one of 40 tons daily production capacity by Messrs. Tungabhadra Industries at Kurnool and the second of 20 tons daily production capacity by Messrs. Mettur Chemical and Industrial Corporation Ltd., at Trichy, increased the total production capacity of the province for Vanaspati to 53,400 tons.

9. All the additional factories contemplated in the Government sponsored scheme and one of the two then-existing factories have a certain amount of production capacity for oil refining over and above that required for Vanaspati manufacture. The total capacity

for additional refined oil production when all the above mentioned factories are producing Vanaspati to full capacity is 12,000 tons. Besides the Vanaspati factories mentioned above, there are several other plants established in this province for manufacturing refined vegetable oil alone. The total production capacity of both the Vanaspati and Oil Refining Factories existing and in the process of construction is 53,400 tons of Vanaspati and about 30,000 tons of refined oil. This roughly takes care of about one-sixth of the groundnut out of this province.

10. Due to the cessation of the war in 1945, the priority which the proposed new factories might have claimed and received in the supply of machinery and equipment lapsed and the suppliers of machinery in United Kingdom failed to deliver the goods within the period promised by them originally. The onset of economic crisis in this country also made it difficult for the promoters of the new companies to collect the necessary share capital. Shortages in iron and steel materials, cement,

etc., further added to the difficulties of the new Vanaspati companies as of every other new industry. The net result of all the above-mentioned factors is that only two new factories have actually gone into production to-date and the other factories including the one being established by the Provincial Government are in various stages of construction.

The Provincial Government has very generously come to the assistance of the Vanaspati Factories sponsored by it and four of the new units have been granted financial assistance in the form of loans under the Madras State Aid to Industries Act—the total amount of aid sanctioned being Rs. 29,50,000. Assistance has also been given to all the companies in securing their requirements of construction materials, priority in the supply of railway wagons for transport of construction materials, machinery and equipment to the factory site, supply of electric power, supply of boring sets for putting down tube wells etc. All the new factories are expected to go into production early in 1950.

NECESSITY FOR TECHNOLOGICAL ADVANCE

"Lack of technical advance weakened countries. This is very true of India, which at one time had a highly developed civilisation, but because it fell back in the technological field, the country ultimately became colonial domain.

It is most important, not only that our country should advance along known technological lines, but that our technicians should show initiative, and add to the existing fund of knowledge.

In the India of the future, there would be more opportunities for the technological expert.

Strive to attain the highest standards and not merely aim at second best.

We have to build up a great and strong India. Sometimes people are apt to dwell too much upon India's past greatness. That is not the correct outlook.

We must fight against stagnation in every shape or form. We must develop our own language. We must perfect our sciences, and learn the most modern technique. Only in that way can India be developed into a country of the first rank."

PUNDIT JAWAHARLAL NEHRU

VANASPATI RESEARCH COMMITTEE'S REPORT

The Place of Ghee in India's Rural Economy

SHOULD GROUNDNUT-CAKE BE MIXED WITH ATTA

The Vanaspathi Research Planning Committee has made a negative recommendation, namely that vanaspathi is not harmful to the human system. The Committee gave the following considered opinion:—

"In comparative feeding experiments carried out, at four different research centres, on rats for three generations with raw groundnut oil, refined groundnut oil and vanaspathi of melting points 37°C and 41°C., the results indicate that there is no deleterious effect produced by vanaspathi as compared with the raw or refined oil."

In the light of the results obtained on short-term human metabolism experiments and long-term human feeding experiments carried out at different orphanages, the Committee came to the following conclusion:

"Human feeding trials carried out at four different centres also indicate that vanaspathi of melting point 37°C has no harmful effect as compared with raw groundnut oil."

While the above conclusions were reached it was considered by the Committee necessary to study in detail the results obtained in the

different series of experiments in which different oil and fat supplements were used in the diet of the rats. Any conclusion in respect of the relative nutritive values of the different fats when fed along with

different diets was not possible unless the data were statistically examined. The Committee, therefore, recommended that all the data should be sent as soon as possible to the Director of the All-India Institute of Hygiene and Public Health, Calcutta, to have it statistically analysed and to have the results submitted by

Mar. 31, 1950.

A Cottage Industry

The opponents of vanaspathi stress another aspect of this problem. Milk-ghee and oil pressing are largely cottage industries in India, supporting millions of people in India's villages. Ghee making forms an integral part of the stock-rearing system of farming followed in India and a little less than half of the total production of milk in this country is converted into ghee. There are reasons for this widespread production and consumption. Firstly, in a tropical country like India, the preparation of

ghee is the only rational method of preserving milk fat without deterioration for long periods. Secondly in rural areas, where facilities for the sale of fluid milk and its products are wanting, the cultivators have to convert milk into ghee in order to supplement their income by its sale.

Three points emerge. Firstly, just as racing is an incentive to horse-breeding, ghee production is an incentive to cattle-breeding. Secondly, as indicated above, ghee production is the only means of preserving milk-fat without deterioration. Thirdly ghee production enables the village cultivator to add to his income.

The consumption of ghee is confined to the Punjab, United Provinces and Rajputana. Let the figures speak. The Government's marketing survey of India published in 1947 gives the following figures of ghee production and its *per capita* consumption in undivided India:—

Province	Production per square mile In Maunds	Per capita consumption in seers (annual)
Assam	0.8	0.1
Bengal	7.3	0.5
Bihar	10.8	0.3
Bombay	6.7	0.1
Central Provinces	4.7	0.3
Madras	10.8	0.5
Orissa	3.0	0.5
Punjab	22.3	3.0
United Provinces	13.3	1.3

It will be thus seen that Punjab consumes the largest quantity of ghee, followed by the United Provinces. The average consumption in Madras, Orissa and Bengal is 0.5 seer a year, followed by Bihar and Central Provinces, 0.3 seer a year and Assam and Bombay 0.1 seer a year. For centuries people outside the Punjab and the United Provinces have lived on vegetable oils, mustard oil, groundnut oil and Til oil.



George Washington Carver

The Wizard Of The Groundnut

By Sri J. B. SUBRAMANIAM

One, perhaps, in a million children born is a potential genius. Given the opportunity and the training, the latent talent flowers into accomplishments and enriches all humanity. But once or twice in a century the spirit within the child is strong enough to overcome every possible handicap of birth and environment.

One of the few such beings that the nineteenth century produced was George Washington Carver. Born in 1860 with a black face in a region where the Negro was considered of less account than a white man's dog, he yet became world famous as a scientist and benefactor of his race.

Whilst yet a baby, he was left an orphan when his mother was carried off by a marauding band of slavers from the South. He

never heard of her again. He was brought up by his mother's employers Moses and Susan Carver, abolitionists both, and childless to boot, who treated the orphan as their own son. While still a child, his "green fingers" became famous for miles around. Some strange power within enabled him to divine the needs of growing plants and to cure their ailments.

As he grew older, his spirit began to chafe at the bonds imposed by the backwoods community in which he lived. When the village school could teach him no more, he determined to continue his education elsewhere. His foster parents were too

poor to help, so he was forced to make his own way in the world. And now for the first time, he learned what it is to have a black skin in a world dominated by whites. Many institutions of learning were closed to him; others offered a grudging welcome. And all the while he had to support himself by working in his spare time.

State Trading

State trading is a large scale operation and in theory it may be true that when the State becomes a monopoly purchaser it can make better bargains, level out price-fluctuations, eliminate speculation and abolish merchant's profits. It also enables the State by its grip on imports to direct and control every aspect of the national economy.

Hon'ble Pundit Nehru

Gradually his ambitions crystallized. He would become an artist. He managed to get himself enrolled in the art class of Simpson College, Iowa, paying his way by doing his fellow students' laundry.

Carver was happy in the art school. Its students and teachers showed no trace of the colour prejudice that his sensitive nature felt so bitterly. But he could not forget the wide social gulf between the white man and the

black. Little by little he came to believe that his life must be devoted to the betterment of his own people.

And so, in the final year of his studies, he made the greatest sacrifice an artist can make. He gave up painting. The reason was simple; he had decided that he could best serve his people in another sphere. Remembering the "green fingers" of his youth, he decided to become a botanist. It meant starting all over again, but eventually he qualified, and after a little teaching experience, went to Tuskegee, a newly opened institution that aimed to help in the rehabilitation of the wretched Negro share-croppers of the south.

In the beginning, Tuskegee had almost nothing. There were no buildings, no equipment; the very land was uncleared. For the first few months the staff and pupils literally did not know where their next meal was coming from. Gradually the land was cleared and farming operations begun. Then the food supply at least was assured. One by one the necessary buildings were erected. No one could ever say that Tuskegee graduates were not practical men. They built up the college almost with their bare hands.

One of the first buildings to be completed was a laboratory for Professor Carver. Equipment for it was, of course, almost non-existent. Carver collected junk and made his needs from it. The total appropriation for laboratory equipment in the early days was about Rs. 16 a term! And yet, from the professor's fantastic collections of old bottles and other discarded trifles, came the first of the discoveries that were to make him famous.

The clearing of its forests and their replacement by continuous crops of cotton, had turned large areas of the South practically into a desert. The sandy, impoverished soil that remained, crumbled to powder in the hot summer and blew away with every puff of wind. Yet the share-croppers continued to plant cotton every year, only to be rewarded by worse and worse crops.

It did not take Carver long to realise that the groundnut offered an ideal solution to the farmers' troubles. It is a legume—a species that actually increases the fertility of the soil in which it is grown. And it thrives on the infertile sand that cotton had left of the rich natural earth.

But Carver also saw that it was no use persuading people to grow groundnuts unless there was a market for them. Of course a tremendous quantity of groundnut oil is now used for making margarine and shortening—foods essentially similar to our own *Vanaspati*—but Carver dreamed of growing

try could absorb them. And so he set to work to create the necessary demand.

Product after product began to come from his laboratory—more than 300 of them in all—and each one derived from the groundnut. He toured the countryside with a demonstration waggon showing farmers how to make the best use of their land. And he addressed meetings all over the United States, explaining his ideas to manufacturers and businessmen.

He wanted nothing for himself. The proceeds of his patents were entirely devoted to the welfare of Tuskegee, which he watched through the years grow into one of the finest colleges of its kind in the world. Eventually he became its Principal.

Carver's fame quickly spread beyond the confines of the United States. From every corner of the globe came requests for his advice and assistance. Gandhiji sent an emissary to ask how the groundnuts could be used to solve India's food problem.

It was a favourite remark of Dr. Carver's that, between them, the groundnut and the sweet potato contained everything essential to human existence. In addition to the 300 products from the former, he obtained no less than 118 from the latter. Conditions are favourable for the cultivation of these vegetables over wide areas in India and Pakistan. Carver's discoveries deserve far deeper investigation by our own scientists than they have had hitherto. Perhaps, in them may lie the key to the food problem that today menaces our future.

Before his death in 1943, Carver became one of the world's leading men of science. The United States Government honoured him by issuing a postage stamp bearing his effigy. But postage stamps and statues cannot measure the true glory of this great American. His real memorial lies in the green fields where he laboured so long, and the love and respect that remains in millions of hearts all over the world.

NEWS & VIEWS

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BORE WELLS.

NOTEWORTHY SUCCESSFUL BORINGS COMPLETED BY THE INDUSTRIES DEPARTMENT.

South Arcot District

Cuddalore Taluk.—In a 6" ground boring put down to a depth of 140'-0" from Ground level, good springs have been tapped at 140' giving a discharge of 19,200 gallons per hour. The approximate cost of boring is Rs. 940.

In a 6" ground boring put down to a depth of 81" good springs were tapped giving a discharge of 10,800 gallons per hour. The water level in the well was 9' below ground level and the approximate cost of boring was Rs. 566.

Vriddachalam Taluk

(i) In a 6" ground boring, put down to a depth of 505' by a Power drill under the 20 artesian bore wells scheme sanctioned by the Government, good artesian springs were tapped between 500 and 505'. The

water from the well overflows 5'-7½" above ground level at the rate of 48,000 gallons per hour. The approximate cost of boring is Rs. 6,700 and an extent of 80 acres of land will be irrigated under this well.

(ii) In a 6" ground boring put down in the same Taluk and under the same Government scheme, good artesian springs were tapped between 380' to 392' below ground level as a result of which the water level rose to 8' above Ground level. The water overflows at the rate of 27,000 gallons per hour. The approximate cost of the boring is Rs. 5,700 and 60 acres of dry land will be benefited.

(iii) In a 6" boring put down in Kottagam village, good artesian springs have been tapped recently under the 20 bore wells scheme. The well gives a discharge of 38,000 gallons per hour and the extent of land that will be benefited is about 60-100 acres.

In a 6" boring put down to a depth of 193' good artesian springs were tapped at 77' and 193'. Water from the well overflows 9'-10" above ground level at the rate of 48,000 gallons per hour. The approximate cost of borings is Rs. 2,625 and an extent of 60 acres of land will be irrigated by this well.

II. Chingleput District.—Ponneri Taluk

(i) In a 6" boring put down in a 14' diameter well to a depth of 85' good springs were tapped. As a result the water level in the well rose by 13'. The well gives a discharge of 19,200 gall. per hour. The approximate cost of boring is Rs. 770 and an extent of 15 acres of land will be benefited.

(ii) In a 6" boring put down in a 15' diameter well to a depth of 85'-3" good springs were tapped, as a result of which the water level rose by 13'. The well

given a discharge of 10,800 gallons per hour. The approximate cost of boring is Rs. 635 and an extent of 5 acres under the command of this well will be benefited.

(iii) In a 6" boring put down in a 15'-6" diameter well to a depth of 85' good springs were tapped at 82'-6" from ground level. The well gives a discharge of 19,200 gallons per hour. The approximate cost of boring is about Rs. 807 and an extent of 5 acres of land under the command of this well will be benefited.

JAGGERY MANUFACTURE IN ERODE TALUK

Govt's Permission

The manufacture of jaggery out of coconut palm trees is a century old cottage industry of the Coimbatore District, which has very few palmyrah trees, and over 20,000 families flourished on this industry. Due to Prohibition, the discontinuance of this cottage industry, which provided employment throughout the year for thousands of families, meant great hardship to these families, unemployment for more than six months a year.

The Madras Government has passed orders permitting the manufacture of coconut palm jaggery in Erode Taluk, Coimbatore District, following the persistent representations made by thousands of ex-tappers of the District.

Census of small industries

Government has decided to take a census of small industries. The census is to be confined to associated activities, where more than one person are regularly engaged in the production of articles for sale. Small mines, not covered by the Indian Mines Act, will be included as also cottage industries.

The census will include all active looms, small mines and industrial establishments with less than 10 workers.

NO SHORTAGE IN TEXTILES

Dr. Mukherji's reply to Assembly question

There is no shortage of cotton textiles in the country at present and on the other

there has been a welcome increase in exports, said The Hon'ble Dr. S. P. Mukherji, Minister for Industry and Supply, on Dec. 6 in the Central Assembly in reply to Mr. Sidhwa.

Giving the stock figures of October 49, he said that the Bombay mills held about 67,000 bales of cloth and Ahmedabad Mills about 81,500 bales of cloth.

The stocks in the mills all over India were 2,76,000 bales.

It was estimated that superfine cloth constituted about 14 per cent of the stocks held in Bombay and 18 per cent held at Ahmedabad.

Since July 18, 1949, imports of cotton fabrics and cotton yarn had been completely stopped, except in respect of commitments made before that date.

The total value of imported cloth between July 1948 and September 1949 was yarn Rs. 5,93,85,000 and cloth Rs. 2,59,33,000; mixed fabric Rs. 68,000.

The internal off-take was low because the prices were higher than the consumers were prepared to pay. The monthly average of exports now was about 755 million yards.

In reply to Pundit Kunzru, he said there was a general complaint that the prices were high and the price structure was examined by the Tariff Board.

The demand for handloom cloth abroad was very small now. It was definitely the policy of the Government to stop the import of foreign cloth, he added.

INDIA TO PRODUCE NEW AIRCRAFT

Fighter to be ready for test by mid-1950

Dr. S. P. Mukherjee, Industries Minister, told the Central Legislative Assembly on Dec. 6, that the Hindustan Aircraft Company would produce a new type of fighter aircraft, and it would be ready for demonstration by the middle of 1950.

He said the Government of India was able to secure the services of a world renowned German technician, Herr Messerschmitt

January 1950. The Messerschmitts were the main-stay of the German Air Force during the war.

Replying to a question by Mr. H. V. Kamath, the Minister said that Prentice and trainer aircraft were being manufactured in the Hindustan Aircraft Company. Three types of trainer aircraft were being developed there. After the prototypes had been flown, the programme of production would be finalised.

The Govt. had a scheme for the development of a fighter, and a contract with a British firm would be finalised soon. The Particular type was in accordance with the proposals of the Ministry of Defence.

In reply to Pundit H. N. Kunzru, Dr. Mukherjee said that so far as the Prentice aircraft was concerned, according to the present programme, the company was expected to complete 30 aircraft in 1950. The capacity of production depended on the regular availability of engines and propellers, the supply programme for which had now been fixed.

The trainer as well as the Prentice aircraft were of the types which were being used in England, and the Government of India had evolved the programme of construction with the Air Ministry, in the United Kingdom.

Stimulate personal incentive

"But mere machinery is not the only desideratum. We cannot have a rising standard of living or stability of employment without a corresponding rise in efficiency. This is really the condition upon which the rewards of industry should be distributed. It is personal incentive which delivers most goods at the cheapest price all the world over, and the employer thrives on incentive just as surely as does the employee.

Until industrial and financial policy is framed in such a way that personal incentive is restored both in the realm of labour and management, industry will remain the lame duck of India's economy.

MR. B. W. BACHELOR.

"The way to a better life"

"Rationalisation in most industries will have to be faced before a better standard is possible for the worker. Though wages and profits may be rival claimants for a limited income at any given time they are partners and not rivals in industry. The way to a better life is by the production of more goods. Without extra production the payment of higher wages merely raises prices against everybody, including the wage-earner himself."

MR. B. W. BACHELOR.

TECHNICAL AID FOR INDIA America grants Rs. 1,66,000

A grant of 71,335 Dollars (about Rs. 3,54,000) to India, Afghanistan, Burma, Pakistan and Syria for various scientific and technical assistance programmes, has been announced by the U. S. Inter-Departmental Committee on Scientific and Cultural Co-operation.

This latest grant brings to 2,138,878 Dollars (Rs. 1,49,41,000) the amount distributed for 1950 by this committee, whose members come from all U. S. Government Departments, and pass on all Point Four projects recommended to it.

The largest single grant under the new appropriation, 34,955 Dollars (about Rs. 1,66,000) has been made to India for three projects, which will be supervised by the U. S. Departments of Commerce, Agriculture, and the Interior.

The Commerce Department will send an expert to assist in tides analysis, which is necessary for precise measurements in planning harbours. The cost of the project is 1,455 Dollars.

TECHNICAL AID FROM JAPAN Offer to India

Six leading technicians from Japan in a joint interview at New Delhi on Dec. 1 said that the country was prepared to repay her "cultural debt" to India by providing her with the technical know-how, that would help to build up Indian industries.

The technicians constitute the first team of Japanese experts, who have been invited by the Government of India, to train displaced persons in various small-scale industries. They are led by Mr. Michael M. Enomoto, the only member of the team who speaks English.

In answer to questions, the technicians made the following points:

1. Having learned the hard lesson of a costly war, Japan under her new constitution, now pins her faith on the ideals of peace and democracy. Mahatma Gandhi's philosophy of nonviolence has assumed a new meaning for the Japanese.

2. Modern Japan believes that a combination of India's natural resources with Japan's technical acumen would be ideal for promoting peace and happiness in the Asian world.

3. Given technical aid, India is capable of producing sufficient goods for her own needs by organising small-scale "home" factories in various parts of the country as is done in Japan.

4. There is a growing fund of goodwill for India in Japan and such acts of generosity as the gift of elephant "Indra" by Prime Minister Pundit Nehru for the Japanese children have added considerably to it.

Mr. Enomoto speaking on behalf of the team said it was Japan's technical skill that saved her from complete destruction after her defeat in the last war. Nearly 50 per cent of Japan's farmers were absorbed in small-scale industries, when they were immobilised after years of war.

As an illustration of Japan's inherent industrial strength Mr. Enomoto quoted the example of Hiroshima, which was razed to the ground during the last war by an atom bomb attack. The city has revived her needle industry, and has been exporting one billion Yen worth of needles to India annually.

Industrial education in Japan was one of the main pillars of the country's industrial structure, Mr. Enomoto said, there were

about 250 polytechnic schools and high schools of technology. Industrial education was imparted through a wide net work of science museums, commercial museums, libraries, motion pictures, radio, public lectures and publications.

He listed cheap labour and abundance of electric power as the main reasons for the success of small-scale industries in Japan.

The present team of technicians to India, Mr. Enomoto said, dealt only with the manufacture of toys, shoe laces and various bamboo products like buttons, mosaic boxes and plywood.

The Government of India has imported more than 50 machines from Japan some of which are being set up by the experts at the vocational training centre at Arab Sarai in Delhi.

Standards for Paint Industry

The Indian Standards Institution has prepared 16 draft standards for oil pastes for paints.

These are intended to assist the paint industry in India in its effort to rationalise production and maintain a good standard of quality.

The drafts, prepared under the authority of the Chemical Division Council, are based upon agreements reached between representatives of the Ministry of Defence, of Railways, and consumer interest, manufacturers, and technologists, who have striven to put the indigenous paint industry on a sound footing.

Rs. 90 CRORES EACH FOR STEEL PLANTS

Statement by Minister

The proposed erection of two steel plants, one in the Central Provinces and the other in Orissa, would cost Rs. 90 crores each, said Dr. Shyam Prasad Mookerjee, Minister for Industry and Supply, replying to Mr. R. K. Sidhwa in the Dominion Parliament, on Dec. 9.

The matter required very careful consideration by Government, he added, in view of the present financial position. In con-

industrial policy and creed should be that capital goods must be produced here. Everything, from start to finish, should be Indian. Judged by these standards, I am glad that today's function marks a step towards the achievement of our ideal."

FINANCING OF INDUSTRIES

Need to unearth hidden money

The Finance Minister Honble Mr. B. Gopala Reddy presiding over the celebration of the anniversary of the School of Commerce at Mylapore on Oct. 24, referred to the Industrial Finance Corporations to be started by the Centre and Provincial Governments to give loans to industries and said that though the circulation of money had increased during the war years, at present it was found that there was not sufficient money to invest in industries. Hidden money was holding up the development of industries and trade. He hoped that this situation would not continue for long. The Central Government was faced with the problem of drawing out money which was hoarded or was lying in the blackmarket. Without the cooperation of the public, it would not be possible for them to solve the problem.

PRODUCTION MUST BE INCREASED

Appeal to workers by Mr. Khandubhai K. Desai and Mr. Hariharnath Sastri, President and General Secretary of the Indian National Trade Union Congress.

"The call for increased production, is a call for self-preservation. Unless the efficiency of industry is substantially increased, and that quickly, a national calamity is bound to occur. Increased production to the maximum limit is the need of the hour. There are some industrialists with a high sense of duty and patriotism. As for the rest they cannot afford to shut their eyes to the signs of the times. For the moment, we desire to make a fervent appeal to the Indian working class, to rise equal to the occasion, and fully to appreciate their onerous duty at the present juncture.

Some Deterioration

"With the advent of freedom there has been a growing sense of responsibility among labour. But let us unhesitatingly and frankly admit that there is still much room for improvement. While there has been generally an increase in efficiency there has been a marked deterioration in production, as a result of shoddy tactics, or slackening of effort.

"We want to impress upon the working class that any such tendency is extremely undesirable. It is an anti-national and anti-working class act. Whatever be the provocation, it is in the best interests of labour, and the country that production should be high, and under no circumstances be hampered and that labour must increase its efficiency.

"We desire, particularly, to urge on the Unions affiliated to the I.N.T.U.C. to give top priority to this task, and to see that no undertaking under their sphere suffers in respect of production."

"Those who either sabotage, or ignore the call for contribution and sacrifice for the purpose of economic recovery in narrow selfish interests, will stand condemned before the nation which is bound to take serious notice of it. Let the working class discharge its responsibility, and earn undoubted stature in the nation."

Objectives of Economic Policy

Views of Mr. B. W. Batchelor, Chairman of Madras Chamber of Commerce

Mr. Batchelor, in his address, at the annual meeting of the Madras Chamber of Commerce, said on Dec. 6, 1949.

"The objectives of economic policy are: To bring about an increase in the national income, to make its flow more regular and its distribution more equitable.

"We find that production in the factory has not significantly increased. In some

industries production is stationary, in some it is falling behind; in only a few is there any marked increase. Nor is there very much yet to show for the large import of machinery and plant since 1945, though that should soon begin to make its contribution to national wealth."

A SOLUTION FOR ECONOMIC BACKWARDNESS

Madras Premier on Industrialisation Plea for Cottage Industries

Speaking at the 10th anniversary of the Madras Industries Association on 9.11.49 Mr. P. S. Kumaraswami Raja, Premier of Madras pleaded for the rapid industrialisation of the country as a solution to "her present economic backwardness."

"India was essentially an agricultural country. But agriculture alone, on which nearly 70 per cent of the people depend, could not better the economic life of the people. But economic development and progress need not solely result from development of large-scale industries. It also depended on the development and consolidation of small-scale industries. Both had an important part to play in raising the national economy. One should be complimentary to the other, provided they expanded on a planned basis."

Helping out Agriculture

"Many millions of people engaged in agriculture depend for their livelihood on subsidiary occupations as their income from agriculture is inadequate to meet the necessities of livelihood. Agriculture is a seasonal occupation, and those engaged in it are unemployed during the off-season. They remain idle for want of suitable, and remunerative occupations, and thus a large part of the nation's economy is allowed to be wasted.

"Unless intensive cultivation is introduced, and made possible for those who remain in agriculture, the necessity for subsidiary occupations will always remain."

The Premier therefore pleaded for subsidiary cottage industries, which by their very nature, would be suitable for them.

"Industries do absorb the spare energy of the nation. They are the passports to the country's prosperity and as they play a very prominent part in the economic life of the nation, they must be strengthened and protected by the State.

"Mere production by industries would not by itself, solve the problem or lead to prosperity. There should be proper advertisement to facilitate distribution, patronage by the public backed up by feelings of patriotism. Because of lack of adequate information people might take imported foreign finished articles.

Useful link

"In this respect, the Madras Industries Association is doing a useful service in functioning as a connecting link between the producer and the consumer.

It deserves praise for its many-sided activities designed to improve industries and speed up their progress. The Central Industrial Museum, the first of its kind in South India, gives a full view of the mineral and agricultural wealth of the Province, and presents a full picture of the industrial enterprises of the Province. The Association has to be congratulated on opening the District Museums.

The harnessing of the immensity of materials and facilities in Madras will speed up further industrial development. There is great scope, and need for cottage industries, large scale and cottage industries playing their own distinct parts in the development of the national economy."

Mr. A. R. V. CHARI

Chief Engineer, (Irrigation), Madras.

The need to Develop Natural Resources

The production of mechanical energy required the scientific development for mining of large quantities of coal and oil, and development of water power resources which latter should not hold up the production and use of coal and oil power.

In many cases the two could be planned to supplement each other the thermal power coming in the first stage, and water power in the second.

It was most important to put in small power plant units spread all over the country units that were easily procured, moved and installed instead of single large units in spite of the over all economy of the latter. Time was the essence of the developments and economy was secondary in the initial stages.

Mechanisation

A step to be taken simultaneously, and as a part of the plan was to import or construct machinery to mechanise various operations and to transform raw products into manufactured goods. To build these machines in the country, needed the building up of many basic heavy industries, the most important of which were iron and steel works, capable of manufacturing all varieties of steel that went to make power plant, and machinery of the type required, Industry to make precision machine tools, which in turn could build new machines, should be set up.

Technical knowledge was an important factor in the building up of these industries.

The coordination of all industries into an integrated overall plan of development and the distribution of such industries over the whole face of the country to distribute wealth, and reduce transportation costs,

having regard to existence of natural resources and other economic factors, were also matters that require careful thought and planning.

INDIA'S MINISTER FOR INDUSTRY

Dr. S. P. Mookherjee's call to the Nation

"Stand by the Government during this period of national crisis. Face the difficulties that confront us today."

Dr. Mookherjee, while inaugurating the Fourth Annual General Meeting of The Indian Non-Ferrous Metal Manufacturers' Association in Calcutta, emphasised the need for more exports from India, and said devaluation had certain bright sides too. It was obvious that they could not afford to import less than they used to do previously.

Here was an opportunity for Indian industries to step up their production so that the gap which had been created by reason of less imports affecting the interests of consumers might be filled up substantially by Indian products. Further, they could capture foreign markets as much as possible. It was, therefore, essential that today they should think in terms of stepping up production and improve the quality of goods making them available at reasonable prices not only for the interest of consumers at home but also for capturing foreign markets.

GOVT'S INDUSTRIAL POLICY

"Government's Industrial policy has been to give full scope to private enterprise in respect of large spheres of industrial activities. At the same time it cannot but exercise control and regulation in the largest interest of the country and for proper co-ordination and rationalisation. Where Government has stepped in or sought to interfere or claimed power to itself, the purpose thereof is not to obstruct, much less to throttle legitimate activities of any section of the people but to ensure that the national economy of the land did not pass into the hands of a few vested interests, that the interests, of the consumers and the masses of the people are not sacrificed or that ideological differences may not lead to widespread class conflicts."

HON'BLE S. P. MOOKHERJEE

Protection Granted To Plastics Industry

Recommendations by Tariff Board accepted

COMMERCE MINISTRY PRESS NOTE

The existing revenue duty of 30 per cent ad valorem on phenol-formaldehyde moulding powder will be converted into a protective duty, and the manufacturers of moulding powder with a minimum annual production of 200 tons granted a refund of import duty on the three principal raw materials used, namely phenol, formaldehyde and hexamine.

The existing revenue duty on electrical accessories wall plugs, switches, and lamp holders, will also be converted into a protective duty, the present preferential rate of 24 per cent in the case of imports from the U. K. being raised to 30 per cent, and the standard rate being adjusted in accordance with the terms of the Indo-British trade agreement of 1939.

Celluloid (raw), imports of which are free for the manufacture of combs and subject to 30 per cent. duty for other uses will be subject to a uniform duty of 20 per cent.

National interest

Recommending protection to the plastics industry, the Indian Tariff Board holds that, in view of the industry's close relation with basic chemical industries, its development would be in the national interest.

The Tariff Board points out that the finishing sections of the industry have developed quicker than industries supplying intermediate and basic raw materials, with the result that the plastics industry is almost entirely dependent on imported raw materials, machinery and moulds.

Phenol-formaldehyde is the only type of moulding powder, the manufacture of which was developed during the war. The rated capacity of the only firm engaged in its manufacture on a commercial scale is 900 tons per annum, while the country's estimated consumption is 1000 tons in 1950, 1,500 in 1951 and 2,000 tons in 1952.

Other types of moulding powders and resins are imported at present. There is no

production of plastic sheets or laminates in India. A few machines for the production of tubes and rods have been installed in two or three factories, but their production is very limited. The Tariff Board, however, hopes that with the development of the Government fertiliser factory at Sindri and various schemes of research connected with indigenous plastic materials as well as the establishment of a larger unit for the manufacture of moulding powders, the required indigenous raw materials will be made available to the industry.

About 60 firms are at present engaged in the manufacture of finished plastic goods, such as soap boxes, combs, knitting needles, electrical accessories, and spectacle frames, with a rated capacity of 4,000 tons per annum. Actual production in 1948 was only about 1,500 tons. The total demand for plasticware in the Indian Union is estimated at 4,000 tons per annum in the next three or four years, and the Tariff Board recommends that the objective should be to produce industrial articles and utility goods which are wanted by and are within the purchasing power of, the people.

To achieve this objective, it is suggested that steps should be taken both by Government and the industry in regard to the production of plastic goods.

In view of the rapid pace at which new types of synthetic plastics are being developed and marketed all over the world, it is essential for Indian manufacturers of plastics to keep abreast of technical developments in other countries.

The plastics industry must co-operate in various schemes of research by setting aside funds for pilot plant experiments to introduce new materials and processes.

Early steps should be taken for the formulation and enforcement of proper standards, both in respect of moulding powder and finished articles.

HEADQUARTERS OF DISTRICT INDUSTRIES OFFICERS AND ASSISTANT INDUSTRIAL ENGINEERS AND THEIR JURISDICTIONS

Designation of officers.	Jurisdiction.
D.I.O., Visakhapatnam ...	Visakhapatnam.
D.I.O., Eluru ...	East and West Godavari districts.
A.I.E., Vijayawada ...	Guntur and Krishna districts.
D.I.O., Kurnool ...	Cuddapah and Kurnool districts.
D.I.O., Anantapur ...	Bellary and Anantapur districts.
D.I.O., Madras ...	Nellore, Chingleput and Madras districts.
D.I.O., Vellore ...	North Arcot and Chittoor districts.
A.I.E., Coimbatore ...	Coimbatore, Salem and Nilgiri districts.
D.I.O., Tellicherry ...	Malabar and South Kanara districts.
A.I.E., Tanjore ...	South Arcot and Tanjore districts.
D.I.O., Mathurai ...	Tiruchirappalli and Mathurai districts.
D.I.O., Tirunelveli ...	Ramnad and Tirunelveli districts.

Index Copies of this Journal may be purchased from the above officers.

List of Fisheries Gazetted Officers in the Madras Presidency

1. The Director of Fisheries, Kilpauk, Madras.
2. The Deputy Director of Fisheries (Marine), No. 9, Lawder's Gate Road, Purasawalkam, Madras.
3. The Deputy Director of Fisheries (Inland), No. 52, Poonamallee High Road, Chetput, Madras.
4. The Assistant Director of Fisheries (Inland, Central), No. 8, Orme's Road, Kilpauk, Madras.
5. The Assistant Director of Fisheries (Inland, Development), No. 8, Orme's Road, Kilpauk, Madras.
6. The Assistant Director of Fisheries (Fresh-water Research), No. 52, Poonamallee High Road, Chetput, Madras.
7. The Fisheries Marketing Officer, No. 8, Orme's Road, Kilpauk, Madras.
8. The Special Officer (Craft and Tackle), No. 8, Orme's Road, Kilpauk, Madras.
9. The Fisheries Information Officer, No. 8, Orme's Road, Kilpauk, Madras.
10. The Assistant Director of Fisheries (Pearl and Chank, South), Tuticorin, Tirunelveli District.
11. The Assistant Director of Fisheries (Deep Sea Fishing—East Coast, South), Chepauk, Madras.
12. The Assistant Director of Fisheries (Deep Sea Fishing—East Coast, North), Gandhinagar, Kakinada, East Godavari District.
13. The Assistant Director of Fisheries (Deep Sea Fishing—West Coast), Kankanady, Mangalore, South Kanara District.
14. The Assistant Director of Fisheries (Inland, North), Nellore.
15. The Assistant Director of Fisheries (Coast), Moonalingal, Kozhikode, South Malabar.
16. The Assistant Director of Fisheries (Marine Biology), West Hill, South Malabar.
17. The Special Officer (Fish Manure Industry), Dwaraka, Vellayil, Kozhikode, South Malabar.
18. The Assistant Director of Fisheries (Inland, West), Coimbatore.

For SALE

Fishing casts and mounted hooks made from the best silkworm guts produced at the Government Gut Manufacturing Section, Department of Industries and Commerce, Coonoor, are available for Sale —

The rates for the improved fishing casts and mounted hooks are:

- | | | |
|--|---|----------------------|
| 1. Knotted Gut casts $1 \times 2 \times 3 \times 4 \times$
(Trout Lines) Plain or dyed
light blue or green | } | Re. 0-2-0 each foot. |
| 2. Plaited gut casts - Plain or dyed
light blue or green | | |
| 3. Mounted hooks—Plain or dyed
light blue or green. | } | Re. 0-4-0 each foot. |
| a. Single ply—4 to 6 lbs. strength | | |
| b. Double ply—6 to 8 lbs. strength | | |
| c. Treble ply—8 to 10 lbs. strength | | |

Apply to:

**The Assistant Chemist,
Government Silkworm Gut Manufacturing Station,
Department of Industries & Commerce
COONOOR (The Nilgiris)**

2. Chinese White Banital

Particulars. (1)	I Gen. (2)	II Gen. (3)	III Gen. (4)	IV Gen. (5)
1. Total rearing period: <i>Days-Hours.</i>	33-6	35-9	35-9	37-9
2. Duration of V. Age	3-15	7-9	10-18	9-9
3. Wt. of 10 mature worm in <i>grams</i>	42-0	40-0	36-2	36-0
4. Yield per 100 D.F.Ls.	...	16-0	25-0	10-0
5. No. of cocoons per lb.	273	263	360	336
6. Percentage of silk content	17%	15%	14%	14%
7. Ave. No. of eggs in a laying	451	350	360	471
8. Season	...(April-May (June-July (Aug.-Sept. (Oct.-Dec. 1947) 1947) 1947) 1947)			

3. Alps French

Particulars. (1)	I Gen. (2)	II Gen. (3)	III Gen. (4)
1. Total rearing period	34-12	39-0	37-9
2. Duration of V. Age	9-12	10-0	9-9
3. Wt. of 10 mature worms in <i>grams</i>	45-8	42-0	38-0
4. No. of cocoons per lb.	221	252	256
5. Percentage of Silk content	18%	16%	15%
6. Ave. No. of eggs in a laying	523	420	400
7. Season	...(April-May (June-July (Aug.-Sept. 1947) 1947) 1947)		

4. Ascole Italian

Particulars. (1)	I Gen. (2)	II Gen. (3)	III Gen. (4)
1. Total rearing period	34-9	38-12	36-9
2. Duration of V. Age	10-9	10-0	10-6
3. Wt. of 10 mature worms in <i>grams</i>	43-0	41-0	51-2
4. No. cocoons per lb.	255	247	240
5. Percentage of silk contents	18%	14.6%	15%
6. Ave. No. of eggs in a laying	470	420	390
7. Season	...(April-May (June-July (Aug.-Sept. 1947) 1947) 1947)		

5. Pyrennes French

Particulars. (1)	I Gen. (2)	II Gen. (3)	III Gen. (4)	IV Gen. (5)
1. Total rearing period	33-3	37-21	34-9	41-15
2. Duration of V. Age	10-15	11-0	9-18	10-0
3. Wt. of 10 mature worms in <i>grams</i>	44-2	46-0	42-0	52-2
4. Yield per 100 D.F.Ls.	...	35-0	37-8	32-8
5. No. of cocoons per lb.	240	230	185	206
6. Percentage of silk contents	18%	16.6%	15.5%	15.8%
7. Ave. No. of eggs in a laying	487	370	320	452
8. Season	...(April-May (June-July (Aug.-Sept. (Oct.-Nov. 1947) 1947) 1947) 1947)			

6. Var French

Particulars. (1)	I Gen. (2)	II Gen. (3)	III Gen. (4)
1. Total rearing period	34-15	41-0	35-9
2. Duration of V. Age	11-0	13-0	8-18
3. Wt. of 10 mature worms in <i>grams</i>	48-5	48-0	52-1
4. Yield per 100 D.F.Ls.	...	66 lbs.	57 lbs.
5. No. of cocoons per lb.	230	222	223
6. Percentage of silk contents	19%	16.2%	15.5%
7. Ave. No. of eggs in a laying	492	420	390
8. Season	...(April-May (June-July (Aug.-Sept. 1947) 1947) 1947)		

A NOTE ON LEAF-CURE DISEASE IN THE CASTOR GARDEN

By Sri M. M. Srikantiah, Govt. Silk Farm Foreman, Kudligi

Occurrence of leaf-cure disease was noticed in the castor garden. There are insects called (Nymphae of Jassids) present in the castor leaves and they suck the juice and chlorophyll in the leaves and thus the leaf becomes pale and curled. The Government Entomologist, who was also addressed in the matter, said that it is due to adverse seasonal conditions and drought. The incidence of the disease is slightly on the decrease. The insects are being destroyed by means of hand-picking. Spraying of insecticides has not been taken up since the insecticides scorch the leaves and such leaves would be no longer useful for feeding the worms.

A NOTE ON THE MANURIAL EXPERIMENTS CONDUCTED IN THE CENTRAL SILK FARM KOLLEGAL

PART II

By Sri V. GOVINDAN, M.A., Assistant Sericultural Expert (Mul. Res) &
Sri K. N. VENKATESAN, B.Sc., Pathology Assistant, Kollegal

The first part of this note dealing with the layout, the several treatments given and dosages administered was published in a previous issue. Since the publication of the first part of the note, three pickings have been taken in the experimental plot taken up. This note deals with the details of the quantity of leaves picked, in these pickings.

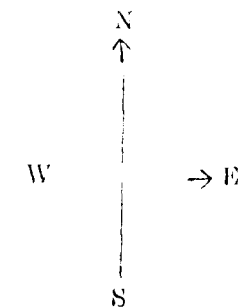
The sub-plots were manured by the end of September '47. Treatments given are—

- A—Groundnut cake
- B—Ammonium Sulphate
- C—Farmyard manure
- D—Mixture of groundnut cake & Farmyard manure.

First Picking

The first picking was started on 1-11-1947 and completed in about a week. Between the commencement of the first picking and the time of manuring, a quantity of 13.50 inches of rainfall was recorded. The growth of the bushes was good and the average height of the bushes was about 5 to 6 feet. The quantity of leaves picked from the sub-plots is indicated below :—

A 24 lbs.	B 31 lbs.	C 23 lbs.	D 29 lbs.
D 18 lbs.	C 30 lbs.	B 28 lbs.	A 28 lbs.
B 31 lbs.	D 23 lbs.	A 26 lbs.	C 39 lbs.
C 34 lbs.	A 40 lbs.	D 37 lbs.	B 24 lbs.

**Abstract**

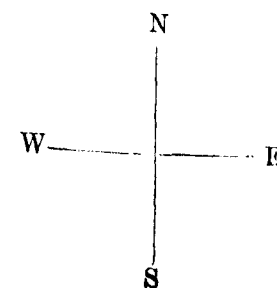
Treatment A — (24 + 28 + 26 + 40) / 4
 -do- B — (31 + 28 + 31 + 24) / 4
 -do- C — (26 + 30 + 39 + 34) / 4
 -do- D — (29 + 18 + 23 + 37) / 4

Average
 29.5 lbs.
 28.5 „
 32.5 „
 26.75 „

Second Picking

A quantity of 0.68 inches of rainfall was recorded between the first and the second pickings. Second picking was started on 16-12-1947 and was completed in two days. The average height of the bushes was about 6 feet. Hoeing was done twice. The details of the quantities of leaves picked from the different plots are indicated below :—

A 15 lbs.	B 24 lbs.	C 10 lbs.	D 16 lbs.
D 8 lbs.	C 10 lbs.	B 12 lbs.	A 18 lbs.
B 18 lbs.	D 12 lbs.	A 10 lbs.	C 16 lbs.
C 10 lbs.	A 12 lbs.	D 12 lbs.	B 26 lbs.

**Abstract**

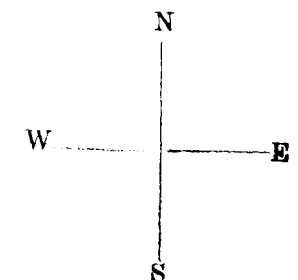
Treatment A — (15 + 18 + 10 + 12) / 4
 -do- B — (24 + 12 + 18 + 26) / 4
 -do- C — (10 + 10 + 16 + 10) / 4
 -do- D — (12 + 12 + 16 + 8) / 4

Average
 13.75 lbs.
 20.00 „
 11.5 „
 12.0 „

Third Picking

Third picking was started on 30-1-1948 and completed in four days. There was practically no rainfall between the second and third pickings. Hoeing was done twice. The average height of the bushes was about 6 to 6½ feet. The leaves were small in size and pale green colour. The quantity of leaves picked from the different sub-plots is indicated below :—

A 28 lbs.	B 16 lbs.	C 15 lbs.	D 17 lbs.
D 8 lbs.	C 16 lbs.	B 17 lbs.	A 12 lbs.
B 16 lbs.	D 18 lbs.	A 12 lbs.	C 15 lbs.
C 10 lbs.	A 12 lbs.	D 16 lbs.	B 18 lbs.

**Abstract**

Treatment A — (28 + 12 + 12 + 12) / 4
 -do- B — (16 + 17 + 16 + 18) / 4
 -do- C — (15 + 16 + 15 + 10) / 4
 -do- D — (17 + 8 + 18 + 16) / 4

Average
 16.00 lbs.
 16.75 „
 14.00 „
 14.75 „

Discussion.

From the above data, it is seen that the highest yields are recorded in the sub-plots manured with Ammonium Sulphate. Definite conclusions could be arrived at after a few more pickings.

INDUSTRIALISTS' INDIFFERENCE

“I am surprised at the amazing indifference of industrial leaders, who do not realise the contributions that science can make to the development of industries. I am surprised at their extreme narrowmindedness, and their utter indifference.

I wonder what is going to happen to the nation if they did not shake up, and do something about it. It is not sufficient, if we make money alone. We should also concentrate on scientific advancement. Human beings make money, but money does not make human beings.”

Hon'ble Pundit Jawaharlal Nehru

A SHORT NOTE ON PREPARATION OF SLIDES TO STUDY THE CAUSAL ORGANISMS OF FLACHERIE

By **Sri V. GOVINDAN, M.A., Assistant Sericultural Expert (M.R.)** and
Sri K. N. VENKATESAN, B.Sc., Pathology Assistant, Kollegal

For the past ten years considerable work has been carried on in Kollegal to study Pebrine disease on silkworms with highly encouraging results. On certain definite conclusions pertaining to the control of pebrine disease, it was decided to discontinue the experimental work on this disease and take up the other common diseases.

Next in importance is Flacherie which takes a heavy toll on the silkworms especially in unfavourable seasonal conditions. Prior to taking up correlated rearings to find out the remedial measures, it was considered essential that the external characters of organism found in worms affected by Flacherie should be studied. With this object in view, the work of preparation of permanent slides of the organisms found in the flacherised worms was taken early in October 1947 in the Research Section at Kollegal. The following procedure was adopted:—

The worms affected with flacherie were collected from the different localities in the different seasons with relevant particulars such as locality, source of seed, symptoms of the disease etc. The diseased worms were dissected exposing the alimentary canal and other internal organs. Suspensions of the contents of the different portions of gut were made. Care was taken to see that the suspension used was sufficiently dilute. The method adopted to fix the smear on the slide was to pass the slide with the smear, three or four times rapidly over a flame of spirit lamp.

Staining of the bacteria with Loeffler's alkaline Methylene blue, Leishman's blue and gram stain were tried. Gram Stain gave the best results. Gram Stain process (Hucker's modification) is indicated below.

(Leaflet IV—Manual of Methods for pure culture study of Bacteria—Staining—

August 1946)

Lugol's solution

Iodine ... 1 gm.
Potassium Iodide ... 2 gms.
Distilled water ... 300 c.c.

Counterstain

Safranin (2.5% soln. in 95% ethyl. alcohol) ... 10 c.c.
Distilled water ... 100 c.c.

Ammonium Oxalate Crystal Violet

SOLUTION A Crystal Violet (90% dye content) ... 2 gms.
Ethyl Alcohol (95%) ... 20 c.c.
SOLUTION B Ammonium Oxalate ... 0.8 gms.
Distilled water ... 80 c.c.

Mix solutions A and B

Staining Schedule

- (1) Stain Smears 5 minutes with ammonium oxalate crystal violet;
- (2) Wash in tap water;
- (3) Immerse 1 minute in Lugol's solution;
- (4) Wash in tap water and blot dry;
- (5) Decolourize 30 seconds with gentle agitation in 95% ethyl;
- (6) Counterstain 10 seconds in Safranin solution;
- (7) Wash in tap water;
- (8) Dry and mount in Canada Balsam;

So far about 25 slides have been prepared. Further study is under progress.

Fisheries Section

STATISTICS OF THE FISH SUPPLY OF OUR FISH MARKETS FOR THE YEAR 1948

BY Mr. P. I. CHACKO, M.A., F.Z.S.,

Asst. Director of Fisheries (Freshwater Research),
and Mr. S. George, B.Sc., Statistical Assistant

For the successful management of the fish trade, it is fundamental to have a knowledge of the amount of the capital and the income derived from the investment. It is also necessary that supply is regulated with due regard to demand so that there is no capture and selling of more fish than the natural increase of the fish population of our provincial waters can allow. The Fisheries is in more or less the same position as an executive employed for managing an investment belonging to other people; the capital invested being represented by the population of fishes of commercial importance found in the public waters, and the dividends derived from that investment being the catches taken from this population. The department, at a very early date of its organisation realised the importance of having accurate information concerning fish catches.

Biological investigation of depletion of supply or breeding stock so as not to endanger future profitable returns cannot be pursued successfully without the collection and use of statistical data.

In the appended table a statistical analysis of the kinds and quality of the fish supply of 38 inland fish markets in the province for the calendar year 1948 is given, with weights

and value expressed in pounds and rupees. Carps, catfishes, murels and gobies predominate the supply in all the markets. Estuarine species like mullets, lates and prawns are abundant in the Circars. The fish supply is comparatively poor in the Ceded districts. The markets may however be said to be fulfilling the needs of our growing population to a certain extent.

RAPID PROGRESS IN INDUSTRIALISATION NEEDED

India needs rapid and far-reaching industrialisation and exploitation of her resources.

The task awaiting us should be approached in a spirit of realism. Paper plans and grandiose talks are not likely to take us far. It is only when we become reasonably self-sufficient in the matter of engineering researches, that we can make rapid progress in the field of industrialisation."

H. E. SIR H. P. MODY,
Governor of Bombay.

The relative size of total yearly catch of a species of fish is regarded by many to be a satisfactory criterion for judging the abundance of a fish over a period of years. But it may be noted here that there are a great many other factors that determine the size of the total annual catches. The chief of them are (1) a species of fish may be seriously depleted, but be very much in demand so that the price rises and consequently more men go into that fishery, with the result

that the total catch stays at a high level or actually increases, because more effort is being expended on the fishery, while the abundance of the species is rapidly decreasing. (2) Improvements in gear or fishing methods may also cause an increase in total catch while depletion is taking place (3) The total catch may decrease while the abundance of the species is constant or even increasing, due to a falling off in demand

for a certain fish, or an increased demand for another species, causing less effort to be expended in the taking of the species in question (4) A closed season or legislation prohibiting the use of some particularly effective gear may decrease the total catch, while these protective measures are really causing an increase in abundance.

It is thus necessary that the data is carefully analysed and changes in fishing effort and methods discounted by some means before authentic information concerning the relative abundance of a species of fish can be obtained. For the full development and conservation of our fisheries and the proper organisation of the fish trade, a comprehensive system of fishery statistics has to be adopted in our province. If necessary legal provision should be made to enforce all fish dealers to furnish statistics to the department, showing what species

and amounts were bought and sold, place of capture, etc., in a prescribed form. Boat owners should also be required to register their boats and to furnish periodical details of gear used, kind of fish caught, etc. Such procedures are successfully followed in America and other western countries. (For further details the reader is advised to refer to Contribution No. 68 of the California State Fisheries Laboratory). An indispensable basis for the study of our fisheries, both from the point of view of over-fishing and of the fluctuations which occur, is a system of statistics, supervised and collated by biologists who could correlate the data with the fecundity of the fish concerned, its growth and migratory movements, its racial characters and with the changes in its environment. The final result then is the average catch per day of a constant unit for each of several years.

HARD WORK AHEAD

When we take stock of the economic happenings, which are the special concern of businessmen, the economic problems of the country will appear less formidable, and offer greater room for hope and encouragement. We have passed through a period of exceptional difficulty, and anxiety in the economic sphere. The beginnings of it were here even, last year but neither the businessmen, nor the Government, had then realised that we should be faced so soon with problems of such magnitude and intensity.

I venture to think that we have now seen the worst, and that although our difficulties are by no means over and still call for hard work and endurance, there is justification for the belief that we may now regard the immediate future with less anxiety, and even with some measure of confidence.

HON'BLE Dr. JOHN MATHAI

FANCY SHELLS' INDUSTRY IN SOUTH INDIA

By Mr. V. D. SPURGEON, B.A.,

Assistant Director of Pearl and Chank Fisheries, Tuticorin.

Introductory.—The commonest articles of interest on a sea beach are shells. These shells are mostly the outward skeletons of soft-bodied group of animals known in science as *Mollusca* and popularly known among the lay people as *shell-fish*. The two names; *Mollusca* and *shell-fish* appear at first sight as contradictory, as the scientific name signifies that these creatures have soft bodies, whereas the popular English name implies that they have hard shells. Both are correct, as the soft-bodied mollusca are encased mostly within hard, calcareous shells.

These shells are of various sizes, and shapes with a variety of colourful designs on them—all marvels of the sea! Some shells may be having double parts or *valves* as in the case of pearl oyster, edible oyster, green mussel, the scallops, ark-shell, window-pane oyster, clams, pinna etc., others are found within single shells such as conch-shell ("Sangu") limpet-top-shell, snails, periwinkles, horn-shell, screw-shell, wing-shell, five ringer chank, cowries, helmet-shell, mitre-shell, Olive shell, Harp-shell, Cone and a host of others. There is yet a third order of shells. These are not found outside, covering the soft-body of shell fish, but found completely imbedded inside the

flesh so as to serve as endoskeleton as in the case of higher animals with a vertebral column to support. The squid and cuttle-fish with their ten long arms are interesting creatures. Inside their bodies are found cuttle-bones, or "pens" composed of fine calcareous laminae enclosing air spaces.

Food value of Shell-Fishes.

Next to Fishes, shell-fishes are commercially important. Primarily shell-fishes are used as food. The oyster fisheries are not only one of the greatest of the world's fisheries it is also one of wide distribution. Europe, Asia, Africa, Australia and the Americas own extensive oyster fisheries. The clams have been recognised as article of food since antiquity. Massachusetts possesses the most important clam fisheries. At present the scallop is classed as one of the delicacies among sea-foods. The California Abalone Industry is too well known to be emphasised here. Sea-mussels are vigorously fished for food. Other shell-fishes

commercially exploited are natica, cockle, periwinkle, squid, donax, pearl-oyster and conch shell.

Shells for a Variety of uses. Besides used as food, shell-fishes are put to a variety of purposes. In Europe large quantities of

DO NOT DISCARD TALENTS

Call for More Production

"It will not do to discard talented men if their services are available. You have also to remember that if we had not achieved what we have, we would not have been honoured like this in foreign countries. If we have a pit in our abdomen it is no use our putting on good clothes and dressing ourselves well, because that would serve no purpose. The plain fact is that if we wish to survive, we have to produce more, and remember, when you think of how to produce more, that a 'drop by drop becomes on ocean.'"

Our production has stopped. We do not create any more wealth. Under British rule we used to do so, and we tolerated when they took their own share away."

THE HON'BLE

DR. SHYAM PRASAD MOOKERJEE

mussels are used as *bait* for fishing. Mussels and mussel muds (mussel beds buried with silt) are used as *fertiliser*. The mussels are dried at a high temperature and then ground. The meal produced is considered an excellent *feed for chickens*. *Trochus* and *Turbo* shells are conical and are beautifully pearly within. These are in great demand for *pearl button* manufacture. The opercula of these shells when heavy are used as *paper weights*. The operculum of one species found in New Zealand, very brightly mottled with green and brown, is highly valued by the Maoris and used as ornaments. They also used it to form the eyes of their idols in former times. A little trochus shell (*Umbonium vestiarius*) available in East Coast backwaters in Madras is so dainty that millions are exported to Europe, where they are used in ornamentation of shell-boxes sold in England. The five finger chanks (*Pterocera lambis*) are used as *net-sinkers*. The five "fingers" are broken off, the shell perforated and then are tied at intervals along the ground rope of nets. By burning them, *white-wash lime* is manufactured. Lastly they are used in Octopus (devil fish) traps as weights for fishing nets. For fishing Octopus or devil-fish these are attached, at regular intervals to a main-line with apex and fingers broken. The line with these shells are left overnight in shallow sea in Ramnad District and when raised next morning small octopus are found hiding in the cavities of these shells. Octopus are used as bait by fishermen. Scallop shells, are often used in the construction of road. The purple dye obtained in ancient times from several species of marine Gastropods is wellknown. The yellow-Money Cowry (*Cypraea moneta*) are employed as *small change* in bazaars in West Africa. In certain parts of India, it is esteemed as an *ornament* and as an *amulet*. The shells of certain mollusca are crushed and the bits mixed with poultry feed to correct "leather eggs" mistake in them. Such shellgrit manufactured in two grades out of edible oyster (*Ostrea edulis*) at Ennur near Madras is sold to poultry-keepers. Mother of pearls is used in Japan in onlaying lacquer. Rs. 1,50,000 worth of *Halotis* are exported. Japan

makes use of *Halotis* in cottage industries. Rs. 2,25,000 worth of buttons are exported from Japan. Not only buttons and studs but slips for fans, knife-handles, etc., are made. Even the humble cowrie is made use of in Japan. The famous pearl oyster shells ("*Muthu Chippi*") are used in *button manufacture* and in polish tiles production. The conch shells (Chanks) are a great wealth to India. Wherever they are available on the Coromandel Coast they are controlled by Government and vigorously fished for their most valuable heavy calcareous shells. When the outer covering (Periostracum) is removed by acid treatment, the inner shell presents a most snowy white polished marble surface, even more attractive than genuine ivory. This quality is taken advantage of, and many ornaments such as bangles, rings, pendants, ear drops, buttons and cuff-lings, are carved out and sold like hot cakes among Hindu folk in Bengal. Again they are used as paper weights, curios, feeding spouts for blowing in temples and amulets for cattle to ward off 'evil eyes'. The opercula are used in manufacture of scented sticks. Cuttle bones have value for polishing paint in fine coach work and a minor industry on the Ramnad Coast exists in collection of these bones during the monsoon, when they drift ashore in numbers. After long continued northerly winds, the collections will be heavy particularly during February and March, and a "Kadaya" woman can collect several hundreds in a day. The shells of shell-fishes are thus utilised in a variety of ways.

Fancy Value of Shells. Of all the uses of shells from the sea, even a casual observer of a few shells washed on the beach will arrive at the irresistible conclusion that the fancy value of shells is greater than anything else. In their hundreds of forms, and sizes and with beautiful strips and dots in all imaginable hues these objects from sea are valued even by those who do not find aesthetic appreciation in anything else in life! Children pick every one of them to play with, the naturalist collects all of them as objects of interest to him, business-minded folk engage coolies and remove basket-

to be sold as curios. So shells have an universal appeal.

Shells had been the first ornaments of barbarous tribes who lived near the sea. The Islanders wore the orange-cowry as a mark of chieftainship, the New Zealander polishes shells into ornaments more brilliant than the "pearl eardrop" of classical or modern times. The beauty of the scallop shell attracted attention long before the food value of this shell-fish was recognised. The shells of Californian giant abiton (*Cryptochiton stelleri*) are used in making curios such as toy boats and electric lamp shades. During the past few years the making of shell ornaments from Florida shells has helped many families over the depression. There is an endless number of designs to be made out of shells but usually Florida shell workers show familiar Florida birds and animals as well as invertebrates in these shells. It is even said that there are big Factories in U. S. A. for this purpose where workers are busily engaged. It is reported that at one time 200 bushels of the valves of *Cardium magnum*, the large cockle were seen there. These are manufactured into ash receivers and other useful and ornamental objects with the addition of other shells. Big shells are drilled and through the holes in the shells electric wires and bulbs are inserted and made into beautiful lamps.

Fancy Shell Trade in South India. In Madras seas there are about 700 kinds of shells—of which 470 are univalves or single shelled shellfishes, and 230 bivalves or double-shelled shellfishes. In Rameswaram Island (a distance of 435 miles from Madras) marine shells are abundant as the coral reefs off Pamban, Krusadai and Mandapam abound with all sports of marine fauna including shell fishes. In this locality the number of living mollusca within reach of the seeker along the shore is limited. A number of small species can be cleaned from the sand and mud with the aid of a sieve. In this manner we can secure at Ennur specimens of the lively little razor-shell and at Adyar *Nassarius* and *Tellina* and *Placuna placenta*.

In Madras Presidency Nature has blessed us with a large number of marine shells. Though their worth is not fully recognised, there is yet an indication of their worth being realised at Rameswaram in South India.

Rameswaram is an ancient and glorious place of historic and religious significance. Year in and year out thousands of ardent worshippers flock the temple premises and never fail to get impressed by shell-booths closely packed inside the temple and outside in the approaches to the temple.

Peculiarly enough, only at Rameswaram in the South, that anything of Public interest in shells, is seen. There are 23 big Fancy shell shops there (17 inside the temple and 6 outside the entrance to the temple).

Business in Marine fancy shells dates back to 1900. Since that time the pilgrims and others have been interested in shells. There is a happy sign of the shells becoming increasingly popular among South and North Indians. On account of increasing demand the number of stalls has been increasing. The sales range from Rs. 2,000 to 3,000 every year and the net profit to each seller after deducting the cost in procuring and cleaning shells and the rental of Rs. 5 p.m. paid to the Devasthanam, appears to be Rs. 600-800 annually. This will work out to Rs. 50 to 67 per mensem—not a bad business! During times of festivals there will be record sales.

It is a delightful sight to see the row of shell-stalls on either side of the main entrance to the holy shrine. The stall-keepers are not a sleepy lot as we meet with among cloth merchants or sweetmeat vendors! They almost sit at an angle leaning more to the front, to shoot up at the sight of a party of pilgrims or casual visitors and to invite them to the stalls for a few purchases. New comers will be put in a dilemma when from a dozen shops—all beautifully decorated and the shells with several tints effectively displayed—the merchants shout and invite "*Ayya, Amma, enga vanga*" ('Sir and Madam, come to my stall').

In each stall there will be hundred kinds of shells and shell products beautifully arranged for sale. All imaginable South Indian and Ceylon shells will be available. Pretty shell necklaces, chank-festoons, rings, pendants, ear drops, buttons, buckles, feeding spouts, trumpets, paper weights etc. attract the eyes of visitors. Visitors never fail to sit at these stalls, discuss at length the 'Biology' and 'Ecology' of each shell and purchase the choicest among the lot by paying off at the first price declared by stall-keepers without a bargain.

Important Shells of South India. The attractive shells and shell-products may be mentioned here:—

1. *Lamellibranchia or Pelecypoda (Double shells or bivalves)*

1. *Window-pane oyster.* Grows upto 6 inches in diameter. These are very much compressed orbicular shells, remarkable for milky white or mica like texture of the shells. Used in glazing windows, and verandah roofs. Window-pane oyster produces inferior seed pearls.

2. *Ark-shells.* Beautiful twisted shells and highly coloured.

3. *Hammer oyster.* Hammer-shaped oyster shell.

4. *Pearl oyster.* "Muthuchippi" in Tamil. These are lustrous beautiful shells useful for table decorations and buttons.

5. *Pinna.* A big wedge-shaped shell often a full foot in length.

6. *Holy-water clam* so called because the huge ribbed valves are used in Roman Catholic Churches to keep water. The shell sometimes grows to 500 lbs. weight. Stories are told about how the pearl divers dread them, as their feet is set, sure to be grievously gripped by the massive valves.

7. *Razor-shells.* Scabbard-shaped.

8. *Sunset-shell.* Marked by broad wedge-shaped bands radiating from the umbo.

9. *Limpets.* Conical-shell and appears like a cap.

10. *Ear-shells.* These vie with the rainbow in the gorgeous colouration of the mother of pearl lining of the shell.

11. *Top-shells and Turban shells.* Conical shells are marvellously pearly within. Most valuable in commerce for button-making. The covering for the shells or opercula are massive sometimes—so large that the operculum serves as a paper weight. In Rameswaram the operculum finds its place along with other shells in the shell-booths for sale to pilgrims and devotees. In Tamil this operculum is known as 'Ambiliman' meaning thereby "disc of the moon".

One kind of top-shell is beautifully variegated. It is a most dainty little shell.

12. *Pheasant-shells* prettily patterned tiny-shells.

13. *Wing-shells* have wing-like expansion.

14. *Scorpion-shells* have "fingers".

15. *The Cowries.* Best shells. Highly valued on account of beauty, variety and polish. Little yellow cowry is abundant on the reefs near Pamban. Other varieties are Eyed cowry, Tiger cowry, Black cowry, Mole cowry, Serpent's head cowry and Arabian cowry.

16. *The chank or conch-shell ("Sangu").*

Very handsome spindle-shaped heavy porcellaneous shells. When cleaned with acid and polished, it is a most attractive object. With carvings on the marble surface of it, there is none who will not be attracted by such a lovely article. Hindus attribute sacred and medical qualities to it. Bangles and rings carved out of chanks are sold in hundreds of thousands among the devotees. Conch-shells are used for blowing in temples, used as feeding spouts and used as amulets to ward off evil eye.

Left-handed chank ('Valampuri sangu') is considered very auspicious and its value was assessed in equal weight of gold in olden days. Even now its price is varying between Rs. 200 to anything upto Rs. 1,000. More than 800,000 ordinary shells are sold in Government in Tinnevely.

17. *Beggar's bowl*. Large pink shell that beggars use for collection of alms. A best curio to be placed in the parlour.

18. *Nautilus shell*. Very lovely object of all the shells on the face of earth! This pretty shell covers an animal called Nautilus. "The interior of the shell and all the septa are pearly, while the outer layer is porcellaneous, barred irregularly with broad reddish brown bands upon a whitish ground".

Several other shells' beauty cannot be depicted in mere writing. They are all things of beauty and joy to mankind. Children and adults, young and old, like these fascinating creatures more than other articles from the ocean depths.

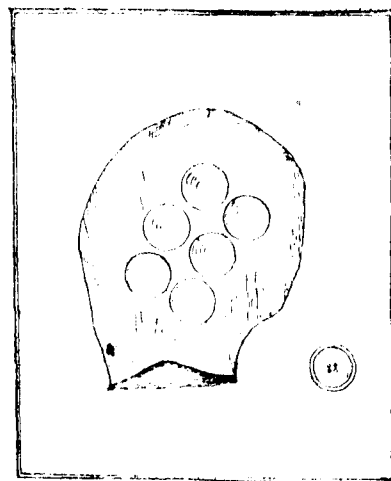
When these objects are so attractive and when the people have appreciative inclination to possess them in their homes or wear ornaments exquisitely made of them, it is upto us to enlarge and develop this indigenous marine industry. While it may find a market for the shells which otherwise go to waste, a cottage industry can be started in poor hamlets on the sea board districts of the presidency to the advantage of countless fishermen families.

Much remains to be done. It is no good if the shells are just cleaned and sold. Cleaning and selling may not offer job for many and the sales cannot be ever expanding. Dainty articles of commerce should be manufactured out of shells. No doubt we have chank or conch shell products now. This is not enough. Out of shells are manufactured in America, lamp shades, buttons, handles for knives, buckles, ash-trays, ornaments, paper weights, window decorations, festoons, rosaries, toy-canoes, toy-birds, toy-animals, and ink-stands. Very fine inlaid work is done with this material in furniture, some used in opera-glass cases, Japanese mother of pearl used for marquetry work. Again some are used for umbrella handles. Often shells are used for the decoration of fountain pens, clocks, ink-wells, picture frames, combs, barpins, beads, studs, cuff-links, hatpins, and other valuable things, sometimes, used to impart an iridescent sheen to the

surface, usually of metals. In Naples it is much in use for iron bedsteads. In Japan carefully executed work is done on lacquer, and the interior surface is lined with layers of pearl or coatings of pearl powder, forming designs of flower, fruits and other ornaments.

When shells are put to "thousand and one" ways abroad, it is surprising in India we use them only here and there simply as articles for show or as curios. I shall suggest a few uses to which shells can be put to in South India:—

In Buttons Industry. (i) As a cottage industry in the villages, in and around the sources of mother-of-pearl, greenmussel, trochus and Turba shells, the old women and children who usually do not go out for hard manual labour can be taught to punch these shells by means of iron punch-pliers made for the purpose. The cut pieces can be polished and four or two holes drilled, with drills, to make them perfect buttons as in the sketch.



DISCS CUT FROM "MUTHUCHIPPI"
(PEARL OYSTER) FOR SHIRT AND
COAT BUTTONS

Shells as Curios. (ii) Besides, button industry, shells easily procurable on the sea shore or on the margins of estuarine lakes, can be cleaned and sold as curios or souvenirs to be placed in our homes to add attraction. Many children gather shells. Old men and women in fishing hamlets

could easily collect them, if a market is created for them, and make their livelihood. The art of cleaning the marine shells to make them very attractive and to remove the animal odour can easily be taught to a few with advantage, for the collectors and purchasers. Shells brought from sea should be washed well in soap water after the animals inside the shells are completely pulled out with a curved iron hook. Otherwise, the remnant flesh inside shells will rot and emit bad odour. Larger shells can be washed in a solution of warm or boiling potash. If you wish to put a high polish on your shells, take a porcelain kettle of fair size, and place it in a solution of 1/3 muriatic acid and 2/3 water. Boil the solution. With forceps immerse shells for a moment in boiling solution and then in the water. This polish will last for ever. This works better with very hard shells. Practice in art of cleaning makes perfect work. Plain shells with their natural colouration, stripes, dots and blotches form excellent objects to adorn the table in parlour. Dull shells can be made lustrous by dipping in dilute solution of gum. Besides this, cleaning certain black dotted cowries in Rameswaram stall are made to give double colour effect—natural outside colour—all over and a violent tint in the centre. Visitors to shell booths carry several of these lovely things mistaking often the dual colouration as Natural. The Ceylon cowrie is yet another shell to serve as fancy paper weight. The beggars bowl is fascinating. The Nautilus shell is simply marvellous. Only those who have seen it can appreciate Nature's lovely home (shell) for the animal Nautilus.

(iii) Shell Ornaments for Personal Wear.

Conch shells are cut into bangles, rings, pendants and ear-drops. This practice is seen only in Dacca District in Bengal. The fashion can be revived in South India where women have mania for gold ornaments—a great national waste, as much gold is lost in wear and tear of ornaments. Small uni-valve shells of little more than pea size are excellent objects for necklaces, armlets and for mounting in long gold chains. Besides

qualities are attributed to them when worn as jewels. These shells can be nicely strung on silk threads by drilling holes through the entire length of each shell. Drilling to be cautiously done by a bodkin and by keeping the brittle shells on cork-mat or folded towel.

(iv) Shells for a Variety of Articles.

Besides buttons, shells can be used for knives handles, combs, pins, pin-cushions, umbrella handles etc. In cottages, the lazy folk can usefully engage themselves in cutting the shells into the above. Besides finding employment for many in maritime villages, the country can get the benefit of cheap indigenous goods out of shells instead of importing them at a heavy cost.

Further, out of shells many toys and fancy articles can be made. With dentalium shells or tusker-shells found in myriads near Manapad in Tinnevely District and "useless" fish scales beautiful festoons, flowers and garlands are made. Fisher—children in schools in certain villages as Veerapandiapatnam near Trichendur, Kuttapuli, and Mukkur make dainty articles. Birds and animals out of some other shells are made. Silk-scarf riddled neatly with tusker-shells form excellent tea-cosy. I have seen many being manufactured at Kuttapuli convent school. Why not villagers along the Coromandel Coast, especially women, do these and make a decent and profitable living? Who is to take up the problem of industry in maritime villages and start them? It is said that in Florida state in America hundreds of toys are manufactured by shells alone. Flowers can be made out of shells neatly arranged on a metal stalk.

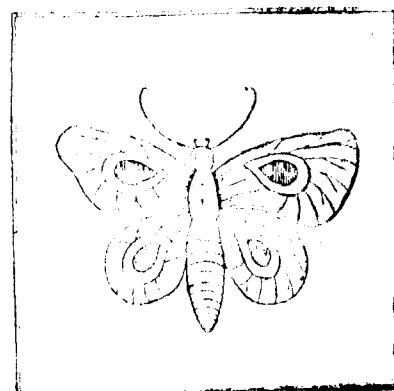
(v) *Shells in lessons.* Shells can take the place of pebbles, nuts and beads used in Kindergarten curriculum to teach arithmetics, each child to be provided with a box of ten cockle shells of equal size. The number 10 is suggested, as that is the limit of children's exercises. While leaving the method of teaching to a qualified mistress, I wish to emphasise the advantages of shells in teaching over beans, sticks, pebbles

generally used. The variety and colour are strong factors in attracting and holding the attention. To go a step further one can cover the shells with scarlet, blue, yellow and white papers and call them as soldiers, naval cadets, oranges and eggs respectively and give small sums to young scholars. Covering the shells with paper occupies but a very short time but the efforts would be amply rewarded by the increased interest on the part of future citizens of India. Shells could again be used in arranging alphabets and teaching to read them in lower classes. Lessons in designs also are possible with gainty shells.

Then comes the use of shells in schools to train in a variety of handicrafts. Two cockle-shells of equal size to be glued along the hinge. With paper or plastic material the body of butter-fly is to be made and joined to the hinge. A beautiful butter-fly will emerge. Likewise eye-glasses, axe, clover-leaf, mushrooms, butter-cups, radishes, the popular tree, cross, anchor, crab, salt-spoon, kettle, lady's purse, vase, tortoise, elephant, mice etc. can be made.

(vi) *Shells in Play.* Besides using shells in forming fascinating designs in schools,

they can be used in a country game called "Pannankuh" and "Thayam". Stall keepers at Pannavaram assert that these are sold more than anything else, among fancy shells.



A BUTTERFLY CHILDREN COULD MAKE OUT OF BIG AND SMALL COCKLE SHELLS AND PLASTIC MATERIAL

Marine shells are suitable for multipurpose industries and much depends in popularising their use for the expansion of shells trade.

For further information please contact Assistant Director of Pearl and Chank Fisheries, Tuticorin, in person or by post.

THE PRICE-WAGE-PRODUCTIVITY COMPLEX

"Our Country is in the grip of a vicious circle of higher prices and higher wages. Unless productivity is increased, prices could not be lowered and India could not compete in foreign markets. Wages could not and must not be lowered. Greater productivity could be secured only by increasing the productive capacity of labour and plant and introducing rationalisation methods. Labour disfavours rationalisation as it would cause unemployment. But there is no way out. The Government must and could take care of labourers who will be then thrown out of work. Everyone, including labour, must realise the truism that we have to rationalise as we have to increase the output and reduce the cost of commodities."

PUNDIT JAWAHARLAL NEHRU

THE INDIAN PEARL OYSTER AND PEARL FISHERIES OF SOUTH INDIA

By SRI S. THANGIAH

The Indian pearls are noted for their lustre, size, form, colour, weight and beauty and they are valued much throughout the world. The orient pearls are known to the westerners from time immemorial. There are numerous references to the pearl and chank fisheries of South India by sailors, foreign travellers and merchants such as Marco Polo (1292 A.D.), Vasco de Gama (1494), Friar Jordanus (1930 A.D.), Ludovico de Vathema (about A.D. 1500), Barbosa (about 1500) and others.

Historical Review.

There are several references to pearl in the Rigveda, the Ramayana and the Mahabharata, i.e., a millennium or even more before the Christian era. Pearls were esteemed in ancient China and their literature contains many fantastic theories about pearls. Again in the Sinhalese literature, i.e. the Mahavamsa and the Dipavamsa there are innumerable allusions to pearls. King Vijaya of Ceylon, according to the Mahavamsa, sent pearls as present to his father-in-law in India about 540-550 B.C. From these ancient chronicles of Ceylon it is seen that several varieties of pearls were exported from Ceylon about 550 B.C. or so. One cannot be definite when pearls were discovered by man for the first time. It may be possible that during his hunt for the mussels and other shell fish washed ashore,

man must have come across pearls in some of the mussels collected for his food. It is equally impossible to state definitely the time from when man began to organise for the pearl fisheries.

From the numerous references made regarding the pearl and chank fisheries in the Tamil (Maturaik-Kanchi, Chilappatikaram) and Sinhalese literatures, one can safely say that these fisheries in South India are of great antiquity. The fisheries were worked out systematically under 'Pandiyan Kings as early as 100 A.D. Foreign travellers such as Greeks, Egyptians, Venetians, Genoese and Arabs have described the wonderful sights of the pearl fisheries seen during their travels in South India. The earliest reference to the pearl fishery in the Gulf of Mannar is recorded by a Greek in the "Periplus of the Erythraean" about the first century A.D. or so. The next reference is given by the classical writer Ptolemy (who died in A.D. 163) about the fishery at Sosikourai and Kolkhic gulf.

Human Relations in Industry

Good Industrial Relations are not the activity of any one individual or department of an organisation nor can it be practised or promulgated in isolated condition. It is the operating philosophy of business which runs through the entire organisation right from its managing-director to the Janitor. It is the spirit or the attitude which an industry exhibits in all its transactions towards everyone with whom it deals or comes in contact.

Mr. B. D. CHIRPUTKAR.

It is evident from the following reference in Kalidasa's 'Raghuvamsa' that pearls were once

found near the mouth of the Tambraparani river.

"The Pandiyas having prostrated themselves before Raghvu presented to him as their glory the collected excellence of the pearls on the ocean into which the Tambraparani flows."

The exact spot mentioned in the above reference cannot be located now as the river mouth would have changed on account of the accumulation of silt. Some of the travellers and writers mention Kolkai or Korkai as the headquarters for the pearl and chank fisheries in those days. Subsequently Kayal or Koel becomes important. Marco Polo, who visited Koel in 1292 A.D. gives a graphic description of the pearl fishery witnessed by him. After some years, it is seen that Koel ceased to be a port most probably due to the silting of the river mouth and Pinnakayal became an important port.

During the reign of the Pandiyan King Tirumala Naick (1623-59) the local chieftain of Ettiyapuram (the Polligars) rebelled against the king. The Sethupathi of Ramnad came to the rescue of the king in putting down the rebellion.

For this valuable and timely help, the Pandiyan King presented to the Sethupathi a piece of land near Mannarkoil which is now known as Rameswaram. On account of this gift, the present Rajah of Ramnad enjoys the right of chank fishery alone in the Ramnad district.

After the downfall of the Pandiyan dynasty, the Portuguese, acquired the right of the pearl and chank fisheries. Then the Dutch succeeded the Portuguese and finally it came into the possession of the British through East India Company. The following table gives an indication as to how the possession of these fisheries has been the "casus belli" between the sea powers of the west:

1. The Dutch took Tuticorin from the Portuguese in 1658.
2. It passed into the hands of the English in 1782.
3. It was given back to the Dutch in 1785 on account of the treaty of 2-9-1783.
4. Again it fell into the hands of the English in 1795.
5. The Dutch got it back again in 9-2-1818.

6. Finally it was given by the Dutch peacefully to the English on 1-6-1825.

The Indian Pearl Oyster

The name "pearl oyster" is a misnomer as it is not a true oyster. Strictly speaking it belongs to the family Aviculidae and is more related to the mussels (*Mytilus*) than to the oysters (*Ostrea*).

It has been called by different names in the past and they are:

Mytilus margaritiferus Linn.

Margarita sinensis, Leach.

Avicula Margaritifera Rossy.

Avicula Melagrina Blain.

Avicula radiata Leach.

Avicula (*Melagrina*) *margaritifera* Lamarek.

Margaritifera Vulgaris Schum.

The correct generic name, however, is *Dinctada* Roding and not *Margaritifera*. Five species are recorded in the Indian waters and they are:

1. *Pinctada margaritifera* (Linn).
2. *P. vulgaris* (Schumacher).
3. *P. chemnitzii* (Philippi)
4. *P. anomoides* (Reeve).
5. *P. atropurpurea* (Dunker).

P. vulgaris is the Indian pearl oyster found on the pearl banks in the Gulf of Mannar and round Ceylon. *P. chemnitzii* is found in the sea round Tranquebar and Mallapatnam. The pearl oyster is known in Tamil and Sinhalese languages as "Muthu Sippi".

The oyster is reported to live for about 5 or 6 years and it is ready to be fished when it attains the age of 3 years or so. As it grows, the shells increase in thickness and the gape at the hinge is also deep and wide. The depth and width of the hinge line are the best indications of the age of the oyster. Still all these signs are merely approximate guides. The sexes are separate. The spawning seasons are April to May and September to October. Fertilization is external. The fifth day after fertilization

it is known as the pearl oyster spat. Many a time in the past the spat of *Avicula voxillum* has been mistaken for the true pearl oyster spat. The former is known as the "false spat" which is very profusely coloured and markedly oblique in form than the true spat.

Pearl formations occur only after the oyster has reached the age of 3. From the point of view of the fishery, the oysters must be fished between the ages of 3 and 5. Otherwise the pearls will be lost. The age of the oysters can be roughly ascertained by the shell measurements as follows:

1 year old measures	2 × 2 inches.
2	do 3 × 2½ do
3	do 3½ × 3 do
4	do 3.6 × 3 do

Pearl Formation

The formation of pearl has been a subject of speculation and discussion among the naturalists of all ages and many curious and fantastic explanations were given. Even the poets of many lands could not keep themselves aloof from these speculations and we find these fantastic explanations reflected in their poetry. They attributed its origin to the tears of angels or water nymphs.

The pearls that long have slept,
These were tears by Maids wept.
(Scott)

The liquid drops of tears that you have shed,

Shall come again, transformed to orient pearl,

Advantaging their loan with interest
Often ten times double gain of happiness.
(Shakespeare)

According to the Hindu tradition, pearl oyster periodically goes to the surface of the sea and takes in drops of dew which in due course become pearls. It is seen from the classical and medieval writings of Europe that a similar belief in the origin of pearls from drops of rain or dew was held in those

days; it is noticed even in the folklore and traditions of some people. This belief in dew-formed pearls is recorded by Pliny also in his "Historia Naturalis". But these are fanciful views which cannot be substantiated with facts. The scientists wanted to find the actual truth from Mother Nature, who was unwilling to give all facts concerning the pearl formation to any seeker at one stretch. In 1554 Rondelet advanced that pearls are diseased concretions found in the molluscs. Anselmus de Boot (1600) was the first writer to point the similarity in material between the pearl and the shell and wrote that the "pearls are generated in the body of the creature of the same humour of which the shell is formed"..... for whenever the little creature is ill and hath not strength enough to belch up or expel this humour which sticketh on the body, it becometh the rudiments of the pearl, to which new humour, being added and assimilated into the same nature begets a new skin, the continued addition of which generates a pearl". A century later, Reaumur (1683-1757) confirmed this theory and said that pearls are misplaced pieces of shells of the animal. In 1761 Linnaeus conducted some experiments in the production of artificial pearls by putting foreign bodies in the shell with some success. This view was changed as a result of researches of Felippi in 1852 and others who advanced the parasitic theory. Several other investigations like Kuchenmeister in 1856, Mobius in 1857, E. F. Kelart and Humbert in 1859, Garner in 1871, Rephael Dubois in 1910 and Jameson in 1902, confirmed the above parasitic theory.

But in 1903 W. A. Hernman proved beyond any doubt that Cestodes, Trematodes and Nematodes and sand particles may all be concerned in the formation of pearls.

According to the modern view, there are three causes for the formations of pearls, viz.,

1. The grain of sand irritation.
2. The pathological secretion.
3. The irritation caused by the presence of parasitic worms.

As per the modern view, pearl formation is a "disease" since the pearl is not a product of health. Whatever may be the cause for the formation of pearls, the pearl formed in each case is a pathological product of the oyster's tissues. In every case it is the animal that produces the pearl and not the sand particle, organic matter on the parasite. As a matter of fact, these things merely provide the stimulus which leads to the formation of pearls. Here is a case of the lowest of all creatures making the best use of the irritation or pain by converting it into a precious gem.

"Learn from you orient shell to love thy foe,

And store with pearls the wound that brings the woe."

Many different kinds of shell fish such as mussels, conches, abalone etc. produce pearls but they are inferior in quality to that produced by the pearl oyster. The pearls produced by the pearl oysters are classified as follows:

I. The pearly excrescences noticed on the interior of the shell are due to the irritation caused by the boring animals like *clione*, *Leucodirecta*. In rare cases, a free pearl may be formed in this way.

II. **Ampullar pearls.** The nucleus in this case is the minute grains of sand or any foreign materials like the piece of shell etc. The pearls lie between the shell and the body or in a pouch (the ampullæ) of the ectoderm projecting into the mouth. The other kinds of pearls lie in a closed (ectodermal) sacs.

III. **Muscle pearls,** are formed around calcospherules or calcareous concretions near the insertions of muscles. The calcospherules are produced in the tissues and form centres of irritation.

IV. **Cyst pearls.** Most of the fine pearls contain the remains of cestode parasites. The enoysted parasite in most of the cases of oyst pearls of Ceylon is the larva of cestodes, viz. genus *Tetrarhynchus*.)

But the Indian pearl merchants classify the pearls into 17 categories according to size, quality, shape and colour as follows:

Mel, Ani, Anatari, Kalippu, Kuruval, Kayaral, Samadham, Nimolai, Sirippu, Masaku, Pisal, Kodai, Vadivu, Madanku, Tul, Masi-tul, Oddu etc.

Chemical composition.

Really the pearl is nothing but lime, the ordinary chunam used in the construction of houses etc. But the physical properties of this lime has been changed on account of the arrangement of the Lime or calcium carbonate crystals in the pearls. Otherwise chemically the pearl and the shells of all the molluscs are similar just like the diamond, graphite and charcoal in which are nothing but carbon in composition. As per chemical analysis it consists of the following:

Calcium carbonate	...	88.79
Calcium sulphate	...	4.93
Organic matter	...	2.32
Water	...	2.28
Less (no magnesium no phosphate, faint traces of iron)	}...	1.68
		100.00

Valuation of Pearls.

The valuation of Pearls depends upon its size, weight, form, colour, lustre etc. The basic value is determined by finding the square of the weight in grains. Thus if a pearl weighs 5 grains then the square of its weight is 25. The basic value is therefore fixed at Rs. 25 or according to the currency of the country concerned. For each irregularity or imperfection a certain deduction will be made from the base value of the perfect pearl of the same size and colour. Oriental pearls are very well known throughout the world from time immemorial, and they are valued more than any other kind of pearls on account of its peculiar lustre. As expressed by a pearl connoisseur, the oriental pearls possess a lustre which is

like "a warm flame lived in the heart of the pearl and shone with a clear soft brilliance through the mother of pearl. Light itself is a prisoner within the nacre." This "precious flame" is the characteristic feature of the oriental pearls.

Famous Pearls.

Pearls are queen of gems which have been valued from time immemorial. "The richest merchandise of all, and the most sovereigne commoditie throughout the whole world, are those pearls"—so wrote Pliny in *Historia Naturalis*. As usual in the case of other gems, there is a lot of superstition that pearls bring misfortune to the owner. Hence the saying: "Pearls bring tears." But inspite of "tears" man is not tired of hunting for a pearl that has no price."

Cleopatra, whose collection of pearls has become proverbial, is said to have consumed a pearl after dissolving it in vinegar at a banquet given in honour of Mark Antony. According to Pliny the value of this pearl was estimated to be 30 million sesterii. (£ 265,000). Another famous pearl was the one given by Julius Caesar to Servilia, mother of Brutus. This was valued at 6 million sesterii by Pliny. The celebrated peacock throne of Shah Jehan contained many priceless gems. Hope pearl is the largest pearl so far known in the modern world and it weighs 1300 grains, irregular pear shaped and two inches in length.

Pearl Fishing or Pearling.

There is certain amount of glamour attached to the pearl fishing on account of the risky nature of the pursuit. As expressed by Governor Van Imhoff in 1740, this risky pursuit of pearling seems to be "more of glitter than gold" Yet it attracts men, from the four corners of the world. The pearl fishery is the monopoly of the Government.

The native home of *Pinctada vulgaris*—the Indian Pearl bearing mollusc—is the gulf of Mannar and Palk Straits. The right of the fishery came into the hands of the English in 1795 and remained with the British Government till 15th August, 1947, when it passed into the hands of the Indian Dominion. The divers are mostly Roman Catholics and they belong to the Parava caste. There are some Arab and Hindu divers also but they are few. The chief of the paravas is known as the "Jathi Talivainmore." Certain privileges were enjoyed by the Jathi Talivainmore during the pearl fisheries for giving assistance such as providing necessary diving force, furnishing necessary informations about the fishery etc. to the ruling Government. The pearl banks are locally known as "Pars" which are arranged for administrative purposes into three divisions as follows:

1. The northern or Kilakarai division extending from Adam's bridge to Vaippar.

MAJOR PROBLEM OF INDIA

"The major problem at present in India is under-production, lack of wealth formation, and proper wealth distribution.

You might theoretically come to the conclusion that a certain structure of society will yield good results, but you have to take into consideration not only the productive apparatus of the country, technical capacity, etc., but also whether in trying to introduce that society you may not for a long period put an end to able production due to conflicts and other reasons. While your ideal may be an extremely good one, in reaching that, if you reach it at all, you may have to spend a generation or two in extreme distress, lack of production and poverty. Are you prepared to pay that price of extreme starvation for vast numbers of people in the name of doing good to those people? You have to consider these human and other factors."

HON'BLE Dr. JOHN MATHAI

2. The central or Tuticorin divisions ie from Vaippar to the latitude of Manappad.

3. The Southern or Comorin division i.e. from Manappad to the Cape Comorin.

Most of the pearl banks are roughly 7—8 miles from the shore and 7—12 fathoms in depth. Of all the pearl banks, Tholayirampar in the central section is the richest and most productive bank. This bank had been frequently fished in the past viz. 14 times after the banks have been taken over from the Marine Department. Other banks which had frequent spat falls and yielded good fisheries are Kudamuthu and Karuval pars. The pearl fishery was worked by the Marine Department till 1909 when it was transferred to the Fisheries Department.

Inspection of Pearl Banks.

Regular inspection of banks at periodical intervals is necessary as the formation of pearls occur only when the oysters attain the age of 3 years and the oysters live only for 5 or 6 years. In other words the oysters should be fished between 3 and 5 years so that the harvest can be gathered before the oysters die. The motto of Captain Worsley of the Marine department "Find them, watch them and fish them" expresses this idea clearly. The annual

inspection of pearl banks is therefore necessary to "find them." As it is impossible to carry the inspection of the three divisions simultaneously every year, each division is inspected once in three years to find the presence and distribution of oysters over the banks.

Three canoes with divers are engaged for the inspection of banks and they are taken to the banks to be inspected by means of motor launches. The bank is located correctly by reading the log, finding the depth, and by taking cross bearings etc. As soon as the bank is located correctly, the three canoes with divers and oarsmen are released. Usually the launch will be anchored either at the western or eastern end of the bank. Then the canoes proceed on with the detailed inspection of the bank by what is known as the "rectangular" inspection which is found by actual experience to be superior over that of the old method viz., the "circle" inspection. The buoys are planted by the launch in parallel rows and not in circles and the area to be inspected every day is marked by means of coloured buoys. The crew in each boat consists of one coxswain, two expert divers and four oarsmen. The coxswain, notes the results of diving on the data sheet. The

FINANCING OF INDUSTRIES

"But our own experience in regard to the establishment of banks for financing industries soon after the first World War has not been very fortunate. And so, before we start new industrial banks we must consider the question very carefully. We have already established an Industrial Financing Corporation in the centre and several provincial Governments are thinking of starting similar ones in the provinces.

We could not raise the standard of living in the country unless there was industrial development on a fairly large scale.

Many of the difficulties through which the stock exchange is passing cannot be easily remedied by any solution which can be given effect to in a short time. It is not so easy to stimulate the flow of capital into the investment market, there is impediment in the way it is not due to reluctance of banks to advance money on shares but more fundamental causes are responsible for this reluctance."

SIR BENEGAL RAMA RAO

buoys are laid from one end to the other end, east to west or north to south according to the prevailing wind and current and are planted at quarter mile intervals in each row as coloured flags are used to indicate the margin of the banks and also to demarcate the area already inspected. Different coloured flags are used to help the inspecting canoes so that they may keep to their respective position and not to mistake one square for another. Thus the end of rows are marked with red flags and interval by black flags and white flags alternatively to mark quarter and half miles. Such elaborate arrangement is found necessary to avoid confusion in the open sea where it is easier to be misled than on the land on account of the expanse of water and total absence of any marks. On the next day, the previous day's inspected area will be marked by means of buoys in half colours i.e. red and yellow, black and yellow flags and so on.

The canoes proceed from north to south or south to north or east to west or vice versa according to the wind and current. Nine dives are usually made in each square and the average of three dives is noted in the square marked on the data sheet. Each square in the data sheet represents one twelfth square mile or 2,58,133, 1/3 square yards. A diver is expected to cover about 3 square yards per dive. The number of oysters in a bank is calculated by adding the number of oysters entered on the data sheet relating to that bank and this number is multiplied by 86044 and the product so obtained gives an idea of the population of oysters in that bank. This figure is, of course, not an exaggerated one as the exact

than the one calculated as above. By looking at the data sheet, one can get a clear picture of the pearl banks as the nature of bottom, the number and conditions of oysters, other animals present on the banks, the enemies of oysters etc, are all entered in the squares by means of conventional signs.

If a detailed inspection of a bank reveals the presence of oyster spat or oysters in large numbers, then it must be decided whether it would be worth while to conduct a pearl fishery immediately or at a later date. This, of course, depends upon the age and the maturity of the oyster as well as upon the financial aspect of the matter. If the oysters are immature, then the bank must be guarded and patrolled frequently to prevent poaching. Fishermen should not be permitted to fish in that region. Enemies of oysters such as star fishes, Vellamin (*Lethrinus* sp.) etc. should be reduced to the minimum. "Find them, watch them and fish them" should be the motto. In such cases, the bank must be inspected at shorter intervals, viz., once in 6 months or so and sample oysters must be lifted periodically for valuation. The sample oysters are washed for pearls which are valued by the experts. If the detailed valuation statement shows a good profit to the Dept., then the sanction of Government for conducting a pearl fishery must be sought. After obtaining the sanction of Government it is widely advertised in all leading English and vernacular dailies of this Presidency, Bombay, Calcutta, Burma, Ceylon, & Fort St. George Gazette, etc. A suitable site for the temporary "Pearl Town" is selected with great care. This pearl town will be

office, revenue, police, Dept., staff etc. The glamour of pearl fishery is such that it will attract huge crowds of all sorts of persons from the four corners of the world—pearl merchants from Bombay, brokers, jewellers, pearl divers, shop keepers, fortune hunters, pick-pockets etc. The pearl town will be a busy place where one may become a millionaire or a pauper in a fleeting moment.

Pearl Fishery Operations

Before the actual commencement of the fishery, the Beach Master registers and numbers all boats, tindals, mundocks (Thodais) boatmen and divers and issues permits for fishing. The boats will leave the shore every day at 5 a.m. when a gun will be fired.

The fishing operations will be carried on under the direction of the Inspector or Asst. Inspector of Pearl Banks. The services of launches are utilized for towing the canoes to the banks if the wind is adverse. After fishing, the divers should bring their catches to the depot vessels or wait there for the depot vessels where the oysters will be divided in the ration 1:2 i.e. one third catch to the divers and two thirds to the Government. The Government shares are then brought to the shore when they are counted and stored in gunny bags and then auctioned that night itself. The fishery will be carried on till the beds are depleted of oysters unless something unforeseen like epidemics (cholera) breaks out. In such cases, the fishery will be closed immediately.

The revenues realised by Government during the last eight pearl fisheries are given below:

Year	Gross	Net.
1889	Rs.1,89,984	Rs.1,58,483
1890	25,061	78,08
1900	19,461	11,033

Year	Gross	Net
1908	10,218	7282
1914	16,542	2497
1926	2,25,498- 6-0	1,54,436 11-4
1927-28	1,95,038-14-0	1,86,427-13-1
1928	2,02,575- 6-0	1,87,221-7 -10

Causes for failure of pearl fisheries

It is a curious fact to note that when there is a fishery on the Indian coast, there is nothing on the Ceylon coast and vice versa. No satisfactory explanation can be given for this curious phenomenon of the irregular cyclic character of the pearl fisheries of South India and Ceylon.

There was no pearl fishery after 1928 on the Indian as well as on the Ceylon coasts. What are the probable causes for the failure of the fishery? Most probably it may be due to the shifting of sand to the pearl banks on account of the strong currents prevalent during the south west monsoon and occasionally to storms. After hatching out from the egg, the pearl oyster larva has a free swimming stage for 5 days when it must settle down on any hard substratum and lead a sedentary life afterwards. If there is no hard substratum like rocky bed for settling down, it will die. Or if there is any strong current during its free swimming larval stage, it may be prevented from settling down and washed away from the pearl banks in which case also it will die. It is noticed that the nature of the beds has changed from rocky bottom to sandy in some of the banks. Secondly, the pearl oyster must have some natural enemies. Some of the probable enemies of pearl oysters are as follows:—

1. Voracious fishes chiefly Rays (especially *Rhinoptera javanica*), File fishes, (*Balistes*) and *Lethrinus* sp.
2. Boring gastropods (*Sistum* sp, *Pinnaxia* sp, *Nassa*, *Murox*, *Purpura* etc.)
3. Boring sponges (*Cliona margaritifera*.)
4. Boring worms (*Polydora* sp.)

5. Star fishes (chiefly *Pentaceros lincki* and *Luidea masculata*.)
6. Smothering Lamellibranch molluscs such as *Modiola barbata*.
7. Crabs and cuttle fishes and other animals which tear off the byssus and crush the pearl oysters.
8. Lastly man himself, on account of his greediness causes wholesale destruction without any thought for the future.

Thirdly, it may be due to overcrowding of oysters resulting in the competition for food, living place between pearl oysters and other associate animals, like crabs, barnacles, sponges etc. Incidentally it may be due to disease caused by *Sporosoa* and other worm parasites. The ruthless destruction of pearl oysters caused by overfishing may after all be the primary cause for the disappearance of pearl oysters in the pearl banks of S. India.

It is not possible to predict a pearl fishery as the natural spat fall is erratic. Some of the causes enumerated above for the failure of the fishery may be removed. For instance cultch material may be provided on the beds so that when spat fall occurs, the oyster spat may settle down. Some of the enemies of oysters may be reduced in numbers to permit the oyster to grow without any interference from its enemies. Transplantation and cultural operations can also be attempted. Overfishing must certainly be prohibited when a fishery occurs.

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NEWS & NOTES

REARING OF FISH IN KODAI LAKE Expansion Possible

To investigate the possibilities of the expansion of pisciculture on the Upper Palnis, Mr. P. I. Chacko, Assistant Director of Fisheries (Fresh Water Biology), and Mr. S. V. Ganapathi, Fisheries Hydrologist, camped at Kodaikanal a week from Oct. 16.

"A preliminary hydro-biological survey of the Kodaikanal Lake has revealed the existence of a large number of golden carp, masheer minnows and a variety of sardines. It is proposed to enrich this fishery by introducing mirror carp, scale carp and tench from Ooty. The first consignment of the former two species is already being nursed in the Bryant Park Pond. With proper conservation and exploitation, the Kodai Lake, besides affording sport to anglers, can easily meet the entire needs of the town for fish."

"The Pambar Reservoir, the source of water supply to the town, has been found suitable for rainbow trout, a fine sporting fish. The streams on the Upper Palnis previously stocked with trout by the Palni Hills Game Association are not easily

accessible to anglers. However, the Pambar and the Parappar which flow through the Kodai municipal limits can be converted into excellent trout streams by methodical annual stocking and managerial procedure. A suitable site for a trout hatchery has also been selected near the Bear Shola Falls."

DEVELOPMENT OF FISHERIES Minister on its Importance

Hon'ble Mr. J. L. P. Roche Victoria, Minister for Food, visited the Port Office at Cocanada on 19th Oct. 1919.

After visiting Uppada and Pithapuram the Minister returned to Cocanada and visited the Vocational Training Centre and the M.S.M. Charities School where he was entertained at lunch by the trustees of the Charities.

Later, the Minister addressed the students of the Andhra Polytechnic at a reception held by the students of the Fisheries Section. Mr. J. Sree Ramamurthy, Principal, presided. Mr. P. Satyanaravana read and presented an address to the Minister.

Replying, the Minister stressed the need to popularise the consumption of fish and the development of fisheries.

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