



REPORT OF THE KING INSTITUTE OF PREVENTIVE MEDICINE, GUINDY

FOR THE PERIOD FROM 1ST APRIL 1954
TO 31ST MARCH 1955

BY

DR. Y. S. NARAYANA RAO, M.B.B.S., D.T.M. (Cal.), D.B. (Lond.)
Director, King Institute, Guindy

AND

REPORT OF THE GOVERNMENT ANALYST, MADRAS

FOR THE PERIOD FROM 1ST APRIL 1954
TO 31ST MARCH 1955

BY

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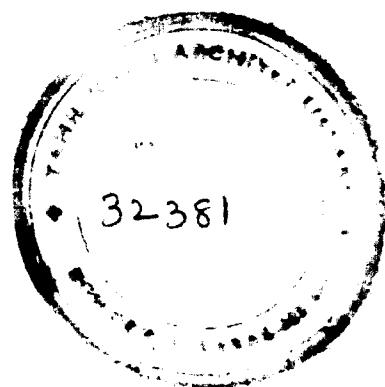
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REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY, FOR THE PERIOD FROM
1ST APRIL 1954 TO 31ST MARCH 1955.

STAFF.

Qualifying Officers.

Medical.

1. Dr. A. S. Narasimhan, M.B., B.S., D.M., (Cald.), D.B.,
(Lond.), Director.

Medical Officers.

2. Dr. S. Govindarajulu, M.B., B.S., Assistant Director,
(under study).

3. Dr. M. K. K. Mahalingam, M.B., B.S., Assistant Director,
Department of Medical Hygiene.

4. Dr. M. Narayana, M.B., B.S., Assistant Director,
Department of Biological Control and Disease Specimens.

5. Dr. C. Srinivasan, M.B., B.S., D.M. (S.), D.P.H., Assistant
Director, Blood Transfusion.

6. Dr. M. W. M. L. S. Srinivasan, Assistant Director,
Diagnostic and Therapeutic Laboratory.

7. Dr. C. Venkatesan, M.B., B.S., D.M. (S.), Assistant Director,
(Diagnostic from 1st April 1955).

Medical Officers.

8. Dr. N. S. Subramanian, M.B., B.S., Assistant Surgeon.

9. Dr. R. L. Subramanian, M.B., B.S., Civil Assistant
Surgeon, up to 20th July 1955.

10. Dr. Devala B. Subramanian, M.B., B.S., Assistant Surgeon.

11. Dr. P. Ramaswami, M.B., B.S., Civil Assistant Surgeon.

12. Dr. K. K. Appalarasu, M.B., B.S., Civil Assistant Surgeon.

13. Dr. T. S. Subramanian, M.B., B.S., Civil Assistant Surgeon.

14. Dr. N. B. Rappaport, M.B., B.S., Civil Assistant Surgeon.

15. Dr. S. Subramanian, M.B., B.S., Civil Assistant Surgeon.

16. Dr. Andujana, N. Subramanian, M.B., B.S., D.P.H., C.P.H.,
Civil Assistant Surgeon.

OFFICE.

NON-GAZETTED OFFICERS.

Manager	..	..	..	..	Sri Gopala Iyer, from 1st April 1954 to 4th January 1955.
					Sri Gopalakrishnan, from 5th January to 31st March 1955.
Librarian	..	..	..	..	Srimathi S. Sundaramma, B.Sc., Dip. Lib. Sc., Dip. in French.
Permanent	..	..	..	..	Accountant 1, Cashier 1, Store-keeper 1, Upper Division Clerks 3 + 2 temporary, Lower Division Clerks 17 + 4 temporary, Typists 4, Stenographers and Steno-typists 2, Attenders 5, Telephone attendants 3.
Permanent	..	..	..	..	Sample takers 5, Technical Assistants 2, Technicians 16 + 4 temporary, Lab. Attendants I Grade 33 + 2 temporary, II Grade 51 + 8 temporary, Lab. Peons 72 + 17 temporary, Algae Collector 1, Compounder 1.
Miscellaneous staff	..				Photo Artist 1, Overseer 1, Deputy Overseer 1, Assistant Overseers 4, Electrician 1, Mechanic 1, Refrigerator Mechanic 1.

4. Sri G. Balasubramaniam, B.Sc. (Hons.), from 1st April 1954 to 25th April 1954.
5. Sri V. Seshagiri Rao B.Sc., (Hons.) Tech.
6. Sri S. Kasthuri, M.A.
7. Sri P. Appavu, B.Sc. (Hons.).
8. Sri M. R. Gopalan, M.A.
9. Sri S. A. Subramaniam, B.Sc., from 1st April 1954 to 30th April 1954 and Sri P. Chandrasekar Rao, B.Sc. (Hons.) from 6th May 1954 onwards.
10. Kumari H. Packiyam, B.Sc. (Hons.).
11. Sri K. Sambandam, B.Sc.
12. Sri M. S. Parthasarathy from 1st May 1954.
13. Sri K. T. Gopalakrishnan, B.Sc., from 8th March 1955 to 31st March 1955.
14. Sri S. Subramaniam, from 12th March 1955 to 31st March 1955.
- N. Gopalakrishna Rao, from 12th April 1954 to 26th April 1954.
15. G. Ranganathan, M.Sc., from 3rd May 1954.
16. Sri N. Srinivasan, M.A., from 16th April 1954 to 2nd May 1954 and from 1st October 1954 to 7th November 1954.
- Acting Sri M. S. Parthasarathy, up to 15th April 1954.
- Acting V. Ramachandran, M.A., M.Sc., from 5th June 1954 to 1st July 1954.
- Acting V. Kondal Rao, M.Sc., from 14th July 1954 afternoon to 31st December 1954.
- Acting K. T. Gopalakrishnan, B.Sc., from 12th January 1955 to 2nd March 1955.
- Acting R. Rajalaxshmi, B.Sc. (Hons.) from 3rd March 1955 to 31st March 1955.

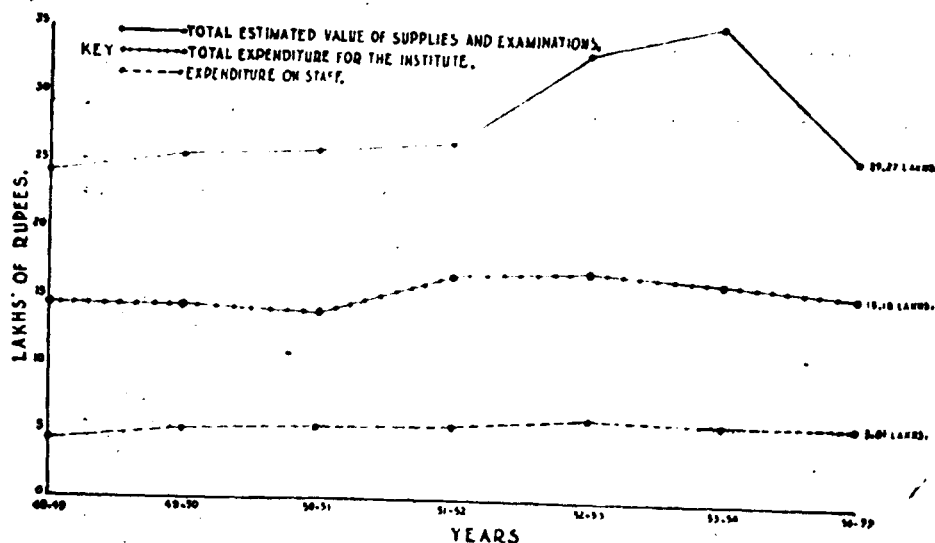
Junior Chemical Assistants.

<i>Solution Section</i>	..	..	..	1. Sri V. V. Krishna Rao, B.Sc., (Hons.),
				2. Sri V. Kondal Rao, M.Sc.
				3. Sri T. Sethuraman, B.Sc.
<i>Anti-Toxin Department</i>	..	..		1. Sri S. Srinivasaraghavan, B.Sc.
				2. Sri T. R. Krishnaswamy, B.Sc., (Hons.), temporary.
<i>Junior Assistant (Vaccine Lymph Section).</i>				1. Sri P. Munuswamy Raju.

GENERAL REVIEW.

The following graph affords a comparison of the expenditure on staff, total expenditure for the Institute and total estimated value of supplies and examinations for the past 6 years including the year under report.

CHART.



There is a slight decrease of about Rs. 1,00,000 in total expenditure. There is a fall in the total estimated value of supplies and examination for the year under report by about eight lakhs as compared to the same of last year. This steep fall in the estimated value of supplies and examinations of this Institute for the year under report is due to the fact that there has been practically no Cholera this year in the States of Madras and Andhra and as such there has been very little demand for Cholera Vaccine in comparison with previous year. Though there is a slight decrease in the demand for Kahn and Wassermann, the demand for other Laboratory Tests were on the increase. The production of A. T. Serum was on the increase during the year under report.

The activities of the Water Analysis Department are on the increase.

Finance.—The total expenditure for the year amounted to Rs. 15,17,845 (see Table I) including the amounts borne by other Departments on Institute Account. The total cash receipts by way of sale proceeds of Sera, Vaccine and collection of payments for services rendered amounted to Rs. 2,48,764. The difference (i.e.) Rs. 12,69,081 represents the net cost of the Institute debited to State Revenues.

As usual, supplies of all Biologicals, Bacterial Vaccine, Anti Toxic Sera, Sterile Solutions, Saline and Saline sets, Blood Plasma, etc., manufactured in this Institute are made free to all Government Institutions. Similarly, the Anti-Toxins and Sera purchased from abroad are also issued free to all Government Institutions; Clinical and Bacteriological examinations are also done free as usual. All Government Institutions in Andhra State are also being supplied with the above mentioned Biologicals, Bacterial Vaccines, Sera, etc., and rendered the services mentioned above. After the separation of the Andhra State, however, from 1st October 1953 the question of adjustment of 36 per cent of the net expenditure of this Institute to the Andhra State towards the above supplies and services is still under the consideration of the Government.

As usual, free supplies and services to local bodies of Vaccine Lymph and Prophylactic Cholera Vaccine and Clinical and Bacteriological examination of specimens received from Medical Institutions run by Local Bodies are also made. Such supplies and services are also extended to Local Bodies of Andhra State, but this is expected to be covered by the adjustment of proportionate expenditure referred to above.

During the year under report Government have ordered free supply of the undermentioned Vaccines to the Institutes noted below :—

1. Sevasamaj Boys Home and Bala Vihar, Madras.
2. Presidency College Social Service League.
3. Cancer Institute, Adayar.

If the above supplies and services rendered by the Institute were to be charged for according to the rates approved by Government, the total anticipated receipt as shown in statement III of Table I, would amount to Rs. 24,19,347-1-0. The difference between these estimated receipts and the actual expenditure, i.e., Rs. 9,01,501-9-2 represents the net profit to Government.

Government have ordered that Pro forma Accounts should be maintained in this Institute for the manufacture of various Vaccines and Sera on Commercial basis. Government have also sanctioned the appointment of a Commercial Accountant on Rs. 80—125 and a Lower Division Clerk. Soon after this staff is appointed, Pro forma accounts will be maintained on commercial lines.

During the year under report, Government in G.O. Ms. No. 1994, Health, dated 16th July 1954, have sanctioned the following additional staff for the manufacture of Intravenous Solutions in bottles and supplies to City Hospitals.

Junior Chemical Assistant	...	...	...	...	One.
Technician	...	...	...	...	One.

Laboratory Attendant, II Grade	...	...	...	Four.
Laboratory Peons	...	...	...	Ten.
Lower Division Clerk	...	...	...	One.

At the instance of the Cinchona Department, this Institute has undertaken the ampouling of Quinine di Hydrochlor and supply to the indentors on behalf of the Cinchona Department. This work will start in the next year.

Government have sanctioned during the year under report, the appointment of six additional calf watchmen to cope up with the work in the Vaccine Lymph Section.

Proposals for the appointment of two additional Syces to work out to a ratio of one Syce for every two horses in the Anti Toxin Department have been made to Government. The sanction of 6 Syces as leave reserve has also been asked for. These posts are hoped to be sanctioned early.

Buildings.—Proposals for the construction of Stables to house 100 horses with necessary adjuncts at a rough cost of Rs. 7½ lakhs have been sent to Government for execution under the Second Five-Year Plan.

Vaccine Lymph.—During the year under report 135,906 ml. of Glycerinated Vaccine Lymph was manufactured as against 210,462 ml. for 1953-54. A total quantity of 5,617,140 doses as against 5,180,450 doses for 1953-54 of Glycerinated Vaccine were issued to the field after the usual test of purity, potency of toxicity. The potency of the Vaccines had been satisfactory, both by tests on calves in the Laboratory and by results of primary Vaccination of children in the experimental range.

Production of Vaccine was suspended during the month of February 1955 owing to diseases among the calves, and the usual cessation of Vaccination during summer months was observed in continuation.

Further trials in the production of freeze dried vaccine was continued and the results of the tests for purity and potency on calves were satisfactory. Trials of freeze dried Vaccine in comparison with the routine liquid Glycerinated calf Lymph with regard to Potency are being conducted through primary vaccination of recruits by the kind co-operation of the Assistant Director of Medical Services, Madras Area, who has arranged with the officer in charge, Pathological Laboratory, Bangalore, for Primary Vaccination of recruits.

Serolog section.—During the year under report, there was a slight fall in the total number of specimens tested as specimens from Stanley Hospital and General Hospital were sent to the Up-graded Venereal Department of the Government General Hospital, Madras, for V.D.R.L. slide flocculation tests.

Testing of Cerebrospinal fluid of academic interest and research cases from Dr. Dhairiyam, M.D., were done during the year.

The supply of Kahn and Wassermann Antigen was on the increase during the year. The demand for Media continued to be heavy during the year.

This section participated in the "Inter Laboratory Evaluation of Serological tests of the I.C.M.R. under Dr. R. V. Rajam, Officer-in-charge of Inter Laboratory Evaluation of procedure for Serological test for Syphilis for 1954-55.

There was a slight fall in the number of specimens examined for Kahn and Wassermann.

Clinical section.—This section received 15,438 specimens for Microscopical, Cultural and Agglutination tests from Government and Local Fund Hospitals, etc., and private practitioners as against 15,955 during last year. Due to low incidence of Cholera in Madras and Andhra States the number of specimens of faeces received for Cultural examination considerably decreased during the year. Notwithstanding this, the total number of specimens received were nearly the same as during the previous year, proving that Hospitals and private practitioners are sending other specimens in increasing numbers.

Prophylactic vaccine section.—The demand for Cholera Vaccine has been very little in comparison with previous years. This is mainly responsible for the steep fall in the estimated receipt of the Institute for this year.

The Prophylactic Vaccine section has manufactured 602,718 doses of Cholera Vaccine and supplied 20,97,143 doses of the same to Madras and Andhra States during the year under report. It has also manufactured 170,403 c.c. of T.A.B. Vaccine and issued 1,76,295 c.c. to Madras and Andhra States.

Department of anti toxins.—There were 64 horses at the end of the year for the production of Therapeutic Serum for the use of the various medical Institutions of the State. As the demand for Tetanus Anti Toxin continued to be high, a large proportion of the horses was assigned for the production of Anti Tetanic Serum. The Department still suffers for want of additional stable accommodation as the entire needs of this State for serum could be satisfied only by still further increasing the number of horses. However, it will be observed that the department has turned out a considerable

amount of work inasmuch as 2,255 litres of Plasma were processed for serum production. The report of the Department shows that Biological standardisation was conducted on 319 samples of sera.

The extent of research work undertaken on various aspects of applied immunology is also seen in the report. The acquisition of a new special apparatus for Electrophoretic studies deserves special mention. With this apparatus, a precise appraisal of immunogenic responses in the horses could be made by Electrophoresis. This also helps in the research studies on various Bio-Chemical features of Serum Proteins in general. Another noteworthy research activity of this Department consists in the manufacture of concentrated toxins and toxoids and observation of their immunising value in the horses. The result of this work will be of considerable value, in the serum manufacturing methods now employed by the Department. Preliminary experiments were conducted in this Laboratory by paper Chromatography for the analysis of Serum Proteins and for examination of the essential Amino-Acids in the culture media for Tetanus Toxin.

Blood Bank.—The activities of the Blood Bank are increasing year after year. Seventeen Medical Officers underwent training during the year under report. The general stores of this Institute is the centre for stocking all articles required for Blood Banks in the State. Supplies of all Blood Bank stores including Saline Transfusion sets to all Headquarters Hospitals, and the City Hospitals and the Andhra State are made from this Institute. The Blood Bank Department took part in the Mayuram, Kumbakonam, Salem and Madras (Teynampet), Exhibitions held during the year.

Department of Biological Control.—One thousand seven hundred and seventy-eight specimens were received during the year for analysis out of which 19 samples were found to be of standard quality. The other five were not of standard quality.

Water Analysis Section.—The Department of Water Analysis and Algae Control continued its work of analysis of water on all protected water supplies in Madras and Andhra States. Samples of water received from water schemes sponsored by the Sanitary Engineering Department, Public Health Department and Regional authorities in charge of Local Development were tested for their suitability for drinking purposes, etc. The researches on Water Purification carried out at the Government Experimental Filter Station, Kilpauk, and all the Analytical examinations pertaining thereto were undertaken. Field investigation of problems connected with water-supply and trade waste disposals was one of the important functions of this Department.

Bacteriological examination of samples of milk during the production of reconstituted milk at the Government Milk Factory, Teynampet, continued to be performed during the year.

Analysis of water to find out their industrial use were also conducted.

The Southern Railway authorities have erected a Filter Plant and other appurtenances at Guntakkal Railway Station for conducting semi-large scales experiments on the removal of fluorides from drinking water. Though the necessary staff and the funds have been sanctioned, the personnel have not been appointed and it is hoped that this will be done soon and the work started.

As per the recommendations of the Indian Standards Institute and the orders of the Government thereon this department has now arranged for the supply of Bacterium Typhosum Lister Strain No. 786 to the various Laboratories in India for carrying out the test for determining Rideal walker co-efficient of coal tar disinfectants, black and white.

Library.—An extensive specialised library is maintained. It serves the needs of the members of the Institute Staff, Officers of the B.C.G. Laboratory and a few members of the Public Health Medical, Veterinary and Public Works Departments, stationed in the City. This Library is one of the very few Medical Libraries in India which have been selected under the India Wheat Loan Educational Exchange Programme.

During the year under report, 103 volumes of books and 197 volumes of Bound Journals were added to the original stock bringing the total to about 11,906 volumes.

The number of Institutions sending their publications in exchange for our Annual Report was 71 and the number of different journals received in our library during the period under report was 183.

Staff meeting.—The weekly staff meetings of the Scientific Staff were held regularly.

Scientific papers published during the year.—(1) Smallpox in a child, aged 3 days, by Dr. Y. S. Narayana Rao, M.B.B.S., D.T.M. (Cal.), D.B. (Lond.), Dr. N. R. Ratnakannan, M.D., Dr. K. S. Balasubramaniam and Sri K. N. Gopalan, *British Medical Journal*, 18th December 1954.

(2) An improved Freeze Dried Vaccine Lymph, I.S.M.R., April 1954, by Dr. Y. S. Narayana Rao, M.B.B.S., D.T.M. (Cal.), D.B. (Lond.), Dr. N. R. Ratnakannan, M.D., and Dr. K. S. Balasubramaniam.

Educational.—The Certified Laboratory Attendants and Technicians Training Courses were continued during the year 1954-55. Eighteen candidates have undergone training in the Certified Laboratory Attendants Course among them, six candidates were trained as private candidates on a stipend of Rs. 30 per mensem. Sixteen candidates out of these 18 candidates have come out

successfully. Fifteen candidates have undergone training in the Certified Laboratory Technicians Training Course, among them 10 candidates have come out successfully. The five candidates who failed in the final examination are given further training in the respective Departments.

There are several enquiries from the various State Hospitals for qualified candidates for appointment as Technicians. As no service candidates are available, the five private candidates who passed the Certified Laboratory Attendants Training Course were recommended for appointment as unqualified Technicians.

Training.—Seventeen Medical Officers from Madras, Andhra and Bihar were trained in the Technique of Blood Transfusion and Re-suscitation in this Institute during the year under report.

The following candidates were given training in one or more branches of work of this Institute as indicated :—

(1) Dr. V. N. Viswanathan, D.C.L.C. student, Post Graduate training in Bacteriology—three weeks from 1st April 1954.

(2) Dr. S. Anantawamy, Chemical Examiner to Mysore Government—Observance of Laboratory Work in the Institute—three weeks from 15th April 1954.

List of distinguished visitors.—The Institute was honoured during the year by the visit of :

Distinguished Visitors from 1st April 1954 to 31st March 1955.

(1) Srimathi H. M. Devi, Deputy Minister of Health, Government of Orissa.

(2) Mr. C. K. Atkins, Adviser in Public Health Engineering, to the Ministry of Health, Government of India.

(3) Mr. Robert Clark, Chief Public Health Engineer, World Health Organization, Geneva.

(4) The Hon'ble Sri A. B. Shetty, Minister of Health, Government of Madras.

(5) Sri M. M. Adyanthayya, retired Joint Director of Industries and Commerce, Madras

(6) Sri Shri Prakasa, Governor of Madras.

(7) Dr. Thomas B. Tuner, M.D., The John Hopkins University, Baltimore, Md.

(8) Dr. M. Zakhorova, Academy of Medical Science, U.S.S.R.

(9) Sri M. Tarbkova, Interpreter, U.S.S.R.

(10) Dr. A. Refyi, Director, Nazi Institute, Iran (Hazzal).

(11) Sri Sootan Bahroem Sjah, Consul for Indonesia, Bombay.

PART I—ROUTINE WORK.

VACCINE LYMPH SECTION.

(Period 1st April 1954 to 31st March 1955.)

Charge.—Dr. Y. S. Narayana Rao, M.B.B.S., D.T.M. (Cal.), D.B. (Lond.).

1. *Manufacture and issue of Vaccine lymph.*—The period under report opened with a stock of 314,136 ml. of vaccine lymph on hand. During the year 135,906 ml. of 1 in 7 glycerinated lymph was manufactured. The average yield of crude vaccinal pulp per calf was 30.8 grammes. A total quantity of 208,353 ml. of vaccine lymph in a dilution of 1 in 7 was issued to the field during the year. Production of vaccine had to be suspended during the month of February 1955, owing to incidence of foot and mouth disease among the calves, and as the balance of vaccine lymph on hand was 232,095 ml. of 1 in 7 dilution. (Quantity sufficient for over a year's demand), the usual cessation of routine manufacture during summer months was observed in continuation. Thus the manufacture and issue of vaccine lymph had been within normal limits and the stock position satisfactory. The usual off-season for vaccination during summer was observed during the year.

All the batches of lymph were treated with chloroform vapour, to reduce the viable bacterial content, before issue to the field. The usual tests for conformity with the bacteriological standards, toxicity and potency were done on all batches of lymph issued to the field.

2. *The Potency of the Vaccine lymph.*—The potency of the vaccine lymph is ensured before general issue to the field by testing samples of different lots of vaccine lymph, both, in the laboratory on calves, and in the experimental range by primary vaccination of children.

Two thousand two hundred and twenty-five primary vaccinations were verified with a case success rate of 94.7 per cent and an insertion success rate of 82.4 per cent.

3. *Analysis of the result statements received from the Districts, Municipalities, Corporation of Madras, etc.*—This analysis, which is for the calendar year 1954, with reference to the total doses of vaccine issued to the field and the returns received in respect of vaccinations done, are given below separately for Madras and Andhra States. Out of a total of 5,617,140 doses of vaccine lymph issued, 3,750,160 doses were supplied to Madras State and 1,866,980 doses to Andhra State.

(A) *Total vaccinations and types*—(Table II) (a) and II (b)—

(a) *Madras State.*—Returns were received in respect of 5,105,686. vaccinations performed of which 22.8 per cent were primary; 0.9 per cent secondary; and 76.3 per cent re-vaccinations.

(b) *Andhra State.*—Out of 2,551,756 vaccinations performed for which returns were received, 23.3 per cent were primary; 0.4 per cent secondary; and 76.3 per cent re-vaccinations.

(B) *Primary vaccinations*—Tables II (a) and II (b), III (a) and III (b)—(a) *Madras State*.—Results were received for 927,697 primary vaccinations with the following success rates :—

	Case success rate. PER CENT.	Insertion success rate. PER CENT.
Corporation of Madras	99.9	93.8
Municipalities	99.3	94.4
Districts	96.9	89.3
State as a whole	97.4	90.3

(b) *Andhra State*.—Returns for 504,931 primary vaccinations were received with the following success rates :—

	Case success rate. PER CENT.	Insertion success rate. PER CENT.
Municipalities	98.9	93.0
Districts	94.0	80.7
State as a whole	94.5	82.1

(C) *Re-vaccinations*—Tables II (a) and II (b), III (a) and III (b).—Returns for 2,443,662; and 1,270,028 re-vaccinations verified were received from Madras and Andhra States respectively with the following results :—

	Case success rate	
	Madras State. PER CENT.	Andhra State. PER CENT.
Corporation of Madras	4.9	..
Municipalities	14.9	11.4
Districts	13.8	11.2
State as a whole	12.9	11.2

4. *Lymph unaccounted for*.—The figures of Madras and Andhra States for the percentage of lymph unaccounted for are 15.8 and 15.4 respectively.

5. *Special Activities*.—(a) The production of more batches of freeze dried vaccine lymph, to determine the consistency of the previous results obtained, was continued. The results of the tests for purity and potency in the laboratory on calves were quite satisfactory.

Trials are being conducted to assess the potency of the product in comparison with the routine liquid glycerinated calf lymph with the kind co-operation of the A.D.M.S., Madras Area, who has arranged with the Officer Commanding, Pathological Laboratory, Bangalore, for primary vaccination of recruits.

(b) With a view to produce potent freeze-dried vaccine from the chorio-allantoic membrane of developing chick, tests for potency of the vaccinia virus cultivated on the chorio-allantoic membrane at different passage levels are being done to determine the optimal passage for the final production of freeze dried vaccine.

6. RESEARCHES.

Trials, in the field, to assess the potency of the freeze-dried vaccine produced in this Institute, in comparison with the routine glycerinated lymph :—

The results of the trial of the first supply of freeze-dried vaccine, reported by the Officer-Commanding, Pathological Laboratory, Bangalore, has been communicated by the A.D.M.S., Madras Area. The wet (glycerinated) lymph was obtained from the Vaccine Institute, Bangalore.

Thirty-six recruits, who had no signs of primary vaccination, were selected. The ages of these recruits were from 14 to 16 years. They were divided into three batches of twelve each. The first batch received two insertions, on the forearm, of the dried vaccine reconstituted in 50 per cent glycerine; the second batch received two insertions of the glycerinated lymph; and the third batch received two insertions, on the right forearm, of the reconstituted vaccine lymph and two insertions, on the left forearm, of the routine wet lymph. Results read on the 5th and 7th days after vaccination were as follows :—

	Number of takes.	Remarks.
I Batch	12	
II Batch	11	
III Batch	11	Rt. arm (dried vaccine). The one case of failure in this batch bears faint marks of smallpox on his face, and it is presumed he suffered from smallpox.
	11	Lt. arm (wet vaccine).

DIAGNOSTIC DEPARTMENT.

Charge.—Dr. C. Venkateswara Rao, M.B.B.S., L.O., Assistant Director.

Assistant Surgeons—

Dr. N. Rajasekharan, M.B.B.S.
Dr. Mrs. A. Natarajan, M.B.B.S.
Dr. Mrs. Chandra Bai, M.B.B.S.
Dr. Dinker Babu Rao, M.B.B.S.
Dr. Mrs. Kanakaraj, M.B.B.S.
Dr. P. K. Menon, M.B.B.S.

This year this section had examined and reported on 15,438 specimens received for microscopical, cultural and agglutination tests from the various Government, Local Fund and Mission Hospitals and Private Practitioners in this State and the Andhra State. Due to the low incidence of cholera in this State this year the number of motions received for cultural examination had considerably decreased and the number of specimens received from the Andhra State had also decreased in number. In spite of this the number of specimens examined had nearly reached the maximum thus showing that the number of specimens that are being sent from the hospitals of this State are increasing in number. 103 specimens were received for histopathological examination and report.

The details of the number of serological tests done along with the details as to the positive results are appended in tabular statements. During this period there was a slight fall in the total number of specimens tested on account of the fact that the Women and Children, Hospital and Stanley Hospital, Madras, were sending their specimens to the Upgraded Venereal Diseases Department, General Hospital, Madras, for V.D.R.I. Slide flocculation tests.

This section participated in the "Inter-laboratory Evaluation of Serological Tests" of the "Indian Council of Medical Research" under Dr. R. V. Rajan, Officer-in-charge, Inter-laboratory Evaluation of procedure for Serological tests for Syphilis in 1954-55. Kahn, VDRL Microflocculation and complement fixation tests were done on the specimens received from Venereal Diseases Department, General Hospital, Madras, and if found positive a quantitative Wassermann, Kahn and VDRL were also done.

This section also undertook to test specimens of cerebro-spinal fluid of Academic interest and Research cases from Dr. J. Dhairiyam, M.D., Madras. A report as to the number of specimens tested is enclosed.

The supply of reagents such as Kahn and Wassermann antigens was continued this year also. The supply during the year was 4,882 cc. of Kahn antigen and 60 cc. of Bullock-Heart-Extract (WR. Antigen)—2,720 cc. of Kahn and 40 cc. of WR antigens more than the previous year.

The demand for media continued to be heavy and the statement of supplies made are shown in Tables V and V (b).

PROPHYLACTIC VACCINE SECTION.

Charge.—Dr. C. Venkateswara Rao, M.B.B.S., L.O., Assistant Director.

Assistant Surgeons—

Dr. Padmanabhan, L.M.P.

Dr. Mrs. N. Saraswathi, D.M. & S.

This section had manufactured 602,718 doses of Cholera Vaccine and supplied 2,097,143 doses of which 804,849 doses were supplied to Andhra State. This section had, also manufactured 198,098 doses of T.A.B. vaccine and supplied 200,270 doses of which 20,322 doses were sold to the Andhra State. The demand for Plague Vaccine was a little higher this year and 192,680 cc. of Plague Vaccine was issued. The Plague Vaccine was as usual obtained from the Haffkine Institute, Bombay.

THERAPEUTIC VACCINE SECTION.

Charge.—Dr. C. Venkateswara Rao, M.B.B.S., L.O., Assistant Director.

Assistant Surgeon.—Dr. Mrs. C. J. Anna, M.B.B.S.

The Therapeutic Vaccines supplied this year amount to 6,958 doses and the Auto Vaccines 824. There is still demand for these vaccines in spite of the various Anti Biotics available in the market. The demand for streptococcus vaccine (filarial origin) and the the whooping cough vaccine are increasing year after year. This section had also manufactured and supplied, Bacterial suspensions, Specific high titre sera, old Tuberculin for montoux and vonperquit tests. This section also maintains all the live pathogenic cultures and supplies them on request to other laboratories.

STERILE SOLUTION SECTION.

Charge—

Dr. M. Narayana Pai, M.B.B.S., was in charge of the Section from 1st April to 3rd June 1954 and from 2nd October 1954 to 31st January 1955.

Dr. K. Dattatreyyulu, M.B.B.S., was in charge of the Section from 4th June to 1st October 1954 and from 1st February to 31st March 1955.

Senior Chemical Assistant.—Sri V. R. Srinivasan, M.A., throughout the year.

Junior Chemical Assistants—

Sri V. V. Krishna Rao, B.Sc. (Hons.), throughout the year.

Sri V. Kondala Rao, M.Sc., from 1st November 1954.

The manufacture and supplies of Sterile Solutions to medical institutions in the Madras State as well as those in the Andhra State have been continued. The scheme for large-scale manufacture

of intravenous solutions like Glucose Saline, 20 per cent Glucose, Normal Saline, etc., in bottles of 540 c.c. has been taken up and considerable supplies of these solutions have been made to all city hospitals. The demands of hospitals for sterile solutions seem to be continually on the increase. Unless additional facilities are provided it will be very difficult to meet these demands in full.

During the period under report, ampoules of sterile solutions totalling well over 4 lakhs have been supplied to the State hospitals, municipal and missionary institutions in both the Madras and Andhra States. In addition, 5,653 bottles of various intravenous solutions have also been supplied. Details regarding supplies made are as follows :—

Ampoules of sterile solutions.	Quantity supplied (ampoules).
1 25 per cent Glucose 20 c.c.	299,122
2 25 per cent Glucose 10 c.c.	7,274
3 Pyrogen free distilled water 10 c.c. ..	58,011
4 Normal Saline 10 c.c.	33,423
5 5 per cent Calcium Gluconate 5 c.c. ..	24,768
6 10 per cent Calcium Chloride 10 c.c. ..	2,734
7 5 per cent Calcium Chloride 10 c.c. ..	1,765
8 Miscellaneous ampoules	4,282
Total ..	431,379 ampoules.

Bottles of intravenous solutions.	Quantity supplied (bottles).
9 5 per cent Glucose normal saline 540 c.c. ..	4,221
10 5 per cent Glucose in Pyrogen free distilled water 540 c.c.	616
11 20 per cent Glucose in Pyrogen free distilled water 540 c.c.	259
12 Darrows' solution 370 c.c.	184
13 Ringer Lactate 540 c.c.	196
14 Distilled water 540 c.c.	44
15 Normal Saline 540 c.c.	61
16 Miscellaneous solutions	72
Total ..	5,653 bottles.

DEPARTMENT OF ANTI-TOXIN.

General Review (for the year 1st April 1954 to 31st March 1955).

There were 64 horses at the end of the year for the production of therapeutic serum for the use of the various medical institutions of the State. As the demand for tetanus anti-toxin continued to be high a large proportion of the horses was assigned for the production of anti-tetanic serum. The department still suffers for want of additional stable accommodation as the entire needs of this State for serum could be satisfied only by still further increasing the number of horses. However, it will be observed that the department has turned out a considerable amount of work inasmuch as 2,255 litres of plasma were processed for serum production. The report of the department shows that biological standardization was conducted on 319 samples of sera.

The extent of research work undertaken on various aspects of applied immunology is also seen in the report. The acquisition of a new special apparatus for electrophoretic studies deserves special mention. With this apparatus a precise appraisal of immunogenis responses in the horses could be made by Electrophoresis. This also helps in the research studies on various bio-chemical feature of serum proteins in general. Another noteworthy research activity of this department consists in the manufacture of concentrated toxins and toxoids and observation of their immunizing value in the horses. The result of this work will be of considerable value to the serum manufacturing methods now employed by the department. Preliminary experiments were conducted in this laboratory by paper Chromatography for the analysis of serum proteins and for examination of the essential amino acids in the culture media for tetanus toxin.

REPORT OF THE DEPARTMENT OF ANTI-TOXINS FOR THE YEAR
1ST APRIL 1954 TO 31ST MARCH 1955.

Charge.—Dr. M. K. K. Menon.

This department consists of four sections, (A) Veterinary Section, (B) Anaerobic Section, (C) Serum Concentration Section and (D) Serum Filling Section.

A. Veterinary Section.

The number of horses maintained by the department at the beginning of the year was 58. The number of horses that died or were bled to death or otherwise destroyed was 12 and the number of horses that were added was 18. Thus the total number of horses at the end of the year was 64

The number of horses under immunization and bleeding and the quantity of blood drawn during this period are shown in the table below :—

TABLE I.

Name of toxins.			Number of horses under immunization but not bled.	Number of horses under immunization and bleeding.	Number under observation.	Total.
1	Tetanus	.. ..	5	42	..	47
2	Perfringens	.. ..	Nil	4	..	4
3	..	.. ..	..	..	13	13
Total ..						64

The name of the anti-toxin and the quantity of blood drawn under each head are given below :—

Name of anti-toxin.				Quantity of blood drawn in litres.
Tetanus	..	..	..	3,691.5
Perfringens	..	..	..	1.61
Total ..				3,692.5

B. Anaerobic Section.

Toxic strains of *Cl. tetani*, *Cl. Welchii* (*Perfringens*), *Vibrio* *Septique* and *Cl. Oedematiens* are being maintained in this laboratory both in the dry state as well as in the semi-solid media. Purity and toxicity tests are done at frequent intervals. A number of experiments were carried out with a view to enhancing the toxicity of the cultures of *Cl. tetani* using different media with differing nutritional constituents. The present stock culture represents a strain of satisfactory toxigenicity which gives fairly consistent good toxins for horse immunization. For the production of *Cl. Welchii* toxin the new strain (PB 6K) which was brought into use last year is continuing to yield potent toxin.

The following amounts of toxin were manufactured during the year under report :—

	LITRES.
Tetanus toxin	925
Gasgangrene toxin (<i>Perfringens</i>)	60

Biological standardization.

Two hundred and seventy-four samples of tetanus anti-toxin and 45 samples of Gas-gangrene (*Perfringens*) anti-toxin were standardized during the period under review including samples of anti-toxin from foreign laboratories.

Special activities.

Preliminary experiments were conducted on the manufacture and use of concentrated tetanus toxins and toxoid for hyper-immunization of horses. It has been reported that the use of these products results in a much better anti-toxic response in the horse than the results observed when neat toxins and toxoids were employed. Work on these lines is in progress and the height of immunogenic response in parallel groups of immunized horses is being studied.

Flocculation experiments with tetanus toxins and anti-toxins were continued. This has now been brought into the routine work of the section to help us in assessing the immunizing value of the antigens under production in the laboratory.

Paper Chromatography was employed for the study and analysis of the amino acid content of the media employed for production of high grade tetanus toxins. With the aid of this method the essential amino acids required for optimum growth of *Cl. tetani* were examined. Further work on this and allied problems is in progress.

A number of experiments were conducted to assess the toxigenic capacity of the existing laboratory strains of *Cl. Septique* and *Cl. Oedematiens*. It was found that the strains have lost their toxigenicity and further experiments on these lines were held up pending the receipt of some other fresh cultures from foreign laboratories.

Scorpions were obtained through the agency of a local dealer and their telsons were cut out and dried and extracted in accordance with the procedure adopted for extraction of toxin in the Lister Institute, London. It was found that the local varieties supplied were not toxic to any great extent. Studies on scorpion toxin could not be continued owing to the difficulty of getting the dried stings from Egypt of the toxic variety (*Buthus quinquestriatus*).

Services rendered to other departments.

In April 1954 a sample of tetanus anti-toxin manufactured by Messrs. Bengal Chemical and Pharmaceutical Works, Calcutta, was received from the Officer, Biologicals Control, for assay. It was assayed and duly reported.

In March 1955 a sample of tetanus anti-toxin and a sample of Gas-gangrene (*Perfringens*) anti-toxin both manufactured by the Bengal Immunity Company were received from the Director of

Medical Services for opinion if they are of standard quality. The respective anti-toxins were assayed and the results reported.

In December 1954 a case of fatal post-operative Tetanus was reported by the District Medical Officer, Erskine Hospital, Madurai. The Assistant Director, Anti-toxins Department of this Institute, proceeded to the hospital to investigate this and to give necessary advice to the hospital authorities. The following samples were collected by the Assistant Director after detailed investigation in the operation theatre there :—

- (1) Sulphanilamide powder.
- (2) ' Kutchie '.
- (3) Gauze.
- (4) Wall scrapings.
- (5) Floor sweepings.
- (6) Silk thread.
- (7) Cotton, etc.

Detailed bacteriological and bio-chemical studies were conducted with a view to find out any clostridial contamination and the results were duly reported, (Cl. tetani were not grown in any of the samples.)

In February 1955 a case of post-operative Tetanus was reported from the same hospital and the following samples were examined :—

- (a) Slough and cat-gut from the muscle layer of the abdominal wound.
- (b) Slough from the wound of the right foot. Investigations were undertaken in this laboratory for possible presence of clostridial contaminants. In this case organisms bearing a morphological similarity but not possessing the characteristic bio-chemical and toxic features of Cl. tetani were isolated (Cl. tetanomorphum).

C. Serum Concentration Section.

During the year under report 501 gallons of immune plasma (2,254.5 litres) were processed. Concentrated sera containing the two types of anti-toxins (tetanus anti-toxin and gas-gangrene anti-toxin) were manufactured from these Tetanus anti-toxin formed the major part of this serum.

The following are the quantities of anti-toxic plasma processed under each head :—

Anti-toxic plasma,	Number of litres processed.
Tetanus	2,205
Gas-gangrene (Perfringens) . . .	49.5

Special work done.—Electrophoretic patterns of anti-toxic sera were taken and studied at different stages in the manufacture, i.e., (a) neat plasma, (b) the plasma after concentration by ammonium sulphate and (c) after refining by enzyme digestion. Significant differences in the protein make up of the sera at the different stages were noticed, the concentration of the Y globulins being the maximum in refined sera. A large proportion of B globulins are generally found in sera concentrated mainly by ammonium sulphate fractionation method. The L.K. 30 model micro-electrophoresis apparatus recently obtained by the department was used for the above work.

Flocculation Studies.—Flocculation experiments were conducted for the evaluation of the potency of tetanus anti-toxic sera and these studies revealed that neat plasmas flocculated readily when they are fresh, the time of flocculation (Kf) increasing with the age of the plasma. Very old plasmas do not flocculate at all. Another important observation was made that plasma concentrated by ammonium sulphate fractionation failed to flocculate at all whereas refined sera flocculated readily. It is presumed that the failure of flocculation with sera concentrated mainly by ammonium sulphate fractionation may probably be due to the presence of relatively large proportion of B globulins of less avidity.

Paper Chromatography in the analysis of serum proteins.—Preliminary experiments conducted in this laboratory on the paper chromatography (strip type) of proteins showed that by using the concentration gradient technique with phosphate solutions as solvents at least four components could be separated. Studies are being continued to find out whether ammonium sulphate at different levels of saturation could be used in place of phosphate solutions for the chromatographic separation of serum proteins.

Refining of anti-sera.—Studies are under progress to find out whether any of the vegetable papainases like Papain and Bromeline effectively be used in place of the proteolytic enzyme pepsin at present being used in the refining of anti-sera.

Services done to other laboratories.—A specimen of C.S.F. from the up-graded Venereology Laboratory was examined electrophoretically for determining the albumin/globulin ratio in the fluid. Owing to the phenomenally low content of protein in the C.S.F. it was first concentrated under vacuum (15 c.c. to 0.5 c.c.) and then subjected to electrophoretic examination after dialysing the concentrated material against a suitable buffer of known PH and ionic strength. The C.S.F. was found to have an albumin/globulin ratio of 1 : 1.

D. Serum Filling Section.

Work in this section consists of proper ampouling, labelling and issue of various Therapeutic sera and other biological products in accordance with the provisions contained in the Drug Rules. The statement of Therapeutic sera issued during the period under report as well as the quantities supplied to Madras and Andhra States is appended. A statement showing sera manufactured and bulbed in the King Institute from 1st April 1954 to 31st March 1955 is also appended.

BLOOD BANK SECTION.

Staff.—Dr. C. Sriramachandra Rao, M.B.B.S., D.P.H., Assistant Director (Blood Transfusion).

Assisted by.—(1) Dr. N. Sundararajan, M.B.B.S., Assistant Surgeon.

(2) Dr. G. N. V. Krishnan, L.M.P., D.L.Sc., Assistant Surgeon.

(3) Dr. Vasudevan, M.B.B.S., Assistant Surgeon.

The activities of the Blood Bank are increasing year by year. In August 1954 seventeen Medical Officers from Madras, Andhra and Bihar States were given training in Blood Bank work. A Blood Bank was organized at Salem Headquarters Hospital. The Mobile Blood Bank team from King Institute visits periodically the Central Jails at Vellore and the Penitentiary at Madras and collects blood from the inmates of the jail. The blood collected is utilized for plasma processing. A Blood Bank team was sent to exhibitions held in the districts to carry out propaganda work. The Blood Bank is popular with the public. Many persons have volunteered to donate blood in the Blood Bank stalls at the exhibitions.

The Central Store of Blood Bank articles continues to supply the Blood Bank requisites to all Blood Banks at the Headquarters hospitals and the City hospitals. It also supplies saline transfusion sets to districts and city hospitals in addition.

The work done by the Blood Bank section during the year 1st April to 31st March 1954 is given below (Blood Grouping, Cold agglutination test and Rh. test done is given in the statement elsewhere.)

1st April 1954 to 31st March 1955.

Blood—

Number of blood bottles received—1,679.

Number of blood donors—570.

Voluntary blood donors—77.

Total blood received in litres—1,026.820.

Plasma—

Total plasma processed—370.0 litres.

Amount of plasma in litres issued—327.0 litres.

Dry serum issued—627 bottles

High Titre Group Serum prepared—

A—2,175 c.c.

B—3,040 c.c.

C—2,900 c.c.

Number of exhibitions in which the Blood Bank has taken part—5.

The places where the exhibitions were held—Mayavaram, Kumbakonam, Salem and Madras-2 (Carnival, Teynampet).

DEPARTMENT OF BIOLOGICAL CONTROL, KING INSTITUTE, GUINDY.*Report for the year 1st April 1954 to 31st March 1955.*

Charge.—Dr. M. Narayana Pai, M.B.B.S., was in charge of the section from 1st April to 3rd June 1954 and from 2nd October 1954 to 31st January 1955. Dr. K. Dattatreyyulu, M.B.B.S., was in charge of the section from 4th June to 1st October 1954 and from 1st February to 31st March 1955.

Pharmacologist.—Dr. K. Dattatreyyulu, M.B.B.S., from 1st April to 3rd June 1954 and from 4th June 1954 he held additional charge till 31st July 1954 and again from 1st December 1954 to 31st January 1955. Dr. S. Subramaniam, M.B.B.S., from 1st August to 30th November 1954 and 1st February to 31st March 1955.

Bacteriologist.—Dr. S. Gnanadesikan, M.B.B.S., throughout the year.

Chemical Assistant.—Mr. P. K. Ramachandran, M.Sc., throughout the year.

One thousand seven hundred and seventy-eight specimens were received in the section during the year for various tests.

Sterility test.—The total number of specimens received for sterility tests was 760, out of which four specimens were found to be contaminated and hence reported as *not* sterile.

Pyrogen test.—Three hundred and eighty-one specimens were received for this test and seven out of them were found to be pyrogenic.

Chemical analysis.—One hundred and eighty-eight specimens were received for chemical analysis and among them 19 specimens were found to be *not* of Standard Quality.

Toxicity test.—Four hundred and thirty-one specimens were received for this test and all of them were found to be non-toxic.

Lymph vaccine.—Fifty specimens of lymph vaccine were received for colony count and safety tests. All of them passed the tests as per the specifications laid down in State Drugs Rules.

Catgut.—Four samples of surgical sutures were received for absorbability test. Three of them were found to be completely absorbed and one was partially absorbed in the tissues of the animal at the end of the usual period of absorption.

Anti-biotic Assay and Sensitivity to Anti-Biotics.—Seven tests were performed under this head.

Assay of Tincture Digitalis.—Three samples of Tr. Digitalis were assayed. One sample was of standard quality and the other two were not of standard quality as per B.P. specifications.

Antitoxin Potency tests.—Eighteen samples of tetanus antitoxin were tested. Two of them were found to be not of Standard Quality.

Agglutination and other identity tests.—These tests were done mostly on anti-cholera and anti-typhoid vaccines. One hundred and nine tests were done in this group.

Male frog test for pregnancy.—Five hundred and forty-two specimens of urine were received for male frog test from the city hospitals, private practitioners and mufassal hospitals. Out of these, 170 specimens gave positive results and 305 gave negative results, 67 specimens were found to be toxic to frogs and hence gave inconclusive results.

Drugs Act.—Under the Drugs Act, 24 samples were received from the various Inspectors of Drugs. Out of these 19 samples were found to be of standard quality and the remaining five were not of standard quality.

Finance.—A sum of Rs. 764 was realized as fees towards various tests from private practitioners and firms.

A few of the interesting cases are given below :—

(1) A sample of paraldehyde was received from a city hospital stating that it was found to be "Absolutely ineffective" after injection to patients. On testing the sample it was found to be not of standard quality.

(2) A sample of Urea Stibamine was received from a city hospital stating that after injection it produced symptoms of collapse and shock, severe pain in the abdomen and profuse sweating. On testing, it was found to be free from abnormal toxicity as per I.P.L. tests. But the percentage of antimony was found to be 42.68 which is a little higher than the permissible limit which is 38 to 42.

(3) A sample of Penicillin Ophthalmic Ointment was sent to this department by a private firm to find out the potency. On testing, it was found to contain 75 per cent of penicillin mentioned on the label. The firm was informed accordingly.

DEPARTMENT OF WATER ANALYSIS AND ALGAE CONTROL.

Charge.—Sri K. G. Veeraraghavan, B.A., M.Sc., Chief Water Analyst.

The department of Water Analysis and Algae Control continued to maintain a check over the hygienic quality of the protected water-supplies in Madras and Andhra States. Samples of water were collected for examination from all the water-supplies thrice as in previous years. Samples of water received from schemes under investigation were also tested for determining their suitability for use for drinking and domestic purposes. These were generally received through the Sanitary Engineering Department, the Public Health Department and the districts and regional authorities in charge of Local Development Works, National Extension Schemes, Community Projects and Block Development schemes. The number of samples required to be tested under these schemes, has increased so much that the analysis of only a limited number of these samples could be undertaken with the available strength of analytical staff in the department.* Even these analysis had to be carried out expeditiously in the interest of the timely execution of the development schemes and so the staff of the department were put to an undue strain.

Field investigations on problems connected with water-supply and trade waste disposal, as well as problems relating to water softening, corrosion of pipe lines, etc., constituted as usual an important aspect of the work of the department. All the analytical researches on water purification carried out at the Government Experimental Filter Station, Kilpauk, and the analytical examinations pertaining thereto were carried out by the Water Analysis Department.

Chemicals used in water purification such as Alum, Bleaching Powder, etc., were also tested for their fitness in water treatment.

As in previous years, bacteriological examination of samples of milk collected from different stages in the production of reconstituted milk at the Government Milk Factory, Teynampet, was done once a fortnight. Besides this, samples of aerated water, ice cream, etc., were also tested for their bacteriological quality.

The analysis of samples of water to find out their suitability for various industrial uses was also carried out. Such analysis are especially intricate and time consuming as they require the

* Proposals have been submitted for the appointment of the minimum laboratory and clerical staff to enable the water analysis department to cope with this demand for analysis of water samples derived from the Development Schemes.

accurate determination of all the chemical constituents in the samples, the nature of the combinations in which these are present and the influence of the various factors on the specific industrial process involved. It was often necessary to carry out extensive trials on a laboratory scale to ascertain correct means for rendering the water fit for the intended industrial use. This type of service to the development of the economy and industrial progress of the state, has shown a steady increase during the past years. In connection with such work, it has also been necessary for the Water Analysis Department to undertake investigation on the quality of the water wastes produced in industrial processes and devise appropriate methods for their treatment so that these wastes may be disposed off without causing harm or nuisance to human beings.

A sum of Rs. 7,742-7-9 was received during the year under report as charges for the analytical work undertaken in respect of samples received from private bodies. The analytical fees for a combined chemical and bacteriological examination was increased from Rs. 20 to Rs. 30 during this year as per G.O. No. 1884, Health, dated 2nd June 1955. As a result of this, the revenue from these sources is expected to increase in the coming year.

As per recommendations of the Indian Standards Institution and the order of Government thereon, this department has now arranged for the supply of *Bacterium typhosum* (Lister Strain) No. 786) to various laboratories in India for carrying out the test for determining Rideal walker co-efficient of coaltar disinfectants Black and White. The cultures are now supplied in Agar slopes at a cost of Rs. 3 per tube. Arrangements are being made to supply lyophilized cultures at Rs. 5 per culture.

One hundred and sixty-nine protected water supplies (141 in the Madras State and 28 in the Andhra State) and one swimming pool were under periodical analytical control by the Water Analysis Department at the commencement of the year. The periodical examination of the water supplies to Bellary and Hospet railway stations which was temporarily suspended after the formation of the Andhra State has been resumed at the request of the Railway authorities and the orders of Government. Apart from these, four more water supplies were included this year in the list of supplies from which samples are drawn for periodical examination at the Institute. These are: (1) Amaravathi Project Camp Water-supply, (2) Mangalam Project Camp Water-supply, (3) Tiruchirappalli aerodrome Water-supply, and (4) Simhachalam Water-supply. The analysis of samples taken from the water-supply to Melapalayam Municipality was discontinued. Thus 174 protected water-supplies in both the Madras and the Andhra States were under periodical analytical control at the close of the year under report. These comprise 49 municipal water-supplies in the Madras State and 18

in the Andhra State, 10 and 7 Panchayat Board water-supplies in the Madras and Andhra State respectively, 17 jails and certified schools in the Madras State and 3 jails in Andhra, 23 private institutions in Madras and one in Andhra, and 54 railway stations. Of these railway supplies, 24 are in the Madras State, 26 are in the Andhra State and 4 are in the Mysore State. At present only the water from the swimming pool in the Gymkhana Club, Madras, is examined periodically in the Institute for the hygienic control of water quality. The desirability of bringing all public swimming pools in the State under periodical analytical control has been emphasized in previous reports but this has not yet been done. Another group of important drinking water-supplies which is not yet under systematic check as regards their quality from the public health point of view is supplies to some of the most important railway stations having a large pilgrim traffic such as Rameswaram, Dhanushkodi, Kancheepuram, Nagapattinam, Srirangam and those which are commercial centres like Coimbatore, Mettupalayam, Ootacamund, Pollachi, Kodaikanal Road and Dindigul. It is essential that these supplies should be brought under periodical examination at a very early date.

As already stated in the report for the previous year, the Southern Railway authorities have erected the filter plant and other appurtenances at Guntakal Railway Colony in connection with the semi-large scale experiments on the removal of flourine from drinking water. Necessary funds for the expenses to be incurred towards the analytical staff for conducting these experiments have been sanctioned by the Government. As soon as appointments to the sanctioned posts are made, this work will be commenced*.

In connection with the starting of a post-graduate degree course in Public Health Engineering at the College of Engineering, Guindy, assistance of this department has been asked for in the matter of giving instruction to the students on water bacteriology, chemistry, and biology, the methods of water and sewage analysis, treatment of sewage and industrial wastes, etc. In this connection the Government have sanctioned a post of Assistant Water Analyst and a Laboratory Assistant to enable the department to cope with this additional work. Government have also ordered that the Chief Water Analyst will be in charge of the course in the King Institute, Guindy.

Statistical data.—The total number of samples of water analysed during this year was 11,969. Of this, 8,129 samples were examined from the Madras State and 2,620 from the Andhra State. Six

* Government has appointed one Research Chemist, one Technical Assistant, one Laboratory Technician and one Laboratory Attendant, II grade, for carrying out this work. These pilot plant studies have been started and an account of these will be given in the report for the year ending 31st March 1956.

thousand and fifty-one of these samples were drawn from the protected water-supplies in both these States (4,252 samples from Madras State and 1,799 from Andhra State), 491 samples of water were received for analysis in connection with the investigations carried out on Rural and Urban water-supply schemes, by Government and other bodies. Four hundred and ninety specimens of organic growths occurring in water sources were examined in the Water Biology Laboratory in connection with the periodical biological assay of water samples and the measures carried out for the control of algal and other aquatic growths.

One thousand seven hundred and forty-seven samples of water were examined in connection with the experiments at the Government experimental filter station, Kilpauk. One thousand three hundred and thirty-five tests were also done for the determination of the dosage of alum, chlorine, copper sulphate, etc., in connection with the experiments.

Eighty-one samples of water were subjected to a full mineral analysis to ascertain their suitability for use in boilers, and for industries like chromium plating, watch making, concrete mixing, ice manufacture, fruit preservation, air-conditioning and humidification, laundering, photographic processing, etc.

A total of 90 samples of sewage and trade wastes were examined during the year under report. These included the samples tested in connection with the studies on the quality of the tannery waste in Madras.

Ninety-two samples of bleaching powder were received during this year for estimation of their available chlorine percentage. Seventy-two of these samples were from Madras State and 20 from Andhra State. Thirty-one out of the 92 samples were of very poor quality and contained 0.4 to 5.0 per cent of available chlorine. Chlorination with poor quality bleaching powders will only give a false sense of security. Bleaching powder which is now generally available in the market is an unstabilised product and it is liable for rapid deterioration especially under conditions of defective storage and handling. Hence as far as possible it would be advisable to instal some form of automatic chlorinating equipments using liquid chlorine for the treatment of water-supplies.

The number of samples of reconstituted milk collected from the Government Milk Factory and tested bacteriologically was 92. Seventy-one samples of rinse waters from sterilized utensils and 24 samples of water from the water-supply to the factory were also tested for their bacteriological quality.

The number of tests carried out to determine the phenol coefficient on samples of disinfectants received were 136 during the

period under report. All these tests were carried out by the Rideal Walker Method using the standard strain of organism (viz. No. 766 obtained from the National Collection of Type Cultures, London).

One hundred and forty-two 'eight litres of pancreatic extract were manufactured and supplied for use in the preparation of cholera vaccine. As usual stains and other reagents required for use in other departments in the Institute were made and supplied by this department.

Three thousand and ninety-nine sterilized bottles were specially prepared and supplied for the collection of samples of water for bacteriological analysis.

Section of water bacteriology.—Five thousand and fifty-seven samples of water, milk, aerated waters, ice-cream, etc., were tested bacteriologically during the year under report. Of these 4,200 samples were collected from the protected water-supplies in the States of Madras and Andhra. The samples of water received from investigation sources, and other institutions were all subjected to a full and detailed bacteriological examination including differential coliform tests. A scheme has now been brought into differential routine practice whereby, samples of water taken from the distribution system which show evidences of transit deterioration are subjected to a full coliform differentiation test, in order to ascertain the hygienic importance of the deterioration, locate its source and apply necessary corrective measures. Water samples received from the surface sources and uncovered dug wells generally showed the presence of coliform organisms of the excretal type indicating potentially dangerous pollution while those received from deep borewells, infiltration galleries and infiltration wells were more or less satisfactory from the bacteriological point of view. Many of these samples did not show the presence of the coliform group of organisms in 60 c.c. volumes. When, however, coliform bacteria were encountered in these samples, the types present were not of specific sanitary significance.

Section of water chemistry.—The progress of the studies on the "Informative Standards" for ice-cream was necessarily very slow during the period under report, since the department had to undertake the examination of an unduly large number of water samples.

One thousand nine hundred and forty-two samples of water were tested chemically during the year under report. Of these 1,860 samples were received for determining their fitness for drinking purposes.

Some features of outstanding interest with regard to the chemical quality of the samples tested may be mentioned.

A sample of water received from a draw-well in Dondlavagu village in Pulivendla taluk (Cuddapah district) showed excessive amounts of nitrate (20 parts per 100,000). Samples of water received from draw-wells in Kondapalli village in Tadpatri taluk and a sample received from the Indian Leaf Tobacco Co., Ltd., Chilakalurpet showed high amounts of sodium bicarbonate (45.0 pph. in the Kondapalli well) and 75 pph. in the Chilakalurpet well and sodium sulphas (68 pph. in Kondapalli village well and 45 pph. in Chilakalurpet well). Fluorides in the Chilakalurpet well water was also very high (3.2 ppm.). On 17th June 1954 a sample of water drawn from Kabadipalem public well in Ongole Municipality was received with a complaint that the use of this water caused diarrhoea. On analysis the sample was found to have a distinctly unpleasant taste and contain a marked amount of magnesium sulphate (79.5 pph.). The presence of this is likely to produce aperient action on the consumers. Samples of water drawn before and after passage through an Aluminium candle filter were received for analysis from an estate organisation with the complaint that the filtered water was whitish and turbid while the feed water was colourless. The feed water was soft and neutral in reaction. The filtered water was slightly acidic in reaction and contained Aluminium Hydroxide in suspension (14.0 ppm. of Al₂O₃). It was noted that the candle had a metallic mount and was fixed to the upper chamber with a brass nut. Due to the dissimilar metals in contact with the electrolyte (water) corrosion of aluminium had taken place resulting in the precipitation of Aluminium Hydroxide causing turbidity in the water.

Section of water biology.—Water samples collected for periodical examination from Madras and Andhra States and samples received from Government and private agencies were examined microscopically to determine the nature and intensity of algal and other organic growths. Field investigation for the study of the nature and extent of biological growths in the temple and other public tanks with a view to evolve suitable remedial measures also form a specialised part of the work of this section. In all cases where the growths were found to be excessive or the analytical results showed that these growths would tend to develop and reach undesirable levels control measures were recommended after laboratory trials using different types of algicide.

Problems arising from the occurrence of macrophytic growths in drinking water storage tanks were also attended to and remedial measures suggested after detailed studies both in the field and in the laboratory.

During the year under report 487 samples were examined microscopically out of which 347 were from Madras State and 140

were from Andhra State. In addition 30 samples from the Kilpauk experimental filter station were examined in connection with the research studies on water purification.

Eighteen water-supplies in the State have adopted systematic algal control measures with success. Where circumstances permit algicidal treatments were carried out under the supervision of the staff specially deputed from the Institute for this purpose. Special samples were also called for from water-supplies showing evidences of infestation with organic growths and examined from time to time in order to keep a watch on the behaviour of the growths under different seasonal conditions.

Many of the large tanks attached to important temples and in towns which are pilgrim centres are in a neglected state, with excessive organic growths and they are subjected to continuous organic pollution. The water is heavily infested with algal which rendered it unfit for bathing purposes. From time to time, requests are received from the temple authorities for investigations on the biological growths present in the tank water and advice as regards measures to improve the quality of the water. After, however, a thorough study of the problem has been made and the necessary remedial measures are ascertained it is found that the concerned authorities are unable to carry out these measures full due to lack of finance. It is a regrettable state of affairs that the tanks in these pilgrim centres some of which attract larger numbers of Tourists from all over the country and abroad should be in such unhygienic and obnoxious condition*.

An interesting observation of scientific interest is recorded below :

A sample of coloured rain water was received from a place called Pullappatta in Malabar district. It was stated that the rain water as it flowed down the tiled roof was coloured red a peculiar phenomenon not noticed before. On examination under the microscope a sample of this water sent by K. P. Thampan of Pullappatta showed the presence of a very large number of spores of a type of fungus known as RHIZOPUS. These spores are reddish brown in colour. A few thread like bodies of the fungus were also noticed. This kind of fungus or mould grows profusely in soil, manure and moist decaying organic matter. These organisms are capable of producing a very large number of minute spores which are coloured reddish brown when ripe. Apparently these fungi had flourished in the layer of dust and organic matter settled on the roofs and the falling rain water had washed down the spores, imparting a reddish tint to the water.

* This matter has since been taken up by the authorities of the Religious Endowment Board, and a scheme for a detailed study of the problem with a view to evolve standard procedures for eradicating the algal nuisance, has been furnished to them by the Institute.

Municipal and Panchayat Board Water-Supplies (Madras).— With the discontinuation of the periodical analysis of the Melapalayam Municipal Water-Supply 50 Municipal and Panchayat Board water-supplies were under periodical analytical control at the close of the year under report. Samples of water were collected for examination three times from these supplies. The water-supplies to Bodinayakanur, Chidambaram, Coimbatore, Cochin Fort, Coonoor, Erode, Kodaikanal, Madras Corporation, Mettur Dam, Kozhikode, Mettupalayam, Ootacamund, Palani, Periyakulam, Pudukottai, Salem, Gudalur, Kotagiri and Pannaikadu are derived from surface sources such as rivers, tanks, etc. The raw waters at these waters supplies generally showed evidence of heavy organic and bacterial pollution. Coliform organisms were usually present in quantities varying from 0.01 c.c. to 5 c.cs. of the water. The method of purification adopted at these water-supplies consisted of slow sand filtration followed by chlorination at Madras, Periyakulam and Salem and rapid sand filtration followed by chlorination at Bodinayakanur, Erode, Mettupalayam, Salem and Mettur Dam. Chlorination is the only treatment given to the water-supply drawn from surface sources at Coimbatore, Coonoor, Kodaikanal, Kozhikode, Ootacamund, Palani, Gudalur, Kotagiri and Pannaikadu. Chlorine and ammonia (chloramine) is used for final treatment at the Nangavalli Water Works where the water-supply to Salem Municipality drawn from the Mettur Reservoir is purified. The water-supply to most of the other Municipal and Panchayat supplies is drawn from infiltration galleries or wells. The raw water from these sources was generally satisfactory from the bacteriological point of view. Coliform organisms were either absent in 60 c.cs. volumes of these samples or were present only in 20 c.c. to 60 c.c. volumes. And often the coliform organisms isolated from these sources were not of any specific sanitary significance.

The filtered water from the pressure filter at Chidambaram was slightly discoloured as a result of post filtration precipitation of alum due to inadequate settlement. The filtered water yielded by the slow sand filters at Madras Corporation was not quite satisfactory from the bacteriological point of view. The slow sand filters at Salem were also not working satisfactorily. The gravity mechanical filters at Bodinayakanur, Erode, Mettupalayam, Salem (Nangavalli Water Works) and the slow sand filters at Periyakulam yielded satisfactory results.

An automatic chlorinator using gaseous chlorine was installed at Rameswaram during this year. Except the water-supplies to Tuticorin, Virudhunagar and a few sources in Ootacamund all the other supplies in the State are chlorinated. Automatic chlorinators with gaseous chlorine have been provided at Bodinayakanur, Coimbatore, Erode, Kumbakonam, Madras Corporation, Madurai,

Mettupalayam, Pollachi, Salem, Tanjore, Tiruchirappalli and at Rameswaram. All the other supplies are chlorinated by the addition of bleaching powder solution and the dosage is manually controlled.

Of the 116 samples of chlorinated water drawn at the head-works 108 samples (93.1 per cent) were satisfactory as regards bacteriological quality. Five hundred and five samples were examined from the distribution system of water-supplies in which the water is filtered and chlorinated or is only chlorinated. (See table below). Of these only 373 (73.9 per cent) were of satisfactory quality from the bacteriological point of view while the rest did not reach a standard of quality required of an efficiently chlorinated supply.

The water-supplies to Bodinayakanur, Chidambaram, Chingleput, Gudiyattam, Karaikudi, Karur, Kumbakonam, Mettupalayam, Palayamcottai, Pudukottai, Mettur Supply of Salem, Srirangam, Tiruchirappalli, Vellore, Virudhunagar, Walajabad, Gudalur, and Rameswaram were generally satisfactory from the bacteriological point of view, as judged by the result of analysis of sample taken from the consumer taps.

Chlorination did not yield satisfactory results at one time or another at Cannanore, Coonoor, Dindigul, Nagapattinam, Palani, Ootacamund, Periyakulam, Salem (Panamarathupatti Supply) and Arantangi. The automatic chloronome of the Panamarathupatti Supply at Salem and at Erode went out of order quite often during this year.

A review of the results indicates that in many cases deterioration in the bacterial quality of the supply occurs in storage in the service reservoirs or in transit through the distribution lines.

TABLE.
Madras State Water-Supplies.

Type of supply.	Number of sources.	Number of samples tested.	Number unsatisfactory.	Percentage unsatisfactory.		
				1954-55.	1953-54.	1952-53.
1. Municipal water-supplies—						
Untreated ..	8	27	4	14.8	43.5	50.0
Chlorinated only. ..	40	312	89	28.5	28.0	36.5
Filtered and chlorinated.	11	102	25	24.5	36.3	27.3
Total ..	59	441	118	26.5	30.6	35.8
2. Panchayat Board water-supplies—						
Untreated ..	..	..	18	21.9	27.7	34.2
Chlorinated only. ..	14	82	..	..	12.5	25.0
Filtered and chlorinated.	1	9	..	..	..	..
Total ..	15	91	18	19.9	32.0	34.0

However, some overall improvement in quality is noticed when the results are compared with those obtained during the previous year. The figure for the percentage of unsatisfactory samples was 32.5 per cent last year while it is 25.4 per cent in the year under report. A thorough investigation into the causes for the fall in quality would no doubt assist greatly in taking suitable measures for further improving the quality of the water supplied for drinking. The proposals made by the Water and Sewage Purification Committee for the formation of a "Water-supply Inspectorate" to tackle this important problem should be implemented at a very early date, so that measures may be adopted to ensure that the drinking water reaches the consumers in the same state of hygienic safety in which it left the treatment works.

Jails and Certified Schools.—Fifty-four railway station supplies were examined this year. One hundred and sixty-five samples of water were drawn. Of these nearly 75 per cent were satisfactory from the bacteriological point of view. A consolidated statement was received from the Chief Medical Officer giving the measures carried out and proposed to be carried out for improvement to the hygienic quality of the railway water-supplies as per the recommendations made in the analytical reports sent by the Institute during the year. It is seen from this annual report of the Railway authorities that the recommendations made by the Institute are being carried out. Among the improvements effected may be mentioned the repairs of the automatic chloronome at Tirumalai and Tanjore. Arrangements are being made to install a MacLeod's box for chlorinating the water-supply to Nidamangalam Railway station. Proposals are also under way for fixing up an automatic chloronome for the Railway station water-supply at Tiruvarur Junction. As the quality of this supply is not uniformly satisfactory, the Railway Medical Officer and the Sanitary Inspector have been advised to carry out field tests every week and personally supervise chlorination. To overcome the discolouration in the water-supply to Dronachalam Railway station there is a proposal to install a pressure filter at this station.

Other institutions.—The water-supplies to Amaravathi Project, Mangalam Project and to the Civil Aerodrome at Tiruchirappalli were included for periodical examination this year. There are at present 24 institutional water-supplies which include state hospital in Madras and outside, Universities, Educational Institutions, Hydroelectric project camps, etc., under periodical analytical control. The drinking water-supply to Annamalai University has been generally unsatisfactory as regards its quality. A new automatic chlorinating equipment has been provided at this water works and this may help in improving the quality of the supply. The water-supply to Pykara and Glenmorgan Camps continued to be unsatisfactory in spite of repeated comments made on this water-supply. No action has been so far taken to improve it.

The drinking water-supplies to the following state hospitals are under periodical analytical check. The General Hospital, Stanley Hospital, Kasturba Gandhi Hospital and Mental Hospital in Madras, the Headquarters Hospital, Coimbatore, Erskine Hospital, Madurai and the Christian Mission Hospital, Vellore. A brief account of the hygienic state of the water-supplies to these hospitals is given below :—

The General Hospital, Madras.—The hospital receives its drinking water-supply from the Corporation mains. The Corporation water is received in an underground sump of two compartments, pumped up to an overhead reservoir also with two compartments from which the water is supplied through taps throughout the hospital. On all the three occasions when samples from this supply were tested the Corporation supply as it was received into the sump was of satisfactory quality from the bacteriological view point. The samples drawn after storage in the underground sump showed deterioration in bacteriological quality and organisms belonging to the type of B. Coli I regarded as excretal in nature and indicative of potentially dangerous pollution were noticed in these. The attention of the concerned authorities has been drawn to the need for cleaning the sumps and the storage tanks thoroughly.

The Stanley Hospital, Madras.—This hospital also gets its drinking water-supply from the municipal mains. The water is received in a number of underground sumps from which it is pumped to cisterns on the roof of the building and supplied to the various wards through taps. The Corporation supply to this area of the city is itself not quite satisfactory and showed wide fluctuation in bacteriological quality. The presence of coliform organisms in quantities varying from 1 c.c and 10 c.cs. of the water was noticed. Systematic chlorination of the supply by the hospital authorities was therefore recommended in order to ensure a uniformly safe supply to the institution.

Mental Hospital, Madras.—The drinking water-supply to the Mental Hospital derived from the Corporation mains was satisfactory from the bacteriological point of view during the period under report.

Kasturba Gandhi Hospital, Madras.—Water from the Corporation mains is stored in three underground sumps from which water is pumped to overhead cisterns and then taken to the wards. The Corporation water on all the three occasions was of fair quality from the bacteriological point of view. But almost all the samples collected from the taps in the wards showed deterioration in the bacteriological quality. This was due to the unhygienic nature of the storage reservoirs. Systematic cleaning of these was recommended.

Government Hospital, Coimbatore.—The water-supply to this hospital is derived from the municipal supply. The municipal

supply is bacteriologically of fair quality but often considerable deterioration was found to occur in the quality of the water as distributed within the hospital. This fall in quality occurred during storage in the hospital reservoirs. Thorough sterilization of these as well as the distribution pipe lines with strong chlorine solution was recommended. But the supply still remains in a rather unsatisfactory state. It is a matter of particular concern that a water of initially good bacteriological quality should show evidence of undesirable bacterial pollution in the hospital water storage and distribution system. Rechlorination of this supply by the hospital authorities and systematic flushing of the pipe line were suggested.

Christian Medical College, Vellore.—The results of the periodical analysis of the samples taken from the water-supply system to this institution showed that bacteriologically it was of very poor quality. This was so inspite of chlorination stated to be carried out and checked by the Hygiene Department of this College. The attention of the concerned authorities was drawn to the unsatisfactory quality of the supply on numerous occasions but they appear to have given little heed to these and there is no evidence of any improvement. In view of this it was considered that no useful purpose would be served by continuing the periodical analysis of samples from this supply. Hence this has been temporarily suspended and the Director of Medical Services has been addressed in the matter.

Christian Mission Hospital, Vellore.—The drinking water-supply to this hospital is derived from the municipal supply. On all the three occasions the supply was good as regards its bacteriological quality.

The Erskine Hospital, Madurai.—This hospital takes its drinking water-supply, from the municipal mains. The results of examination of samples taken from the hospital supply has often showed that a fall in bacteriological quality occurred as a result of subsidiary storage in the hospital reservoirs. Organisms belonging to the type of *B. Coli* I indicative of excremental pollution in the hospital samples was a particularly disconcerting feature. Recommendations were made to clean the storage reservoirs systematically with a final wash using bleaching powder solution each time.

Field investigations.—Field investigations in connection with new water-supply schemes, improvements to existing installations, schemes for sewage and trade wastes disposal, sterilization of newly laid water mains, etc., are an important part of the normal work in this department. A brief account of some of the investigations carried out during the year is furnished below. Field investigations carried out in respect of the Andhra State water supplies are given separately.

1. *Mangalam project camp water-supply (Palghat taluk).*—At the request of the Superintending Engineer, Coimbatore Circle, a detailed survey of the drinking water-supply to Mangalam Project camp was carried out by Mr. K. G. Veeraraghavan, Chief Water Analyst in September 1954. The supply is derived from two wells, one of which is fitted with a pump while the other is used only in times of scarcity. The water is pumped to a covered masonry service reservoir where it is chlorinated with the addition of bleaching powder solution, and supplied to the colony through taps. A set of samples were collected for bacteriological and chemical analysis. Advice was given on the proper methods to be adopted for chlorinating the supply effectively. Suitable sampling points on the supply were selected and this supply has now been included in the list of periodical examination at the institute.

2. *Coonoor water-supply—Algicidal treatment to Ralliah Reservoir.*—The Ralliah reservoir water was treated with copper sulphate and bleaching powder between 5th and 9th May 1954 under the technical guidance of Mr. A. S. Hariharan, Assistant Analyst (Water Biology), for destroying the excessive growth of algal organisms in the water. The growth comprised predominantly members of chlorococcales (*Oncocystis*, *Kirchneriella*) Desmids, (*Xanthidium Staurostrum*, *Cosmarium*) and Diatoms. A decrease in organic matter content of the water and in the intensity of the algal forms and improvement in the turbidity of the lake water resulted from the treatment applied. In the report furnished to the local authorities on the treatment carried out mention was also made of the defects in the present method adopted for chlorinating the water. The provisions of an automatic plant using liquid chlorine for chlorinating the water-supply was recommended.

3. *Control of algal growths in temple tanks.*—At the request of the Municipal Health Officer, Kancheepuram, a detailed survey of the algal growth infesting the tanks attached to the principal temples at Kancheepuram was carried out by Sri A. S. Hariharan, Assistant Analyst (Water Biology), in November 1954. Six tanks were studied, viz., the Anandasaras, and the Pothamarai tanks in Varadarajaswami temple, the Kampanadi and Sivaganga tanks in Ekambaranathar temple, Mangalathirtham in Kamakshiamman temple and the Sarvathirtham tank in the town. Of these the Kampanadi water showed a scanty growth of algae but supported a large number of animal plankton organisms (*Cypris*, *Daphnia*, *Cyclops* and *Rotifers*). The others showed a profuse growth of the blue green algae *Microcystis* together with a large number of filamentous forms like *Oscillatoria*, etc. These algae form a thick scum on the surface of the water, and emit a foul odour when they die and decay.

Chemically, the tank waters are soft and contain a moderate amount of dissolved salts. They contain an excessive amount of organic matter in solution and to this factor and the favourable meteorological conditions is attributable their ability to support heavy growths of blue green algæ almost all the year round.

Experiments conducted in the field showed that these waters require a dose of at least 5.0 parts per million of copper sulphate for destroying the offensive algal growths. This high dose would appear to be needed because the organisms possess a fairly thick mucilagenous coat and the water in which they occur is highly alkaline in reaction.

Recommendations were made to treat these tanks with copper sulphate followed by bleaching powder on a systematic basis for eradicating the existing growths of algae and for keeping the tanks in a satisfactory state of cleanliness.

However, the temple authorities would seem to have regarded these measures as unduly costly. Hence the advice of this department was sought regarding alternative methods which may be adopted.

They were informed that (a) continuous recirculation of the tank water with a suitable filter interposed in the cycle, (b) planned cultivation and harvesting of fish and (c) planned cultivation and removal of higher aquatic vegetation like lotus, lily, etc., may be expected to yield satisfactory results when adopted over a long period with diligence and prescience. These measures in fact require to be tried out on a large scale to correctly assess their relative merits and demerits and their utility as compared with the well known and accepted measures of treatment with algicides.

4. *Siruvani water-supply system.*—In connection with the studies on the nature and extent of changes in the chemical and biological features occurring in the Siruvani lake water during its passage along its course from the tunnel outlet to the settling tanks, an investigation carried out by Sri K. R. Ramaswami and Sri S. Venkataraman in the last week of November 1954. The water from the Siruvani lake passes through an open channel for a short distance and through a masonry tunnel about 1,000 feet long. It then travels for about 7 furlongs through a naturally formed stream referred to as the Anayar course. The water is settled in sedimentation basins at the foot of the hills, and then sent to Coimbatore through two gravitation makes. The main defect in regard to the Coimbatore water-supply is its turbidity during certain seasons of the year. These investigations are being carried out to ascertain the nature and the extent of the benefit that may be derived by leading the water from the tunnel outlet through a pipe flume down to the settling tanks. The course of the

river from the tunnel outlet down to the settling tanks is in a rugged and difficult terrain with several cascades en route where the flowing water receives the benefit of good aeration. The bed of the channel is mostly rocky with gravel and sand. The soil is of the loose red earth near the outlet of the tunnel, and in some places below clay also occurs. In the course of the present investigation samples of water were collected at several points along the water course and were tested both in the field and in the laboratory to determine the extent of changes in the physical appearance and other characteristics of the water, which occurs between the tunnel outlet and the settling tanks. Samples of water were collected from 12 points and were tested for organic matter content, pH, CO₂ content and for dissolved oxygen content on the spot. Estimation of turbidity and bacteriological examinations of these samples were also carried out at the camp laboratory.

The results of the present investigation showed that the Siruvani lake water is clear, soft and slightly alkaline in reaction (pH 7.3). It is fairly rich in dissolved oxygen (87.7 per cent saturation) and has a low biochemical oxygen demand (five-day B.O.D. 0.12 part per 100,000) indicating "clean water" conditions. Bacteriologically the lake water showed coliform organisms including *B. Coli* 1 organisms in 5 c.c. to 1.0 c.c. volumes. Planktonic algae were scanty and the benthic forms were predominantly *Mougeotia* and *Diatoms*.

The water in Pattiar River and Anasolayar, two of the feeders for the Siruvani lake, was more or less similar to the lake water in all its features except that these were somewhat worse in bacterial quality.

As the water from the lake issues out of the tunnel, it undergoes some changes in quality, the main change being a decrease in its pH value to the acidic range (6.8) and a slight decrease in the percentage saturation of dissolved oxygen (85.6 per cent). Up to this stage there was hardly any change in the physical appearance of the water.

After leaving the tunnel, the water flows along a naturally formed channel for a distance of 9 furlongs before it is drawn off into the settling basins.

A gradual increase in the turbidity of the water was noticed as it flowed down the channel (from 2.5 ppm. at the tunnel outlet to 6.5 ppm. at about the sixth furlong). The percentage saturation of dissolved oxygen increased from 85.6 per cent at the tunnel outlet to 94.4 per cent three furlongs below as a result of aeration in the falls out cascades. This gain in dissolved oxygen content was maintained with small fluctuations further below. Biologically there was little evidence of changes in the algal flora of the water

along the course but at the sixth furlong a large number of Coleopterian larvae were noticed attached to the rocks. The pH of the water became again alkaline during the flow through the channel.

The water in Anayar which is often blamed for affecting adversely the clarity of the Coimatore supply was of satisfactory quality on the present occasion. It however showed a markedly higher figure for B.O.D. than the lake water or the channel water before its confluence with Anayar.

The results of the investigation indicate that the Siruvani lake water is likely to gain in turbidity after leaving the tunnel due to the mixture with Anayar water and surface washings brought in by small steamlets, particularly during rains. It is also seen that there is an appreciable increase in the dissolved oxygen content of water as it passes over the cascades while at the same time the pH of the water is shifted from the acidic to the alkaline side and the dissolved carbon dioxide content of the water decreases. This shift to an alkaline pH and decrease in dissolved carbon dioxide occurs after the main water fall at the third furlong and so it would appear worthwhile to consider how best advantage may be taken of this natural purification in piping the supply to the settlement basins.

5. *Boiler feed water treatment at the Central Jail, Coimbatore.*—At the request of the Inspector-General of Prisons, Sri K. G. Veeraraghavan, Chief Water Analyst, visited the Central Jail at Coimbatore in February 1954 to instruct the concerned jail staff in the methods of softening the water used for feeding the boiler at the jail factory. The factory draws water from a well for use in the boilers. This well water was found on analysis to be excessively hard and unsuitable for the purpose without adequate treatment for removing the hardness. The most suitable method was ascertained to be the addition of lime and soda to the water. The correct dose of the chemicals to be added, the method of determining the dosage necessary, the method of adding the chemicals and the degree of agitation which should be employed for getting satisfactory results were all demonstrated to the jail staff. With the plant facilities available the treatment decreased the hardness of the water from 69.6 to 7.6 parts per 100,000 and it was considered that this treatment would materially decrease scale formation in the boiler. The treatment is being carried out satisfactorily as ascertained by subsequent analysis of the samples sent from the jail.

6. *Large scale fish mortality in the Bhavani River at Mettupalayam.*—Many fish were observed dead in Bhavani river in December 1954. The types of fish which were noticed dead in the river were those popularly known as "Otta mean", "Kasamba

mean", "Kanda mean" and "Ara mean". In this connection the District Health Officer, Coimbatore, requested that a field investigation may be carried out to ascertain the probable cause which had led to the death of these fish in the river water. The investigation was carried out by Sri K. R. Ramaswami, Assistant Analyst, Water Bacteriology and Chemistry, jointly with the Research Health Officer from the Department of Public Health and the District Health Officer, Coimbatore. Detailed enquiries were made at a place called Nallithurai, five miles above Mettupalayam, where also fish mortality was observed. The Aravangadu Cordite Factory was also visited in this connection, and the methods adopted at this factory for disposing waste water was inspected. Samples of water at different places in the river were collected and subjected to detailed chemical analysis including tests for pH Dissolved Carbon dioxide and Oxygen on the spot. The samples were also tested for the presence of both organic and inorganic poisonous substances. The results did not indicate any abnormal feature which might have caused the death of fish. Whether the deaths were due to any disease of the fish was under investigation by the Department of Fisheries. The investigations showed that the drinking water-supply to Mettupalayam was in a good and hygienically safe condition and was not affected in any manner by the factors which had caused the fish to die.

II. AMARAVATHI PROJECT WATER-SUPPLY.

A survey of the drinking water-supply to Amaravathi Project camp was carried out by Sri A. S. Hariharan, Assistant Analyst in December 1954 in connection with the request from the project authorities to undertake periodical analytical examination of samples taken from the supply to ensure its hygienic safety. The water-supply to this camp is taken from the Amaravathi river from a point about 600 feet upstream to the dam. The water from the river is pumped to a rectangular masonry covered service reservoir where it is a chlorinated by adding bleaching power solution and supplied by gravity to the camp. There are about 60 taps. Samples of water were taken from the river and at many points on the water-supply system and tested. It was found that the river water is chemically of good quality but bacteriologically heavily polluted and showed the presence of B. Coli I organisms indicative of potentially dangerous pollution. The method of chlorination adopted was not also quite satisfactory. It was pointed out in the report on the supply that the river water is subject to gross bacterial pollution owing to the fact that a very large number of men are employed in work at the river side. Moreover the quality of the water would also fluctuate with seasonal conditions particularly as regards its turbidity and organic matter content and bacteriological quality. Hence it was recommended that filtration should also be adopted as a safety measure in addition to chlorination. The need for providing an automatic

chlorinating apparatus was also pointed out. The number of samples and the point from which they should be drawn for periodical analysis were determined.

Industrial waste treatment and disposal—Cotton Textiles United Bleachers, Limited, Mettupalayam.—The management of United Bleachers, Limited, Mettupalayam, a company dealing with processing and finishing of cotton cloth, sought the help of this department at the direction of the Public Health Authorities, in examining the waste waters from the factory and devising appropriate methods for treating the wastes to render them fit for discharge into the River Bhavani.

As this is one of the first investigation of this nature to be undertaken in the State, an account of the same is given below.

The factory draws its water-supply from Bhavani river. The water is treated with alum, filtered through a pressure filter, and pumped to masonry storage tanks. About two lakhs of gallons of filtered water is used per day.

The factory at present processes about 5,000 lb. of grey cloth per day working a double shift of 8 hours each. The working units in wet processing of the cloth comprise a desizing vat, masonry piler tanks, four kiers, three washing machines, three tanks for souring, chemicking and Antichlor. On the dry processing side they have a drying chamber, a stretcher, damper and a calendering machine. Steam for the factory processes is generated in three boilers. The factory also manufactures its requirement of hypochlorite solution by an electrolytic process.

Processing methods and quality of waste produced.—Grey cotton cloth pieces are stitched together to form a continuous length of 5,000 lb. or 20,000 yards. This is fed to rubber rings through which it is taken automatically to the desizing baths.

Desizing.—In this vat the cloth is immersed in a solution of a proteolytic enzyme (0.3 per cent on the weight of cloth) and common salt (15 lb. per 5,000 lb. of cloth) in 750 gallons of water. After a short stay in the desizing vat the cloth is taken out and left piled in a masonry tank for about 16 hours. In this process the enzyme solubilises the starch in the cloth, converting it into sugars.

The waste water from this process is small in quantity (about 10–15 gallons) but it is highly polluting and shows an excessive content of organic matter and Biochemical oxygen demand (300.0 parts per 100,000 and 658.0 parts per 1,000,000 respectively).

The cloth is washed after desizing with a jet of water as the cloth passes over wooden rollers. Fresh water is used for this purpose and the total quantity used is about 25,000 gallons. After washing the cloth goes into the kiers.

Kiering.—The kier is an iron kettle with an inner silicate and cement lining and with arrangements for heating and for raising the internal pressure with steam. Each kier contains 2,000 gallons of a solution of caustic soda for saponification, sodium silicate for wetting and a detergent. The cloth is placed in the kier and kept at a pressure of 25 lb. (about 115°C) for about 8 hours. In this process the fatty matter adherent to the cloth is saponified and removed. About 1,200 gallons of waste water issues from these kiers. This waste is coffee brown in colour, highly alkaline and shows high figures for suspended solids. This is the most harmful of all the wastes as its organic matter content is very high (267–308 parts per 100,000) and it shows an excessive biochemical oxygen demand (480–650 parts per 100,000). The washing operations which follow the kier treatment use up about 25,000 gallons of fresh water.

Grey sour.—The washed cloth then passes through a dilute solution of sulphuric acid for adequately neutralizing the caustic alkali in the wet cloth and also to soften it. The waste from this process—about 1,500 gallons—is acidic in character (pH 3.2–5.0) and shows a moderate amount of total and suspended solids, a comparatively low organic matter content (2–3 parts per 100,000) and a moderate Biochemical oxygen demand (58–78 parts per 100,000).

Sometimes a second kiering is done when an additional 2,000 gallons of waste is obtained.

The cloth after souring, goes into the chemicking tank where it is treated with a solution of hypochlorite for purposes of bleaching the cloth. The waste from this process is about 1,500 gallons. It has a chlorinous smell and is not particularly polluttional in character.

Chemicking or bleaching is followed by thorough washing with about 25,000 gallons of fresh water. The bleached cloth is then taken into a bath or tank containing 1,500 gallons of a solution of sodium hydrosulphite for dechlorinating the cloth and it is later washed with 25,000 gallons of water. This process is termed Antichlor treatment and the waste issuing from the process (about 1,500 gallons) is whitish in colour and shows a low suspended solids and organic matter content (6.0 to 12 parts per 100,000 and 0.4 to 0.6 parts per 100,000 respectively) and a moderate Biochemical oxygen demand 109–140 parts per 100,000).

From a single cycle of operations in the factory, the quantity of waste produced is 12,000 to 14,000 gallons and the wash water is about 1,50,000 gallons.

Samples of the pooled waste water were analysed. This is discoloured (coffee brown) and turbid (320–380 parts per million).

It has a total solids content averaging 1,735 parts per 100,000 of which about 40 per cent is volatile solids. The suspended solids content averaged 65 parts per 100,000. The composite had a high organic matter content (137 parts per 100,000 and Biochemical oxygen demand (356 parts per 100,000). This is highly polluting and would require treatment to render it suitable for discharge into the river.

The wash water waste was however of better quality and suitable for disposal directly into the river without rigorous treatment.

It was therefore considered essential that suitable arrangements should be made to segregate these two types of waste waters and deal with them separately.

Experiments were carried out both in the field and in the laboratory to evolve suitable means of treating the strong liquors. It was found that it required pooling up to effect mutual interaction and equalisation and then treatment with a coagulant and settlement for about 4 to 6 hours to effect a satisfactory reduction in colour, suspended and colloidal matter, and Biochemical oxygen demand. Both Ferric chloride and alum were found suitable as a coagulant, ferric chloride yielding better results at lower doses. The advantages of further secondary treatment through biological filters was also considered and it was decided that these may be interposed if found necessary in actual treatment practice.

Examination of samples of water from the receiving stream showed that the river water is of good chemical quality with a dissolved oxygen saturation value of 95 per cent. It was ascertained that under normal conditions of flow in the river, a minimum dilution of about 1,740 times will be obtained for the discharged waste with the river water.

A report on the results of the investigation with recommendation for treating the waste waters as outlined above was made to the company authorities and to the Department of Public Health.

On the basis of the report the company authorities have erected a waste water treatment plant comprising a segregation and equalisation tank, two sets of masonry sedimentation basins each of 12,000 gallons capacity provided with baffle walls, equipment for the uniform addition of coagulant (alum) and subsequent mixing. The factory drains have been suitably realigned for leading the strong wastes to the treatment plant and for regulating the flow of the treated effluent into the main wash water drain at a regulated rate in order to effect proper dilution.

A set of samples of the waste water and the treated effluents was also examined after the treatment plant was placed in commission in March 1955. It was found that about 20 grains of

alum per gallon of waste was needed to bring about suitable flocculation owing to the somewhat high alkalinity of the waste. The treated effluent showed a reduction of 66 per cent in suspended solids, 62 per cent in organic matter content and 42 per cent in Biochemical oxygen demand. Samples of the river water collected from a point above the discharge of the factory waste and also immediately after the admixture with the waste, showed on examination little change in B.O.D. chloride content and the amount of suspended solids. The analytical results showed that the discharge of the treated wastes into the river, does not appreciably impair the normal uses to which the river water is put, and would not ordinarily cause the development of dangerous or obnoxious conditions in the river and would have no deleterious effect on organic aquatic life.

The active co-operation received from the manager of the factory and his assistants in carrying out these investigations and in promptly implementing the recommendation made by the department should be recorded with appreciation.

ANDHRA STATE.

Municipal and Panchayat Board Water-supplies.

Samples of water were collected and analysed three times during the year under report from 18 municipal and panchayat water-supplies in the Andhra State. The water-supply to Adoni, Eluru, Guntur, Kakinada, Kurnool, Masulipatnam, Palacole, Ramachandrapuram and Rajamundry are taken from surface sources (river, canal, storage tank). In all these cases the supply is filtered and chlorinated for ensuring protection to the consumers against the danger of water-borne diseases. Slow sand filters are used at Adoni, Eluru, Kakinada, Kurnool, Guntur and at Ramachandrapuram. The supplies to Masulipatnam and Palacole are filtered through rapid filters while at Rajahmundry sand filters are used. Judged from results of the examination of samples of the filtered water from the water works, it is seen that during the year under report all these filters functioned satisfactorily.

For chlorinating the water before it is supplied to the public for drinking, automatic chlorinators using liquid chlorine are employed at Vijayavada, Cuddapah, Eluru, Guntur, Kakinada, Nellore, Visakhapatnam, Chodavaram, Tirumalai-Tirupati. It would appear that a similar equipment would be installed also at Vizianagaram. At other places, the supplies are chlorinated using bleaching powder solution, the addition being regulated manually.

A total of 76 samples of chlorinated water were drawn from the headworks and tested. Of these, 71 were found to be bacteriologically of good quality. Two hundred and fifty-four samples

of water were collected from the taps on the distribution system (the consumer taps) of the water-supplies under periodical analytical control. The following table gives the number of samples which were found to fall short of the standard of the bacteriological quality required for a drinking water-supply in each group of supply divided according to the type of treatment adopted. :—

TABLE.
Andhra State Water-supplies.

Type of supply.	Number of sources.	Number of samples tested.	Number unsatisfactory.	Percentage unsatisfactory.	
				1954-55.	1955-56.
1. Municipal water-supplies—					
Untreated	1	9	4	44.4	20.8
Chlorinated only .. .	21	125	25	20.0	20.2
Filtered and chlorinated ..	8	74	9	12.1	15.8
Total ..	30	209	38	18.6	—
2. Panchayat Board water-supplies—					
Untreated	..	..	..	..	..
Chlorinated only .. .	8	43	13	32.5	36.8
Filtered and chlorinated ..	1	2	..	..	..
Total ..	9	45	13	29.1	..

It would be seen that out of 254 samples taken from the consumer taps, 51 or near 20.7 per cent were not of approved quality. This rather high figure contrasts markedly with the small percentage (6.5 per cent) of samples were taken at the headworks which were not good. It is thus seen that in the majority of cases the unsatisfactory nature of the samples at the consumer end is the result of the deterioration in quality which occurs during the passage through the distribution pipe lines, and during storage in service reservoirs. This indicates the need for adopting a planned programme of efficient flushing of the mains and cleaning of the reservoirs at each water works. Sometimes this fall in bacterial quality may be attributed to pollution of the supply from leaks in the lines, as was found to occur in Cuddapah. The periodical analytical examination is found to be very helpful in detecting the possibilities of the existence of such leaks and in carrying out timely repairs.

During the year under report requests were received for the analysis of a large number of samples of water in connection with the water-supply schemes, under the National Extension Service, Rural Development Programme and the National Water-supply and Sanitation Programme. It has, however, to be stated that the department could not meet these requirements even to a small extent owing to want of sufficient staff to undertake this extra work without affecting the work in connection with the periodical analysis of sample from the protected water-supplies already in existence.

At the request of the Engineering authorities, the analysis of samples of the filtered water yielded by each sand filter at Kakinada was carried out, once a month. This special investigation is being made to ascertain the effect of varying grades of fine sand in slow sand filters on the quality of the filtered water and the duration of filter runs.

Field investigations were carried out by the staff of this department in connection with sterilization of the newly laid water mains at Kakinada and Guntur, and on the drinking water-supply to Simhachalam, especially the temple and its surrounding area where pilgrims gather in large numbers. A brief account of these special investigations is given below.

1. *Sterilization of the new mains—(a) Kakinada.*—At the request of the Executive Engineer, Public Health Division, Vijayawada, a field analytical unit under Sri K. R. Ramaswamy, Assistant Analyst, was sent to Kakinada to carry out analytical examinations in connection with the sterilization of the newly laid mains in districts I and II of Zone I, comprising a total length of 13 miles.

Filtered water containing 35 to 45 parts per million of chlorine was pumped into the overhead service reservoir at the headworks from which it was drawn and filled into the net work of the newly laid distribution lines. The scours in the system were opened to test the water for its chlorine content and to ensure that all parts are filled with heavily chlorinated water. The solution was retained for over ten hours in the pipe lines and then flushed out with the ordinary municipal water-supply. The tests done on the spot showed that on an average a residual chlorine content of 4 to 10 p.p.m. was present in the water in the pipe lines after the 10 hour contact period. Bacteriological analysis were carried out on a large number of samples of water taken at different points on the lines after the sterilization was done and it was found that no deterioration in quality occurred during its passage through these mains indicating satisfactory conditions in the pipe lines following sterilization.

(b) *Guntur.*—The newly laid water-mains in five zones in the low level areas of Guntur Municipality were sterilized under the technical guidance of Sri S. Venkataraman, Junior Water Analyst, from this department. The total length of pipe lines in all the zones was 1 lakh running feet. Strong solution of bleaching powder (containing 40 to 45 parts per million available chlorine) was filled into these mains and allowed to stay for one day. A residual of 10 to 15 parts per million of chlorine was found in the water after this contact period. The scours were then opened to draw out the superchlorinated water and the pipe lines flushed out. The results of bacteriological tests carried out in the field laboratory indicated that the lines had been properly sterilized by the adopted.

Simhachalam water-supply.—An investigation was carried out in February 1955 by Sri K. R. Ramaswami, Assistant Water Analyst, on the drinking water-supply to Simhachalam, which is a perennial pilgrim centre at the request of the Director of Public Health.

The water-supply to this hill temple and its surrounding localities is derived mainly from two springs, the Godavari Dhara and the Vegavathi Dhara. The spring waters are collected in a set of masonry cisterns and distributed to the public through taps. The water-supply is not chlorinated. Samples were collected at different points in the two water-supply systems and tested chemically and bacteriologically. Both the supplies are satisfactory as regards their chemical quality, but they showed evidence of excessive bacterial pollution of a potentially dangerous character. Organisms belonging to the type B. Coli. I indicative of pollution from excremental sources were found in large numbers in the samples. Recommendations have been made in the reports on the water-supply sent to the Director of Public Health (Andhra) for chlorinating these supplies systematically, and for making certain alterations in the pipe lines to avoid intermediate pollution. Representative sampling points were also selected, and this supply was included in the list for periodical analysis.

The Water and Sewage Purification Committee.—The following are the members of the Water and Sewage Purification Committee. :—

- (1) Dr. T. S. Adisubramaniam, M.B.B.S., B.S.S.C., D.I.H. (Eng.), Director of Public Health and President, Water and Sewage Purification Committee.
- (2) Dr. Y. S. Narayana Rao, M.B.B.S., D.T.M. (Cal.), D.B. (Lond.), Director, King Institute, Guindy.
- (3) Sri S. Rajagopalan, B.E., M.I.E., Sanitary Engineer, Chepauk, Madras.
- (4) Sri T. N. S. Raghavachari, B.A. (non-official member).
- (5) Sri P. V. Seetharama Iyer, M.A. (additional non-official member).
- (6) Sri K. G. Veeraraghavan, M.Sc., Chief Water Analyst and Secretary of the Committee.

The Committee met four times during the year under report.

Government in their Order Ms. No. 1268, Health, dated 12th May 1954, appointed Sri P. V. Seetharama Iyer, Retired Chief Water Analyst as a non-official member of the Committee.

At its meeting held on 13th May 1954, the Committee discussed the question of carrying out large scale experiments on the Corporation sand filters at Kilpauk employing the Break point method of chlorination in treating the Red Hills Lake water prior to sand filtration. The Committee also discussed the question of permitting pisciculture in Red Hills Lake. The Director, King Institute, Guindy, pointed out the hygienic hazard involved in permitting fish-farming and removal in the Red Hills Lake from which water is drawn directly for supplying to the City, particularly in view of the fact that under the existing conditions much difficulty is experienced in obtaining a high degree of efficiency in the purification methods which are adopted. The use of Cholavaram Lake may perhaps be less objectionable provided that water is not drawn from this lake into the Red Hills lake during the period of fish removal and for at least two weeks thereafter. This, it was considered, would give sufficient time for any pollution that may get accidentally introduced into the water to die out owing to the beneficial process of sunning and storage.

In accordance with an order of Government Ms. No. 639, Health, dated 18 March 1954, regarding the investigations on a combined drainage scheme for abatement of nuisance from tannery wastes in the Chromepet-Pallavaram area in the Chingleput district, the members of the Water and Sewage Purification Committee visited on 2nd June 1954 some tanneries in this area and examined the methods currently being adopted by these tanneries for the disposal of the waste liquors. The Committee decided that representative samples of waste liquors at different stages of processing from three tanneries should be collected and analysed at the King Institute in order that suitable treatment measures may be designed on the basis of their chemical and biological characteristics.

The Committee was requested by the Chief Engineer, P.W.D., for advice on the type of settlement basins required for pre-treatment of the Red Hills Lake water before rapid sand filtration and on the standards of quality of the filtered water prior to chlorination which may be laid down for guarantee by the tenderers in connection with a 10-Million gallons per day mechanical filter scheme for the Madras City water-supply. The opinion of the Committee is given below :

" Alum flocculation and sedimentation "

A flocculator and clarifier with mechanical scraper equipment for continuous desludging of the sedimentation basins will be an improvement over conventional rectangular basins with provision only for periodical scouring of the accumulated sludge. Continuous desludging would avoid the formation of dead pockets

in the sedimentation tank and reduce the water loss by properly compacting the sludge and by regulating its discharge. The Committee considers that such an arrangement would ensure a consistently better quality of preconditioned water which could be handled efficiently by the rapid sand filters.

Standards of quality for the filtered water—(a) Physical characteristics.—The turbidity of the filtered water shall not exceed 10 parts per million (silica scale) nor shall the colour exceed 20 (standard cobalt scale). The filtered water shall have no objectionable taste or odour either in the cold or when heated to a temperature of 80° C.

(b) Chemical characteristics.—The filtered water shall contain not less than 1.0 part per 100,000 of total alkalinity expressed in terms of calcium carbonate.

The pH of the filtered water shall not be below 7.0 or above 8.0.

(c) Bacteriological quality.—When the total colony count of the raw water exceeds 3,000 colonies per ml, the reduction in the colony count in the filtered water before chlorination shall be not less than 97 per cent.

When the total colony count of the raw water is less than 3,000 colonies per ml, the filtered water shall not have a colony count of more than 100 colonies per ml.

The total colony count shall be the number of colonies appearing on nutrient agar after 48 hours growth at 37° C.

Details regarding the Break Point experiments to be carried out on the City Corporation sand filters were discussed by the Committee with the Water Works Engineer and the Health Officer of the City Corporation at a meeting held on the 4th August 1954. It was agreed that:

(1) The experiments should be carried out on a row of seven sand filters.

(2) Experiments should be conducted using chlorine by the Break Point method, chloramination and cuprichloramination as pre-treatment measures. The Water Works Engineer intimated that the Corporation would loan the use of an automatic chloronome plant for use in these experiments.

(3) The experiments would be conducted with the existing depth of supporting layers and of fine sand in the filter beds.

(4) The Corporation authorities would arrange for the supply of chemicals needed in the experiments and carry out the day-to-day maintenance of the filters at their cost.

(5) Frequent samples would be collected for a detailed chemical and bacteriological analysis at the King Institute, Guindy*.

At its meeting held on 7th March 1955, the Committee discussed in detail the Government Memorandum No. 105680-H3/54-1, dated 15th November 1954, on the subject of the establishment of an experimental unit on a plant scale for the treatment and disposal of tannery wastes in Vaniyambadi-Ambur area following representations made by the local residents in this area that the waste waters from the tanneries there are let into the Palar river and into certain irrigation spring channels and that as a result the water in the river and in the channels is rendered unsuitable for agricultural purposes and for drinking. The question of proper treatment and disposal of these wastes was discussed by the Union Minister for Industries and Commerce with the Director of Public Health and the Sanitary Engineer, Madras. It was suggested by the Union Minister that experiments to determine a suitable method of treating these wastes may be carried out at Vaniyambadi where the problem of pollution of the river basin which is the main source of drinking water supply is stated to occur. The Minister also intimated that the Central Government may be willing to extend financial assistance to the State in carrying out these experiments.

This subject was again considered at a Conference held in the Chief Minister's room on the 20th October 1954. It was then decided that an experimental treatment plant should be established at Vaniyambadi or Ambur for purposes of evolving a satisfactory method for treating these pollutional and obnoxious wastes and disposing them in such a manner that they will not pollute the natural water sources in the locality. It was also decided at this Conference that an analytical unit from the King Institute should be detailed to study the effluents and formulate standard treatment measures. On these recommendations Government called for information on the recurring expenditure on staff, materials, etc., for working the experimental unit, the additional expenditure which will be incurred in detailing the unit from the King Institute and the apportionment of the cost of the scheme between the State Government and the Government of India. The Committee resolved that the design and construction of the Pilot plant and its maintenance would be carried out by the Sanitary Engineer through his departmental staff and that the analytical unit from the King Institute will be in charge of the day to day conduct of the experiments and carry out the

* In G. O. Ms. No. 2419, Health, dated 28th July 1955, Government have sanctioned the appointment of a Junior Water Analyst, one Technician and one laboratory attendant, Grade II in the Water Analysis Department of the King Institute for carrying out this additional analytical work.

necessary analytical examination of the wastes, treated effluents, etc., for formulating standard treatment measures. Hence a recurring expenditure would have to be incurred on this scheme for running and maintaining the plant and towards the cost of treatment chemicals, analytical reagents, travelling allowance, etc. It was resolved that the minimum analytical staff required for carrying out this work would comprise one Assistant Analyst, one Technical Assistant, one I Grade Laboratory Attendant and one unskilled assistant and it was estimated that the approximate annual cost of this staff would be Rs. 6,700. The Committee recommended that the Government of India may be requested to share half the capital expenditure on the plant and its equipment and the whole expenditure in connection with the staff and recurring cost of running this experimental unit.

Another subject of interest which was considered at the same meeting was one relating to a report from the Water Analyst of the Corporation of Madras wherein he had traced the history of the troubles regarding the odour nuisance in the City water supply from as far back as 1917 and had made the following suggestions for improving the quality of the supply:—

(a) that a programme of pisciculture should be started in the Red Hills Lake and the present practice of treating the water with algicides should be discontinued.

(b) That the existing sand filters should be cleared of all filtering materials and used only as plain sedimentation tanks.

(c) That copper sulphate, ammonia and chlorine should be added to the water before the roughing filters, at the entrance to the underground conduit at the Red Hills and at Kilpauk respectively in that order; and

(d) that the water dosed with these chemicals may be supplied without any form of filtration to the City after allowing it to settle in the sedimentation tanks for some time.

The Committee considered these proposals and was emphatically of the opinion that fish-farming and removal operations with regard to the Red Hills Lake involved serious hygienic hazards and should not be permitted. The Committee also could not accept the suggestion for supplying the water without filtration as in the opinion of the Committee a multiple line of defence is an essential safeguard to the health of the public and that none of these measures, viz., pre-chlorination, filtration and post-chlorination can be abolished without creating serious potential risks to the consumers.

Experiment on water purification, Kilpauk Experimental Station.—The main lines on which experiments at the Filter Research station were carried out during the year under report were (1) treating the Red Hills Lake water with chlorine by the Break

point method prior to slow sand filtration and (2) treating the Red Hills Lake water with chloramine prior to slow sand filtration. The results of the experiments prove that both chlorination (Break Point) and chloramination of the Red Hills Lake water before sand filtration resulted in longer filter runs as compared with the performance of a control sand filter which was fed with untreated lake water. The filtered water derived from filters which received the pre-treated water showed a slightly higher turbidity than that from the control sand filter. This would appear to be due to the absence of a film of actively living biological forms on the surface of the sand in these filters due to the lethal action of the chlorine and the chloramine. Pre-treatment with chlorine by the break point method brought about a reduction of 25 to 34.8 per cent in the organic matter content of the water while the application of chloramine reduced the organic matter content by 6.5 to 20.6 per cent. Plain sand filtration also brought about a decrease in the organic matter content equivalent to that effected by chloramine treatment.

The experiment on break point chlorination which has now been carried out uninterruptedly for over four years has consistently yielded a filtrate entirely free from hydrogen sulphide. Chloramination of the Red Hills Lake water also yields a filtrate similarly free from H₂S. The effect of applying a mixture of copper sulphate, chlorine and ammonia to the water before filtration on the production of H₂S in the sand filter is also being studied at this research station.

Full details regarding the experiments carried out have been furnished to the Government in the form of half-yearly reports through the Water and Sewage Purification Committee.

PART II—RESEARCHES.

Government Analyst Laboratory.—The previous finding recorded in Current Science (June 1954, 23, 192) has been confirmed that the variety of Coffee, *Coffea Robusta* which is being increasingly cultivated in South India gives a higher range of Caffeine and a lower range of fat content than those accepted as average figures in Standard books.

Among spurious drugs investigated, a sample sold as "Gorochani" was found to consist of legume starch coloured with an yellow coal tar dye and did not contain any substance like bile salt or bile pigment for which genuine Gorochani is prized.

A sample of arecanut sold in small paper packets was found to consist of tamarind kernel bite gently roasted and coloured to resemble arecanut.

2. *Department of Water Analysis.*—The research work that was undertaken relates to the experiment of water purification carried out at the Government Experimental Filter Station at Kilpauk.

During the above period, the following experiments on water purification were conducted :—

(1) Pre-treating the Red Hills Lake water with chlorine by the Break point method followed by slow sand filtration.

(2) Pre-treating the Red Hills Lake water with cupri-chloramine at the time of production of Sulphuretted hydrogen in the sand filter followed by slow sand filtration.

A sand filter receiving untreated water was worked as a control.

The data obtained in the Break point chlorination experiment confirms our earlier findings that this Pre-treatment followed by sand filtration when compared to the one without any treatment.

(1) Yields a longer filter run and thus filters a greater volume of water for unit area cleaned, but produces a filtrate which is slightly more turbid.

(2) Gives an effluent which is coliform free when the most probable number in the control sand filtered water ranged between 7 and 24.

(3) Shows a greater reduction in the organic matter content.

(4) Results in the persistence of dissolved oxygen in the filtered water for a greater length of time.

(5) Produces an effluent which is free from sulphuretted hydrogen.

(6) Yields a filtrate with residual chlorine throughout the filter run.

3. *Serology Section*—As a first step in the standardization of the Serological Diagnosis of Syphilis, current in different laboratories in India, the Indian Council of Medical Research sponsored a programme of Inter-Laboratory Evaluation of Serologic tests which included the Upgraded Venereal Department of the Madras Medical College and six laboratories all over India. Serum samples obtained from patients in all stages of Syphilis and from persons suffering from other infections which gave false positive reactions and a few Sera from healthy normal persons were mailed each week to participating laboratories.

The antigens (W.R. and Kahn) were supplied by the Serologist to the Government of India, Calcutta, along with notes on technical details of the tests. The tests were done on the same day of the week in all the laboratories. Kahn, Micro-floculation (V.D.R.L.) and compliment fixation tests were done on these specimens and if these were found positive a quantitative test also followed.

A total number of 576 sera were tested from 13th July 1954 to 24th March 1955 the results of which as found in this laboratory are furnished below :—

The results of comparative study is awaited.

Special work done during 1954-55.

Specimens from I.C.M.R. for Inter-Laboratory Evaluation of Serological Tests.

Serial number and name of test.	Number examined.	Positives.
1 Bloods for Kahn test	576	157
2 Bloods for W.R. test	576	230
3 Bloods for Screen test (one tube Kahn and W.R. 2 MHD).	576	230
4 Bloods for V.D.R.L. test	519	202
	<u>2,247</u>	<u>819</u>

We have also tested about 950 specimens of C.S.F. which were received for W.R. test with V.D.R.L. antigen; it was noticed that the V.D.R.L. antigen is in no way superior to the W.R. antigen.

4. *Department of Biological control—Male frog test.*—This department continues to carry out the abovementioned test in the diagnosis of early pregnancy, vesicular mole and certain tumours of the uterus such as chorion-epithelioma. The morning specimen of the urine of the patient is employed for the test, which has been found to be a reliable substitute for the Friedman's test. In cases of chorion-epithelioma and vesicular mole, the test is found to be positive even when dilutions of urine (up to 1 in 400) are employed. In one case of vesicular mole, the test was positive in a dilution of 1 in 1,000.

5. *Department of Anti-Toxins.*—(a) Preliminary experiments were conducted on the manufacture and use of concentrated tetanus toxins and toxoids for Hyper-immunisation of horses. It has been reported that the use of these products resulted in a much better anti-toxic response in the horse than the results observed when neat toxins and toxoids were employed. Work on these lines is in progress and the height of immunogenic response in parallel groups of immunised horses is being studied.

(b) Preliminary experiments were conducted in this Laboratory by using paper chromatography for the analysis of serum proteins and for examination of the essential amino acid content of the media employed for production of high grade tetanus toxins. With the aid of this method the essential amino acids required for optimum growth of *Cl. tetani* were examined. Further work on this and allied problems is in progress.

(c) A number of experiments were conducted to assess the toxigenic capacity of the existing laboratory strains of Cl. septicum and Cl. oedematiens.

(d) An attempt for the extraction of toxin from the local variety of scorpions in accordance with the procedure adopted in the Lister Institute, was made. But later on, this work was given up as the local varieties of scorpions supplied were not toxic to any great extent and as it was difficult to get the dried stings of the toxic variety from Egypt—(Buthus Quinquestratus).

(e) The acquisition of a new special apparatus for electrophoretic studies deserves special mention. With this apparatus, a precise appraisal of immunogenic response in horses employed for serum production was rendered possible by electro-phoresis. Research studies on various biochemical features of serum proteins in general are also under progress with the aid of this instrument.

Electrophoretic patterns of antitoxic serum were taken and studied at different stages in the manufacture, i.e., (1) neat plasma, (2) the plasma after concentration by Ammonium Sulphate and (3) after refining by enzyme digestion. Significant differences in the protein make-up of the sera at different stages were noticed the concentration of the (Gamma) globulins being the maximum in the refined sera. A large proportion of (Beta) globulins are generally found in sera concentrated mainly by ammonium sulphate fractionation method.

6. *Clinical and Vaccine Lymph Sections—Freeze-drying of Vaccine Lymph.*—The production of more batches of dried vaccine lymph to determine the consistency of the previous results obtained, was continued. The results of the tests for purity and potency in the laboratory were quite satisfactory.

Trials are being conducted to assess the potency of the product in comparison with the routine liquid calf lymph with the kind co-operation of the Assistant Director of Medical Services, Madras Area, who has arranged with the Officer Commanding, Pathological Laboratory, Bangalore, for primary vaccination of recruits. They vaccinated three batches of 12 persons in each and the results are as follows:—

Batch No. 1.—Was given Dry Vaccine Lymph only. All took.

Batch No. 2.—Was given routine glycerinated Vaccine Lymph. One did not take. The others took.

Batch No. 3.—Was vaccinated with the dry vaccine lymph on the right arm and routine glycerinated vaccine lymph on the left arm. One of the boys bore faint marks of small-pox and did not take. In the rest, both took. The age of these persons varied from 14 to 16 and had no signs of primary vaccination.

Work on the preparation and drying of chick membrane vaccine lymph was started and is in progress.

The vaccinia virus cultivated on the chorio-allantoic membrane of the developing chick is being tried on the calves for its potency with a view to produce a potent freeze-dried vaccine from the chorio-allantoic membrane.

Human vaccination with dry chick lymph will be attempted later.

STUDIES ON THE BACTERIOLOGICAL QUALITY OF ICE CREAM— BACTERIOLOGICAL STANDARDS.

(K. G. Veeraraghavan, and K. R. Ramaswamy, Department of Water Analysis.)

At a meeting of the Standing Expert Committee constituted by Government in G.O. No. 1000, Health, dated 19th March 1953, held on 11th July 1953 for working out desirable standards for appraisal of the sterilisation of equipment and utensils by Bacteriological Examination and suggesting Bacteriological standards for certain foods like ice-cream, ice-cream salads, etc., it was decided that laboratory and field studies should be made by the King Institute to determine the bacterial purity of ice cream, when prepared under hygienic conditions, in order to obtain informative bacteriological standards for this product.

Samples of ice cream were prepared in the laboratory in a hand-operated freezer. The ice cream mix was boiled for half an hour in a clean stainless steel vessel, cooled rapidly and transferred to the churner vessel which had been thoroughly washed and given a flash rinse with boiling water. Samples of the ice cream mix before transfer to the churner vessel, ice cream soon after freezing, and the same after storage in a bottle-cooler at 6° to 10°C for varying lengths of time were examined bacteriologically.

The following tests were carried out (1) the total colony count at 37°C for 48 hours, (2) the least volume of the same showing presence of coliform bacteria and (3) the methylene blue reduction test.

All the samples of the ice cream mix were free from coliform organisms in 60 c.c. volumes of the samples tested and their reduction time exceeded 7 hours. The total colony count varied from 20 to 440 per ml. Samples of the ice cream tested soon after freezing were similar to the sample of the mix in coliform content and Reduction Time but showed a marked increase in total count averaging 28,720 per ml. This increase is due to the contamination from the vessel, persisting even after the boiling water rinse. In view,

however, of the fact that there was no increase in the coliform content, and the Methylene blue Reduction Time continued to be high, it may be inferred that the contamination is not of particular sanitary significance.

In the next series of samples, the churner vessel and paddle were given a final rinse with boiling water for 3 to 5 minutes. This brought about a reduction in the total count of the ice-cream to an average of 6,000 per c.c.

It was also seen that no appreciable change occurs in the Bacteriological quality of ice cream when stored in the cold, for a period extending to seven days.

The organisms which were commonly seen in the samples examined are: (1) *Bacillus subtilis*, (2) *Bacillus cereus*, (3) *Bacillus firmus*, and (4) *Bacillus Megathorium*—*B. Cereus* Intermediates.

The studies are being continued.

RESEARCH WORK IN THE GOVERNMENT ANALYST DEPARTMENT DURING THE YEAR 1954-55.

A paper entitled "Chemical Standards for Coffee Powder" was published by Sri S. Narayana Iyer, and Sri K. Ramachandran in "Current Science, June 1954." The important finding was that in the Robusta variety of Coffee, the low fat content is associated with a high caffeine content.

Spurious drugs received from the Police and the Magistrates provided considerable investigatory work. A sample of Hetrazan received from a private dealer consisted of a mixture of boric acid and starch. Two samples of "Gorochanai", were found to consist of a mixture of gram starch and tapioca coloured with a coal tar dye. An authentic specimen analysed in this connection was found to consist mainly of bile pigments. Genuine gorochanai is a very costly product priced for its medicinal properties.

Department of Anti-Toxins.

Comparative studies are in progress on the immunogenic response in horses when neat and concentrated tetanus toxins and toxoids were used for the hyper-immunisation of horses.

Flocculation experiments with tetanus toxins and anti-toxins were continued. Conditions have been standardized for a working method to be employed in assessing the immunising value of the Antigens under production in this laboratory.

With a view to examine the essential amino acid requirements for the optimum growth of clostridium tetani preliminary studies on the amino-acid make up of the routine media employed for

production of high grade Tetanus Toxin were carried out by employing the technique of circular paper chromatography. Further work on this and allied problems is in progress.

Examination of the local varieties of scorpions revealed that they are not toxic to any great extent.

Electrophoretic patterns of anti-toxic sera (tetanus-anti toxin) were taken and studied at different stages in the manufacture, i.e., (a) neat plasma, (b) plasma after concentration by fractionation with ammonium sulphate, (c) after refining by Enzyme digestion. The results revealed in general a maximum concentration of the gamma (γ) globulins in refined sera and a relatively large proportion of the beta (β) globulins in sera concentrated mainly by ammonium sulphate fractionation method. Representative electrophoretic patterns of sera under the different conditions stated above are given below:—

Experimental.

"Throughout this work the sera examined were always dialysed against phosphate buffer of P.H. 7.4 and ionic strength (u) 0.1 and protein concentration was always adjusted between 1 per cent and 2 per cent. The electrophoresis of the dialysed sera was carried out in L.K. 30 modil micro-electrophoresis apparatus at a temperature of 30 ° C against phosphate buffer of P.H. 7.4 and ionic strength (u) 0.1 at a voltage gradient of 6 volts/cm. and 3.5 milliamperes".

Studies on the evaluation on the potency of tetanus anti-toxic plasmas derived from horses under immunisation for periods ranging from 1 to 5 years and more by the flocculation method revealed that neat plasmas flocculated readily when they are fresh and during the earlier stages of immunisation the time of flocculation increasing with the period of immunisation and the age of the plasma. It was also observed that plasmas derived from horses which have been subjected to a repeated course of immunisation extending a period over five years completely failed to flocculate.

Preliminary experiments were conducted in this laboratory on the analysis of serum proteins by Paper Chromatography strip type ascending technique. The concentration gradient method was used with phosphate solutions as solvent. An examination of the chromatograms showed the presence of 3 to 4 components. Further work is in progress in this direction as also the possibility of using ammonium sulphate solutions at different levels of saturation in place of phosphate solutions for the chromatographic separation of serum proteins is being studied.

Studies are in progress to find out whether any of the vegetable papainases like papain or bromelain could effectively be used in place of pepsin at present being used in the refining of anti-sera.

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

TABLES.

TABLE I.
Statement I.

Head of account.	Actual expenditure during 1954-55 including adjustment.		
(a) King Institute, Guindy—	RS.	A.	P.
1 Pay of Officers.. .. .	1,44,915	13	0
2 Pay of establishment	2,10,980	8	0
3 Travelling allowance	14,180	0	0
4 Other compensatory allowance	70,768	12	0
4a. Honoraria	248	3	0
5 Dearness allowance	1,26,552	4	0
6 Pay of skilled labourers and menials	5,262	6	0
7 Madras House Allowance to menials.. .. .	774	15	0
8 Dearness allowances to menials	6,998	9	0
9 Electric current	22,488	12	0
10 Telephone charges	2,814	14	0
11 Service postage	34,050	0	0
12 Cleaning charges	2,644	4	3
13 Rates and taxes	11,084	14	0
14 Other contingencies	46,132	2	0
15 Purchase and feed of calves and other animals	82,874	2	0
16 Purchase of serum	3,33,053	10	0
17 Instruments and chemicals	2,45,192	3	4
18 Motor car maintenance	8,247	6	0
19 Customs duty	Nil.		
Expenditure under Five-Year Plan—			
20 Block grant	17,651	15	9
21 Books and Periodicals.. .. .	7,060	2	6
Total	13,93,973	11	10
(b) Administration of Drugs Act—			
Pay of Officers	26,104	6	0
Pay of establishment	4,450	11	0
Travelling and other compensatory allowance	4,465	11	0
Dearness allowance	5,982	0	0
Total	41,202	12	0
(c) Amount borne by other Budget on Institute Account—			
Proportionate cost of management and supervision by Director of Medical Services and his staff.	3,030	0	0
Cost of audit	402	0	0
Maintenance charges of buildings and electric installation			
(a) Buildings 31,498			
(b) Electric Installation 845	32,343	0	0
Depreciation and interest charged on—			
(a) Buildings	29,199	0	0
(b) Electric Installation	4,853	0	0
Cost of Stationery, clothing and printing	12,163	0	0
Superannuation allowances and pensions	679	0	0
Total	82,669	0	0
Grand total	15,17,845	7	10
Deduct receipts (actuals)	2,48,764	0	0
Net cost to State funds	12,69,081	7	10

REPORT OF THE KING INSTITUTE OF PREVENTIVE
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Statement II.

Actual Receipts.

Head of account.	Actual expenditure during 1954-55 including adjustment.		
	RS.	A.	P.
1 Sale proceeds of sera and vaccine	78,802	0	0
2 Recoveries of over payments—Bacteriological Laboratories.	92,745	0	0
3 Collection of payment for services rendered	14,650	0	0
4 Miscellaneous	53,415	0	0
5 Contribution from local bodies for analysis of food samples.	12,410	0	0
Total	2,49,023	0	0
Deduct refunds	259	0	0
Net actual receipts	2,48,764	0	0

Statement III.

Estimated cost of supplies and services made.

1 Bacterial and chemical examinations	3,63,268	0	0
2 Bacterial Vaccine supplies	3,07,431	0	0
3 Value of cultures and antigens, etc.	1,71,022	3	0
4 Vaccine lymph	3,51,165	0	0
5 Sera	9,74,805	14	0
6 Value of examinations done under Drugs Act	62,210	0	0
7 Value of Plasma and Group Sera issued	42,815	0	0
Total	22,72,717	1	0

Government Analyst section.

Government Analyst section.

Madras State.	Andhra State.
1st April 1954 to 31st March 1955.	1st April 1954 to 31st March 1955.
RS.	RS.

Food—

- 1 Contribution from local bodies working the Madras Prevention of Adulteration Act at Rs. 7-8-0 per sample.
- 2 Value for analysis done for Government Institutions.
- 3 Fees received from un-official sources for analysis of food samples.

88,350 51,510

83,960 11,120

1,435 160

Drugs—

- 4 Value for drug samples analysed for hospitals and samples under the Madras Drug Rules.
- 5 Fees received from un-official sources for analysis of drug samples.

15,490 1,560

210 ..

Total ..

1,89,445

64,350

Grand total ..

2,53,795

..

Grand total value of receipt ..

25,36,512 0 0

Deduct—Expenditure ..

15,17,845 7 10

Net value of profits ..

10,08,666 9 2

REPORT OF THE KING INSTITUTE OF PREVENTIVE
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TABLE II (a)—MADRAS STATE.

Types of vaccination.

Serial number and type of vaccination.	Total number of cases verified	Total number of cases not verified (unknown).	Total.
1 Primary ..	927,697	234,513	1,162,210
2 Secondary ..	46,023	..	46,023
3 Re-vaccination.	2,443,662	1,453,791	3,897,453
Total ..	3,417,382	1,688,304	5,105,686

Percentage of each type to total cases done.

22.8

0.9

76.3

..

Percentage of each type to the total quantity issued.

..

84.2

15.8

A. Total quantity of vaccine lymph issued at four insertion rate.	3,750,160	..
B. Total quantity of vaccine lymph used for vaccinating cases in 1, 2 and 3 calculated at four insertions per case.	3,156,959	84.2
C. Total vaccine lymph unaccounted for	593,201	15.8

TABLE II (b)—ANDHRA STATE.

Types of vaccination.

Serial number and type of vaccination.	Total number of cases verified.	Total number of cases not verified	Total.
1 Primary ..	504,931	90,576	595,507
2 Secondary ..	11,634	..	11,634
3 Re-vaccination.	1,270,028	674,587	1,944,615
Total ..	1,786,593	765,163	2,551,756

Percentage of each type to total cases done.

23.3

0.4

76.3

..

Percentage of each type to the total quantity issued.

..

84.6

15.4

A. Total quantity of vaccine lymph issued at four insertions rate.	1,866,980	..
B. Total quantity of vaccine lymph used for vaccinating cases in 1, 2 and 3 calculated at four insertions per case.	1,579,448	84.6
C. Total quantity of vaccine lymph unaccounted for.	287,532	15.4

REPORT OF THE KING INSTITUTE OF PREVENTIVE
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TABLE III (a)—MADRAS STATE.
Primary, secondary and re-vaccination results (1st January to 31st December 1954).

(The districts are in order of case success rate in primary vaccination.)

Serial number and districts.	Primary Vaccinations.				Re Vaccinations.				Total vaccinations.	Percentage of vaccine lymph unaccounted for.	Total numbers not verified (unknown).
	Case success.		Insertion success.		Cases.		Percentage success.				
	Total cases verified.	Percentage of case success.	Total number of injections verified.	Percentage of successful cases.	Total verified.	Percentage success.	Total verified (unknown).	Percentage success.			
1 Nilgiris ..	7,590	99.1	30,034	95.6	18,555	15.6	6,834	32,979	1.1		
2 South Kanara ..	42,075	98.7	165,434	92.5	90,289	19.9	53,689	186,003	22.0		
3 South Malabar ..	59,278	98.3	235,306	91.6	168,336	15.5	107,318	334,932	3.3		
4 Chingleput ..	37,320	97.8	142,549	89.6	60,390	11.9	45,681	143,397	3.2		
5 North Malabar ..	49,928	97.7	196,689	92.1	136,238	15.9	89,556	275,722	1.5		
6 Ramanathapuram ..	36,537	97.4	144,037	89.3	58,034	14.2	88,519	183,090	14.1		
7 Madurai ..	60,434	97.3	221,110	95.9	280,465	14.8	224,804	565,703	4.0		
8 North Arcot ..	72,514	97.2	280,166	91.7	70,946	10.6	66,760	210,220	20.0		
9 South Arcot ..	66,831	96.5	263,417	90.6	193,429	10.9	184,499	444,759	0.1		
10 Tiruchirappalli ..	52,216	96.3	204,289	85.8	121,125	13.8	129,227	302,568	11.2		
11 Coimbatore ..	85,406	96.3	303,186	86.4	131,650	13.8	129,442	346,498	9.9		
12 Tanjore ..	58,843	96.1	225,101	88.1	110,951	13.7	114,718	282,512	12.4		
13 Tirunelveli ..	53,034	95.9	210,723	86.2	86,683	13.7	113,319	263,036	0.3		
14 Salem ..	65,191	95.7	245,234	84.7	104,647	8.5	136,394	306,232	9.4		
District Total ..	745,197	96.9	2,867,275	89.3	1,631,694	13.8	1,490,760	3,867,651	15.7		
Madras Corporation ..	49,941	99.9	195,654	93.8	285,529	4.9	81,208	416,678	31.5		
Municipalities ..	132,559	99.3	526,994	94.4	526,439	14.9	162,359	821,357	6.2		
Grand Total ..	927,697	97.4	3,589,923	90.3	2,443,662	12.9	1,734,327	5,105,686	15.8		

Note.—No returns were received from the other bodies.

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TABLE III (b)—ANDHRA STATE.

Primary, secondary and re-vaccination results (1st January to 31st December-1954.)

(The districts are in order of case success rate in primary vaccination.)

Serial number and district.	Primary Vaccinations.			Re-Vaccinations.			Total numbers not verified (unknown).	Total vaccinations.	Percentage of vaccinee for lymph unaccounted for.
	Case success.	Percentage of case success.	Total number of insertions.	Case success.	Percentage of case success.	Total number of insertions.			
1 Chittoor ..	34,738	98.1	137,986	91.9	85.6	72,994	45,707	153,439	5.4
2 Krishna ..	37,691	95.7	141,723	85.6	81.9	85,765	79,383	202,839	17.1
3 Guntur ..	43,141	95.5	164,829	81.9	84.9	94,718	74,479	212,338	24.7
4 West Godavari ..	28,747	95.4	111,377	84.9	82.3	59,019	50,297	138,063	23.9
5 Anantapur ..	42,744	95.1	170,235	82.3	79.6	118,535	81,488	242,767	2.2
6 East Godavari ..	54,331	93.4	215,653	79.6	78.4	104,125	74,515	229,400	13.0
7 Srikakulam ..	44,884	93.2	177,075	78.4	74.8	73,597	58,817	207,826	18.8
8 Visakhapatnam ..	36,327	93.1	139,336	79.9	72.9	134,146	66,167	176,091	20.9
9 Kurnool ..	51,229	91.9	171,789	74.8	78.0	62,965	88,377	273,752	11.5
10 Nellore ..	42,434	87.4	170,956	78.0	72.9	72,848	47,324	152,723	13.8
11 Cuddapah ..	31,554	87.4	118,077	72.9	80.7	979,266	56,976	161,378	11.1
Total ..	447,820	94.0	1,719,036	80.7	93.0	230,762	723,530	2,150,616	14.9
Municipalities ..	57,111	..	219,581	93.0	..	230,762	53,267	401,140	17.7
Grand Total ..	504,931	94.5	1,938,617	82.1	..	1,270,028	776,797	2,551,756	15.4

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

Statement showing the Pathological specimens examined during
the year from 1st April 1954 to 31st March 1955.

Name of Institute and Section: Clinical Section, King Institute of
Preventive Medicine, Guindy.

Serial number, part and description.	Number Examined	Number positives.	Details regarding positives.	
Part I—Microscopical and Bacteriological Examinations—				
1 (A) Blood films ..	84	2	Malaria	2
			Microfilaria	Nil.
			Spirochaetes	Nil.
			Leishmaniadona- vani.	Nil.
			Other	..
			Organisms	Nil.
2 Blood Redcells, white cells. Differential count. ..	558	..	R.B.C.	23
			W.B.C.	42
3 Blood for total count. ..	65			
4 Blood for Haemoglo- bin. ..	22			
5 Blood for grouping ..	255	..	Group A	60
			Do. B	72
			Do. O	101
			Do. AB	22
			Positive	232
5 (a) R.H. Test ..	268	232	Negative	36
6 Blood for agglutination test. ..	5,550	2,253	Enteric group—	
			Sal. typhi	1197
			Do. typhi A	26
			Do. B	80
			Do. C	9
			More than one organism.	843
			Dysentery gr up—	
			Sh. Shiga	Nil.
			Sh. Flexner	Nil.
			Weil Ofelix reac- tion.	..
			o x 2	11
			o x 19	12
			o x k	66
			More than one Organism.	7
			Malta fever	..
			Br. abortus	Nil.
			Br. melitensis	Nil.
			More than one Organism.	2
			Total	2253
Cold agglutination. ..	35	4	Positive	4
			Negative	31
7 Blood for Aldehyde test. ..	95	23		
Blood for Antimony test. ..	95	17		
8 Blood for culture ..	1,714	152	Sal. typhi	85
			Sal. para typhi A	22
			Do. B	17
			Do. C	18
			Other organisms	10
			Total	152
Part I (A) Total ..	8,741	2,683		

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Serial number, part and description.	Number of examined.	Number positives.	Details regarding positives.
9 Part I (B)—			
Cerebro spinal fluid for cell count.	38	..	Nil.
Cerebro spinal fluid for other examinations.	3	3	M. tuberculosis .. Nil. N. meningitidis .. Nil. D. Pneumonia .. Nil. H. Influenza .. 3 Other organisms .. Nil.
Cerebro spinal fluid for cultural examinations.	172	23	M. tuberculosis .. Nil. N. meningitidis .. 1 D. Pneumonia .. Nil. H. Influenza .. 22 Other organisms .. 22
Part I (B) Total ..	213	26	Total .. 26
10 Part I (C)—			
Urine for qualitative.	33	..	..
Urine for quantitative.	Nil.	..	..
Microscopical examination.	33	..	..
Cultural examination.	110	257	B. Coli .. 213 Enteric group .. 2 Other organisms .. 42
Part I (C) Total ..	876	257	Total .. 257
11 Part I (D)—			
Faeces for Microscopical examinations.	30	10	E. Histolitica (Vegetative and cystic) .. 1 Ova .. 2 Cellular exudate .. 6 Others .. 1
Faeces for cultural examinations.	1,168	289	V. Cholera .. 274 Dysentery group .. 6 Enteric group .. 4 Others .. 5
Part I (D) Total ..	1,198	299	Total .. 289
12 Part I (E)—			
Pathological fluids for Microscopical examination.	2,202	306	M. tuberculosis .. 271 M. Leporae .. Nil. N. Gonorrhoea .. Nil. T. Pallidum .. Nil. P. Pestis .. 15 C. diphtheria .. 18 Others .. 2
Pathological fluids for cultural examination.	2,147	289	M. tuberculosis .. 121 C. diphtheria .. 35 D. Pneumonia .. 1 Others .. 132
Part I (E) Total ..	4,349	595	Total .. 289

REPORT OF THE KING INSTITUTE OF PREVENTIVE
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Serial number, part and description.	Number examined.	Number of positives.	Details regarding positives.
13 Part I (F)—			
Test on animals with specimens of pathological fluids.	61	6	M. tuberculosis .. 2 C. diphtheria .. Nil. Other organisms .. 4
Part I (F) Total ..	61	6	Total .. 6
Part I, Grand total.	15,438	3,866	

Statement showing the number of Serological tests from 1st
April 1954 to March 1955.

Serial number and name of the test.	Number examined.	Positives.
1 Number of bloods for Kahn test ..	29,369	6,832
2 Do. W. R. test ..	11,526	5,784
3 Do. C. S. Fs. for W. R. Test ..	1,575	328
4 Do. Lange's test ..	1,639	255
5 Do. bloods for Kahn-verification test ..	1	..
6 Do. bloods for Paul-Bunnell test ..	8	..
Total ..	44,118	13,199
7 Number of bloods from I.C.M.R. for Kahn test ..	576	157
8 Do. bloods for W.R. test ..	576	230
9 Do. bloods for Screen test ..	576	230
10 Do. bloods from V.D.R.L. slide test ..	519	202
11 Do. C.S.Fs. from Dr. J. Dairyam for W.R. test.	40	23
12 Number of C.S.Fs. from Dr. J. Dairyam for Lange's test.	39	13
Grand total ..	46,444	14,054
1 Number of specimens received broken or Lysed ..	..	2,551
2 Number of specimens found broken or Lysed while testing.	..	881

Details of number of Histopathological specimens examined in the Institute and reported during the period of 1st April 1954 to 31st March 1955, Madras and Andhra State.

Total number of specimens examined	..	103
Malignant	..	2
Benign	..	98
Others	..	3

Annual report of Serology Section, King Institute, Guindy, from 1st April 1954 to 31st March 1955.

Serial number and name of Institution.	Blood for Khan.			Blood for W.R.			Cerebro-spinal fluid for W.R.			Negative. (11)
	Negative. (2)	Positive. (3)	Total. (4)	Negative. (5)	Positive. (6)	Total. (7)	Negative. (8)	Positive. (9)	Total. (10)	
1 General Hospital, Madras ..	79	15	94	11	12	23	317	144	461	416
2 Stanley Hospital, Madras ..	2	1	3	3	..	3	2	1	3	2
3 Blood Bank Section ..	3,517	906	4,423	2,866	1,398	4,264	..	..	..	..
4 Women and Children Hospital, Madras.	25	7	32	8	4	12	1	..	1	1
5 Kasturba Gandhi Hospital, Madras.	3,852	802	4,654	237	605	842	..	..	..	..
6 Ophthalmic Hospital, Madras.	2,234	550	2,784	193	366	559	..	..	..	..
7 Indigenous Medicine Hospital, Madras.	206	55	261	23	33	56	..	..	..	..
8 Mental Hospital, Madras ..	1,135	191	1,326	154	130	284	783	115	898	854
9 Royapetta Hospital, Madras.	404	68	472	37	34	71	3	1	4	2
10 Other Hospitals Madras City.	135	52	187	23	39	62	..	..	..	..
11 Mission Hospitals ..	946	158	1,104	490	212	702	7	1	8	5
12 Mufussal Hospitals ..	9,251	3,882	13,133	1,159	2,745	3,904	71	51	122	71
13 Local Fund and Municipality	227	60	287	36	39	75	..	..	..	..
14 Public Health Centres ..	69	14	83	3	8	11	..	..	..	..
15 Private Practitioners ..	455	71	526	499	159	658	63	15	78	25
16 Indian Council of Medical Research.	419	157	576	346	230	576	..	..	..	..
17 Dr. J. Dhairiyam ..	..	..	..	..	..	..	17	23	40	26
Total ..	22,956	6,989	29,945	6,088	6,014	12,102	1,264	351	1,615	1,403

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Serial number and name of Institution.	Cerebro-spinal fluid for langes.		Blood for VDRL.			Blood for Kahn			Paul.	K. N. P.	K. P.	
	Positive. (12)	Total. (13)	Negative. (14)	Positive. (15)	Total. (16)	Negative. (17)	Positive. (18)	Total. (19)	(20)	(21)	(22)	(23)
1 General Hospital, Madras ..	117	533	..	..	..	..	..	..	..	2	..	2
2 Stanley Hospital, Madras ..	2	4	..	..	..	..	..	..	..	1	..	..
3 Blood Bank Section ..	..	1	..	..	..	..	..	..	..	..	645	296
4 Women and Children Hospi- tal, Madras.	..	..	..	..	..	..	..	..	..	..	22	166
5 Kasturba Gandhi Hospital, Madras.	..	..	..	..	..	..	..	..	..	..	11	153
6 Ophthalmic Hospital, Madras.	..	1	..	..	..	..	..	..	..	..	3	16
7 Indigenous Medicine Hospi- tal, Madras.	..	..	..	..	..	..	..	..	..	..	6	56
8 Mental Hospital, Madras ..	93	947	..	..	..	..	..	..	..	2	3	16
9 Royapetta Hospital, Madras.	..	2	..	..	..	..	..	..	..	..	4	13
10 Other Hospitals, Madras City.	..	..	..	..	..	..	..	..	..	..	5	13
11 Mission Hospitals ..	3	8	..	..	..	..	..	..	1	1	27	106
12 Mufassal Hospital ..	33	104	..	..	..	..	..	..	..	..	3	..
13 Local Fund and Municipality	..	..	..	..	..	..	..	..	..	2	26	19
14 Public Health Centres ..	7	32	..	..	..	..	..	..	..	..	..	..
15 Private Practitioners ..	..	..	317	202	519	346	230	576	..	..	..	..
16 Indian Council of Medical Research.	..	..	..	..	..	..	..	..	..	..	..	..
17 Dr. J. Dhairiyam	13	39	..	..	..	..	..	..	1	8	755	872
Total. ..	288	1,678	317	202	519	346	230	576	1	8	755	872

Prophylactic vaccines, Cholera T.A.B. and Plague from 1st April 1954 to 31st March 1955.

Name of Vaccine.	Opening balance in c.c. (2)	Receipt from mufassal in c.c. (3)	Manufactured in c.c. (4)	Issues.		Total issues in c.c. (7)	Closing balance. (8)
				Madras State. (5)	Andhra State. (6)		
1 Cholera (1)	28,01,272	2,35,383	6,02,718	12,92,294	8,04,849	20,97,143	15,42,230
2 T. A. B. ..	29,869	685	1,98,098	1,79,948	20,322	2,00,270	28,382
3 Plague ..	13,480	Nil.	* 1,90,000	64,580	1,28,100	1,92,680	10,800

*Received from the Haffkine Institute, Bombay.

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

Statement showing supplies of stock vaccine (Polyvalent), etc., auto-genous vaccines, bacterial suspensions, high titre sera and live cultures for the period commencing from 1st April 1954 to 31st March 1955.

Serial number and name of organisms.	Stock vaccine doses.	Auto-genous doses.
(1)	(2)	(3)
Pyogenic Group.		
1 Staphylococcus vaccine	8,106	126
2 Streptococcus + Staphylococcus vaccine	9,221	94
3 Streptococcus (Pyogenic) vaccine	1,749	..
4 Streptococcus (Pyorrhoeal)	639	..
5 Streptococcus (Filarial) vaccine	15,492	6
6 B. acne vaccine	315	24
7 B. acne + Staphylococcus vaccine	54	6
8 Streptococcus + Pneumococcus + N. catarrhalis.	..	6
9 Streptococcus + Pneumococcus	..	10
10 Streptococcus + Staphylococcus + Diphtheroids	..	6
11 Staphylococcus + (Coli form organism)	..	12
12 Staphylococcus + Diphtheroids	..	6
13 B. Pyocyaneus	..	..
Intestinal Group.		
14 T.A.B. vaccine 1 in 4 dilution for protein shock therapy.	2,388	..
15 T.A.B. vaccine (curative)	7,070	..
16 Typhoid vaccine (curative)	245	6
17 Enterococcus	..	6
18 Enterococcus + B. Morgani	..	6
19 B. coli	..	16
20 B. coli + B. carolinus	..	..
Genito Urinary Group.		
21 Gonococcus vaccine	9,456	..
22 Gonococcus compound vaccine	573	12
23 B. coli vaccine	772	..
24 B. coli + Streptococcus (puerperal) vaccine	210	..
25 Streptococcus (puerperal) Vaccine	237	6
26 B. coli + Enterococcus + B. proteus	..	12
27 Staphylococcus + B. coli	..	6
28 B. coli + Enterococcus	..	6
29 B. Morgani	..	6
30 Staphylococcus	..	6
Respiratory Group.		
31 Compound catarrhal vaccine	3,827	146
32 Compound influenza catarrhal vaccine	41	60
33 Whooping cough vaccine (curative)	6,835	..
34 Whooping cough vaccine (Prophylactic)	2,250	..
35 Pneumococcus vaccine	99	..
36 Streptococcus + Pneumococcus	..	36
37 Streptococcus + N. catarrhalis + B. friedlanders.	..	6
38 Streptococcus + Staphylococcus + Pneumococcus.	..	18
39 Streptococcus + Staphylococcus + Diphtheroids + B. friedlanders.	..	6
40 Streptococcus + N. Catarrhalis + H. influenza	..	36
41 Streptococcus + Staphylococcus	..	12
42 Streptococcus + N. Catarrhalis	..	24
43 Streptococcus + Pneumococcus + H. influenza	..	6
44 Streptococcus + Staphylococcus + Diphtheroids	..	12
45 Streptococcus + Staphylococcus + Pneumococcus + N. Catarrhalis.	..	30
46 Streptococcus + Pneumococcus + N. catarrhalis + B. Friedlanders.	..	18
47 Streptococcus + Pneumococcus + N. Catarrhalis + H. influenza + B. friedlander.	..	24
48 Staphylococcus + Diphtheroids	..	6
49 Pneumococcus + N. Catarrhalis	..	6
Total doses	69,580	824

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

Serial number and name of organisms.	Stock vaccine doses.	Auto-genous doses.
(1)	(2)	(3)
Miscellaneous.		
50 Old Tuberculin (Human) for V.P. Tests	..	4,825
51 Old Tuberculin (Human) for Mantoux tests	..	4,545
52 Live cultures of all organisms	..	425
53 Bacterial suspensions	..	35,680 c. c.
54 High titre sera	..	650 c. c.
55 Reports on Kalaazar	..	3
56 Reports on specimens received for Auto-Vaccine	..	14

Miscellaneous supply of Media made to Government Hospitals, Local Fund Dispensaries, Public Health Departments and Private Bodies in Madras and Andhra State during the official year from 1st April 1954 to 31st March 1955.

Serial number and name of articles.	Number of test tubes, 1 oz. bottles bulk.	Remarks.
(1)	(2)	(3)
1 Various Media in tubes	9,846	..
2 Various Media in 1 oz. bottles	1,187	..
3 Various Media in bulk	23,795 c. c.	..
4 Sterilised Wasserman ampoules 5 c.c.	85,546	..
5 Sterilised bottles	1,119	..
6 Sterilised test tubes	1,163	..
7 Spreaders	97	..

Annual Supplies of Dysentery Bacteric Phage for the Period from 1st April 1954 to 31st March 1955.

Total Dysentery Bacteric phage.
486 x 3 c. c.

Reagents supplied during the year 1954-55.

Serial number and name of Reagent.	Number of "C.O.S" supplied.
(1)	(2)
1 Kahn antigen for Kahn test	4,382
2 Bullock Heart Extract (W.R. antigen) for W. R. Test.	60

Special work done during the year 1954-55.

Specimen from I.C.M.R. for Inter Laboratory Evaluation of Serologic Tests.	Number examined.	Positives.
(1)	(2)	(3)
1 Number of bloods for Kahn Test	576	157
2 Number of bloods for W.R. Test	576	230
3 Number of bloods for Screen Test	576	230
4 Number of bloods for V.D.R.L. Test	519	202
Total	2,247	819

Specimens of Cerebro-spinal fluid of academic interest and Research Cases from Dr. J. Davriyam, M.D., Madras.

Serial number and name of test.	Number examined.	Positives.
(1)	(2)	(3)
1 C.S.F. for Wasserman Test	40	23
2 do. Langes Test	39	13
Total	79	36

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

*Statement showing King Institute of Preventive Medicines Products
Bulbed from 1st April 1954 to 31st March 1955.*

Number and names of sera.	Number of ampoules bulbed.	
(1)	(2)	(3)
1. Tetanus—Anti Toxin 1,500 I.U./1950 (Prophylactic)	..	59,322
2. Tetanus—Anti Toxin (Prophylactic) 10 doses vials	..	3,300 vials
3. Tetanus Anti Toxin 25,000 I.U. (curative)	..	1,972
4. Anti Gas-gangrene 4,000 I. U.	..	2,274

Number and names of sera.	Quantities issued from 1st April 1954 to 31st March 1955.	Quantities supplied to Andhra State from 1st April 1954 to 31st March 1955.	Quantities supplied to Madras State from 1st April 1954 to 31st March 1955.
(1)	(2)	(3)	(4)
1 Anti Anthrax 10 c.c.	1	..	1
2 Anti Gas-gangrene 10,000 units	5,090	2,262	2,828
3 Anti Scorpion 1 c.c.	4,826	2,701	2,125
4 Anti Venene 10 c.c.	1,531	505	1,026
5 Diphtheria Anti Toxin 10,000 units	18,086	1,647	16,439
6 Diphtheria Prophylactic A.P.T. 0.5 c.c.	171	12	159
7 Diphtheria Prophylactic P.T.A.P. 0.5 c.c.	1,005	177	828
8 Haemostatic 2 c.c.	7,617	1,869	5,748
9 Tetanus Anti Toxin $\frac{1,500 \text{ I.U.}}{1,950}$ Prophe-	342,579	74,158	268,421
lactic.			
10 Tetanus Anti Toxin 25,000 I.U./1950	31,195	7,714	23,481
Curative.			
11 Tetanus Toxoid 1 c.c.	53	10	43
Total ..	412,154	91,055	321,099

TABLE VII.

Department of Water Analysis.

WATER SAMPLES.

(a) Domestic Purposes.

Madras State.

Number and description.	Number examined.
(1)	(2)
1 Bacteriological Examination of water samples from Protected water supplies.	1,480
2 Chemical Examination of water samples from Protected water supplies.	1,043
3 Samples of water for bacteriological examination from Investigation sources and field investigations.	59
4 Samples of water for chemical examination from Investigation sources and field investigations.	81
5 Samples of water for bacteriological examination from Government Local Bodies and Private bodies.	174
6 Samples for chemical examination from Government Institutions, Local and Private bodies.	126
7 Samples of water for bacteriological examinations from Rural Water Supply Scheme.	16
8 Samples of water for chemical examination from Rural water supply sources.	35
9 Samples of water for Fluoride Estimation only	1
10 Water samples for Vibrios test	1,729
11 Water samples for Physical Tests like Turbidity, colour, odour, etc.	1,285
12 Water samples for Bacteriological examination from the Government Milk Factory.	24

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

TABLE VII—cont.

Department of Water Analysis—cont.

PART I.

WATER SAMPLES—cont.

(a) Domestic Purposes—cont.

Andhra State.

Number and description.	Number examined.
(1)	(2)
1 Bacteriological examination of water samples from Protected Water Supplies.	625
2 Chemical examination of water samples from Protected Water Supplies.	447
3 Samples of water for Bacteriological Examination from Investigation sources and field Investigations.	23
4 Samples of water for chemical examination from Investigation sources and field Investigations.	25
5 Samples of water for Bacteriological examination from Government, Local Bodies and Private Bodies.	42
6 Samples for Chemical Examination from Government Institutions, Local and Private Bodies.	58
7 Samples of water for chemical examination from Rural Water Supply Schemes.	18
8 Samples of water received in connection with the Research Experiments of Kakinada Slow Sand Filters (Bacteriological Examination).	37
9 Samples of water received in connection with the Research Experiments of Kakinada Slow Sand Filters for Chemical Examination.	27
10 Water Samples for Fluoride Estimation only	11
11 Water Samples for Vibrio Test	727
12 Water Samples for Physical Tests like turbidity, colour, odour, etc.	575

(b) Experimental Filter Station, Kilpauk.

Number and description.	Number examined.
(1)	(2)
1 Samples of water for bacteriological examination	693
2 Samples of water for physical tests	527
3 Samples of water for chemical analysis	527
4 Dose of chlorine and residual chlorine, determinations carried out.	546
5 H ₂ S and dissolved oxygen estimations	602
6 Tests for sulphate reducing bacteria	37
7 Dose of copper and residual copper determinations	40
8 Ammonia estimations	64
9 B.P. Dose determinations	16
10 Sand samples for examinations	5
11 Samples of raw and filtered water for microscopic examination	25

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

TABLE VII—cont.

Department of Water Analysis—cont.

PART I—cont.

WATER SAMPLES—cont.

(c) Non-domestic.

Madras State.

Serial number and description.		Number examined.
(1)	(2)	
1 Suitability for use in boilers	23	
2 Do. condensers	5	
3 Do. chromium plating	4	
4 Do. humidification	1	
5 Do. concrete making	1	
6 Do. matches making	2	
7 Do. fountain pen ink manufacture	1	
8 Do. laundry purposes	3	
9 Do. building construction	6	
10 Do. paddy boiling	1	
11 Do. leather and bark sole tanning	1	
12 Do. ice manufacture	1	
13 Do. gardening, bathing and washing	3	
14 Do. air conditioning and Refrigeration	1	
15 Do. cooling and processing of photo-plates.	1	
16 Do. fruits and Pickles preservation	1	
17 Water samples from Aluminium filters	2	
18 Do. full Mineral analysis	15	
19 Do. tested for suspected faecal contamination	1	
20 Do. from a spring considered to be "Sacred Theertham".	1	
21 Do. for suspected Typhoid cases	1	
22 Water samples—Drinking of—develop kidney trouble, urinary trouble and sometimes proving fatal in cattle.	1	
Total ..	76	

WATER REPORTS.

(d) Algological Studies.

Madras State.

Serial number and description.		Number examined.
(1)	(2)	
1 Microscopical examination on aquatic growth	347	
2 Sand and alime sediment for microscopic examination	4	
3 Tests for determination of dose of Algicide	34	
4 Residual copper and chlorine tests	40	
5 Estimation of dissolved gases in samples of water	7	
6 Field tests for determination of pH of water samples	8	
7 Field tests for organic matter in water	8	
8 Field tests for turbidity, odour, etc.	8	
9 Samples of aquatic vegetation for identification	2	
Total ..	458	

TABLE VII—cont.

Department of Water Analysis—cont.

PART II.

MISCELLANEOUS SAMPLES.

Madras State.

(1954-55).

Serial number and description.		Number examined.
(1)	(2)	
1 Bleaching powder for available chlorine	72	
2 Determination of pH	7	
3 Samples analysed for Residual chlorine	1	
4 Salt sample analysed	1	
5 Soda, Lime, etc., analysed	1	
6 Alum-analysed	3	
7 Estimation of D. D. T., from D. D. T., treated water	1	
8 Analysis of accumulated black silt at the bottom of service reservoir.	7	
9 Digestive value of Trypsin	3	
10 Samples of urine for estimation of sugar content	95	
11 Milk samples for bacteriological examination	71	
12 Rinse water from sterilized utensils for bacteriological examination.	25	
13 Ice cream for bacteriological examination	4	
14 Aerated waters for bacteriological examination	85	
15 Sewage and trade wastes	11	
16 Leakage water from Mettur Dam	6	
17 Number of cultures of B. Typhosus supplied	397	
Total ..	397	

PART III.

SOLUTION SUPPLIED.

Serial number and description.		Quantity supplied in C.C.
(1)	(2)	
1 Normal Sodium Hydroxide	16,200	
2 33 per cent potassium hydroxide	150	
3 Fenlins solution (for urine analysis) 'A'	150	
4 Do. do. 'B'	150	
5 0.1 per cent phenol red solution	200	
6 0.4 per cent brom Thymol blue	450	
7 0.5 phenolphthalein	1,000	
8 Lactose salt solution for Vaccine lymph section	2,000	
9 Benedict solution (Qualitative)	1,400	
10 Standard Iron solution	350	
11 Nitric Acid 1:1	1,000	
12 Nitric Acid (Conc.)	250	
13 10 per cent ammon. Thiocyanate solution	1,000	
14 Orthotolidine	500	
15 Pancreatic extract	1,42,800	
16 Wet stanis and other reagents supplied	52,330	
Total ..	1,29,930	

(c) NON-DOMESTIC.

Andhra State.

Serial number and description.		Number examined.
(1)	(2)	
1 Sample of water for corrosivity tests	3	
2 Do. suitability for bathing etc.,	1	
3 Do. building construction	1	
Total ..	5	

TABLE VII—cont.

Department of Water Analysis—cont.

PART I.

WATER REPORTS.

(d) *Algological Studies.**Andhra State.*

Serial number and description.	Number examined.
(1)	(2)
1 Microscopical examination on aquatic growth	140
2 Sand and slime sedimentation for microscopic examination.	2

PART II.

MISCELLANEOUS SAMPLES.

Andhra State.

Serial number and description.	Number examined.
(1)	(2)
1 Bleaching powder for available chlorine	20
2 Sewage and trade wastes	5

TABLE VIII.

Protected water-supplies examined at the King Institute, Guindy, with details regarding source, method of filtration, chlorination, etc. (*Madras State.*)

Protected water supplies.	Total number of		Sources.					
	Places.	Sources.	Impounded reser- voir.	River or stream.	Tank.	Well.	Infiltration gallery or well.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Municipalities	40	59	12	8	8	8	16	10
Panchayat Boards	10	15	2	1	1	3	3	1
Jails, Borstal and Schools and Vigilance Homes.	17	24	2	1	1	13	5	2
Railway Stations	54	61	1	4	..	51	3	2
Swimming Pool	1	1	..	..	..	1	..	..
Other Institutions	23	29	8	9	..	6	5	1
Total ..	145	189	23	31	6	81	32	16

	Filtration.					Chlorination.		
	Slow sand filter.	Mechanical filter.		Infiltration gal- lery or well.	Not filtered.	Automatic liquid chlorine.	Bleaching Powder.	Unchlorinated.
	(10)	Pressure.	Gravity.	(13)	(14)	(15)	(16)	(18)
Municipalities	3	2	5	28	22	16	1	3
Panchayat Boards	2	1	..	4	10	8	1	2
Jails, Borstal and Schools and Vigilance Homes.	..	..	..	..	14	5	..	..
Railway Stations	..	2	4	5	50	18	28	15
Swimming Pool	..	1	..	..	..	1	..	..
Other Institutions	5	5	2	6	11	11	6	7
Total ..	19	12	12	48	107	53	35	16

TABLE VIII—cont.

Protected water-supplies examined at the King Institute Guindy, with details regarding source, method of filtration, chlorination, etc.—cont. (*Andhra State.*)

Protected water supplies.	Total number of		Sources.					
	Places.	Sources.	Impounded reser- voir.	River or stream.	Tank.	Well.	Infiltration gallery or well.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Municipalities	18	30	..	7	4	6	8	5
Panchayat Boards	7	9	..	1	3	4	..	1
Jails	3	5	..	..	..	3	1	1
Other Institutions	1	2	..	2	..	..	..	..
Total ..	29	46	..	10	7	13	9	7

	Filtration.				Chlorination.			
	Slow sand filter.	Mechanical filter.		Infiltration gal- lery or well.	Not filtered.	Automatic liquid chlorine.	Bleaching powder.	Unchlorinated.
	(10)	Pressure.	Gravity.	(13)	(14)	(15)	(16)	(18)
Municipalities	5	2	1	13	9	12	..	17
Panchayat Boards	1	..	..	1	7	2	..	7
Jails	..	..	..	2	3	4	..	1
Other Institutions	..	..	..	..	2	..	..	2
Total ..	6	2	1	16	21	18	..	27

REPORT OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY

TABLE IX.

Department of Biological control: King Institute, Guindy, Madras-15. Tabular Statement of tests conducted during 1954-55.

Serial number and nature of tests.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
		Tests done for various de- partment of institutions.	Tests done for Government hospitals.	Tests done for private firms.	Tests done for other Govern- ment institu- tions.	Tests done for Inspector of manufactur- ing concern in drugs.	Tests done for other than Madras.	Tests in the year 1954-55.	Number of spe- cimens found unsatisfactory in 1954-55.	Value of tests if charged at scheduled rate 1954-55.	Amount realle- ed 1954-55.
1 Pyrogen Tests	337	22	..	..	1	15	6	381	7	19,050	..
2 Sterility Tests	673	57	..	..	1	16	12	760	4	9,120	..
3 Toxicity Tests	418	9	..	..	..	..	4	431	..	21,550	..
4 Chemical Assay	136	28	..	3	..	16	5	188	19	4,640	..
5 Bio-assays, Tincture Digi- talis leaves and powder.	..	..	..	3	..	1	..	4	3	96	..
6 Anti-toxin Potency tests and Bio-assays.	18	..	..	..	..	..	..	18	..	1,350	836
7 Penicillin Assay	..	..	1	1	..	..	4	6	4	150	..
8 Penicillin Sensitivity tests.	..	..	1	..	..	..	..	1	..	25	..
9 Prophylactic Vaccine: tests of Opacity, Identity and serological tests with H.T.S.	109	..	..	..	..	..	..	169	..	2,725	..
10 Vaccine Lymph Bacterial content, Colony count and safety tests.	50	..	..	..	..	..	..	50	..	1,250	..
11 Male Frog Tests	..	..	412	125	..	..	5	542	..	2,710	..
12 Miscellaneous— Catgut Absorbability	..	..	4	..	..	..	..	4	2	200	1

REPORT OF THE GOVERNMENT ANALYST,
MADRAS, FOR THE PERIOD FROM 1st APRIL 1954
TO 31st MARCH 1955.

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I STAFF.

Government Analyst Sri S. Narayana Ayyar, M.A., A.I.L.S.C.,
F.B.I.C.

Deputy Government Analyst. Sri Y. G. Doraiswami, M.Sc., F.B.I.C.
from 1st April to 27th October
1954.
„ K. R. Srinivasan, M.A., F.B.I.C.,
from 8th November 1954 to 31st
March 1955.

Senior Assistant to Government Analyst. Sri K. R. Srinivasan, M.A., F.B.I.C.,
from 1st April to 7th November
1954.
„ K. Narayanaswami, M.A., A.B.I.C.
„ M. Krishnamurthi, M.Sc.
„ P. S. Nataraja Sarma, M.A.
„ K. Balasubramaniam, B.Sc.
(Hons).
„ K. Ramachandran, M.A.
„ N. Srinivasan, M.A. from 3rd May
to 31st August 1954 and from 8th
November 1954 to 31st March
1955.

Junior Assistant to Government Analyst. Sri N. Srinivasan, M.A. from 1st April
to 2nd May 1954 and from 1st
September to 7th November 1954.
„ M. V. Narayanan, B.Sc. (Hons).
„ C. S. Raghunathan, B.Sc. (Hons).
„ G. Balasubramaniam, B.Sc.
(Hons).
„ V. Seshagiri Rao, B.Sc. (Hons).
„ S. Kasthuri, B.Sc. (Hons).
Kumari H. Packiyam, B.Sc. (Hons).
from 12th April 1954.
Sri M. R. Gopalan, B.Sc. (Hons).
„ K. Sambandam, B.Sc.
„ P. Appavu, B.Sc. (Hons).
„ G. Ranganathan, M.Sc. from 3rd
May 1954.
„ P. Chandrasekara Rao, B.Sc.
(Hons). from 6th May 1954.

The following Junior Assistants officiated in short vacancies.

Sri T. R. Krishnaswamy from 1st April to 11th April 1954. Appointed as Junior Chemical Assistant in the Department of Anti toxias.

Sri M. S. Parthasarathy from 5th March to 12th June 1954.

Sri S. Subbaraman from 1st April to 30th April 1954.

Sri N. Gopalakrishna Rao from 12th April to 26th April 1954.

Sri V. Ramachandran from 5th June to 1st July 1954

Sri V. Konial Rao from 14th July to 31st October 1954. Appointed as Junior Chemical Assistant in the Solution Section from 1st November 1954.

Kumari S. Rajalakshmi from 31st December 1954.

Sri K. T. Gopalakrishnan from 13th December 1954 to 2nd March 1955.

In order to deal with the rush of work arising from tender samples sent by hospitals Government were pleased to sanction in G.O. No. 314, Health, dated 28th January 1955 the appointment of two Junior Assistants for the period from January to March every year for two years.

Sri K. T. Gopalakrishnan and Sri S. Subramaniam acted in these vacancies from 8th March to 30th April 1955 and from 12th March to 30th April 1955, respectively.

Sri S. A. Subramanian was relieved on 25th February 1954 to take up his appointment as Junior Chemist in the Soil and Mechanics Laboratory attached to the Office of the Chief Engineer (Irrigation) Madras Government.

LEAVE.

I was on leave on average pay from 3rd August to 17th September 1954 when Sri K. R. Srinivasan, Senior Assistant, held full additional charge of the post of Government Analyst.

Sri Y. G. Doraiswami, Deputy Government Analyst, was on leave on average pay from 28th October 1954 to the end of the year and Sri K. R. Srinivasan acted in the vacancy from 8th November 1954, and Sri N. Srinivasan, Junior Assistant, was promoted to act in his place. Sri K. R. Srinivasan was on earned leave from 22nd September to 1st October 1954. Sri K. Narayanaswami, Senior Assistant, was on earned leave from 3rd May to 31st August 1954 when Sri N. Srinivasan acted for him. Sri K. Ramachandran was

on earned leave for 5 days from 27th December 1954. The following Junior Assistants were on earned leave for the periods shown against each :—

Sri N. Srinivasan, for 53 days from 22nd February to 15th April 1954.

Sri M. V. Narayanan, for 31 days from 1st to 31st July 1954, for 8 days from 11th to 18th August 1954; for 1 day on 30th October 1954; for 3 days from 25th to 27th November 1954 commuted leave on medical certificate for 2 months from 14th December 1954 to 18th February 1955. Unearned leave on medical certificate for 17 days from 14th February to 2nd March 1955.

Sri C. S. Raghunathan, for 70 days from 23rd August to 31st October 1954.

Sri G. Balasubramanian, for 48 days from 26th April to 12th June 1954.

Sri P. Appavu, for 12 days from 2nd to 13th November 1954; for 10 days from 16th to 25th November 1954. Unearned leave on medical certificate for 25 days from 26th November to 20th December 1954.

Sri M. R. Gopalan, earned leave for 11 days from 28th July to 7th August 1954.

Sri K. Sambandam, for 30 days from 10th April to 9th May 1954.

II. SALIENT FEATURES FOR THE YEAR 1954-55.

This is the first report of the Government Analyst for a full year for the residuary Madras State after the Andhra State was separated on 1st October 1953. A report of the Government Analyst covering the same period is submitted separately in respect of the Andhra State also. The previous reports on the working of the Government Analyst Department with reference to the Madras and Andhra States were prepared for the half year ending 31st March 1954.

Adulteration in foods and drugs continues at a high level. While in progressive countries in the West the percentage of adulterated samples is less than 5 per cent, it continued to be over 40 per cent in the Madras State for the last several years. One may well ask why the position is so bad and whether there is no remedy. One of the reasons is that only a restricted number of samples is taken from each local body. More samples can be taken if and when more laboratories are started. Another disconcerting feature is that the average fine levied in food adulteration cases is decreasing year by year and is only Rs. 36 for the year under report. Many local bodies were not even able to recoup their contribution to Government. The rapid fall in fine can be illustrated by taking a typical case. The total fine levied in Madurai during the year 1954-55 for 272 convictions was only Rs. 8,568 whereas the fine for the year 1949-50 was Rs. 23,551 for 278 convictions. It is no wonder that adulteration does not show a tendency to decrease

when some Magistrates take such a lenient view of food adulteration. No doubt a few Magistrates do impose fairly high fines in suitable cases. The position is expected to improve when the Central Prevention of Food Adulteration Act, 1954, which prescribes deterrent punishment, comes into force throughout India. But what is most urgently required is construction of more analytical laboratories without which no improvement can be expected.

With the lapse of time merchants take to new methods of adulteration hoping they will escape the notice of the Analyst. Skimmed milk powder is being used to a large extent to adulterate milk. Other adulterants met with are exhausted tea, tea coloured with coal-tar dye, foreign starch like tapioca in turmeric. In fact coaltar colours find extensive use in a variety of substances, such as tea, honey, dhall and groundnut to give them an attractive appearance.

In one or two instances Co-operative Societies refused to give copies of the bye-laws of the societies to the Sanitary Inspectors for reference in connexion with filing of charge-sheets against them and were forced to supply a copy when ordered to do so by Government.

Disciplinary action was taken by the authorities concerned against some Sanitary Inspectors for causing financial loss to local bodies by allowing samples to lapse or for not filing charge-sheets in the case of adulterated samples within the specified time-limit. The persons concerned had to make good the loss incurred by the local bodies.

Most of the manufacturers of coffee-chicory mixtures throughout the State were individually addressed to rectify the defects in the labels used by them on such mixtures and such a method of persuasion has yielded fruitful results.

Analysis of diet articles and drugs supplied to Government hospitals shows that there is great scope for improvement. Many stock mixtures and medicines compounded in hospitals were not accurately dispensed and some drastic action is called for since the patients' well-being and progress depends not a little on the potency of the medicines administered to them.

Owing to inadequacy of laboratory accommodation and other facilities, drug analysis could not be undertaken on a large enough scale. Analysis of the few drugs sent by Magistrates proved that sale of spurious drugs and cosmetics is wide spread. As emphasized in previous reports there is pressing need for starting more laboratories if food and drug adulteration is to be brought under control.

The total number of food samples and drugs analysed in the Government Analyst's Laboratory during the year under report is 19,734 and 531, respectively, as shown in Table I below as against 10,203 and 152, respectively, for the previous half year ending 31st March 1954.

TABLE I.

Number and categories of samples analysed from different sources in the Government Analyst Laboratory.

Category.	For the year 1954-55.		For the half year 1st October 1954 to 31st March 1955.	
	Number of samples taken.	Number adulterated or unsatisfactory.	Number of samples taken.	Number adulterated or unsatisfactory.
	(2)	(3)	(4)	(5)
Food samples under the Madras Prevention of Adulteration Act.	11,658	5,029	5,763	2,384
Food samples analysed for Government Hospitals.	7,482	919	3,917	661
Food samples from other Government Departments.	582	56	462	58
Food samples from unofficial sources.	82	29	61	15
Total (Foods) ..	19,804	6,033	10,203	3,118
Drugs analysed under the Madras Drugs Rules.	145	50	70	34
Drugs analysed for Government Hospitals and other Government Institutions.	379	224	73	42
Drug samples from unofficial sources.	7	2	9	..
Total (Drugs) ..	531	276	152	76

III. FINANCE.

As given in Table II below the total estimated income is Rs. 1,89,445 and the estimated expenditure is Rs. 1,31,761 showing a profit of Rs. 57,684.

The total estimated income is Rs. 1,89,445 and the estimated expenditure is Rs. 1,31,761 as shown in Table II below.

The total fines credited to the Judicial Budget amounted to Rs. 1,56,213 (for adulterated samples Rs. 1,54,231 and non-analysis cases Rs. 1,982).

TABLE II.

Financial statement of Government Analyst Department for the year 1st April 1954 to 31st March 1955—(Madras State).		Rs.
Food—		88,350
(1) Contribution to Government from Local Bodies working the Madras Prevention of Adulteration Act at Rs. 7-8-0 per sample.		83,960
(2) Estimated value for analysis done for Government Medical Institutions.		1,435
(3) Fees from unofficial sources for analysis of food samples.		15,490
Drugs—		210
(4) Estimated value for drug samples analysed for hospital samples and under the Madras Drug Rules.		210
(5) Fees received from unofficial sources for analysis of drug samples.		1,89,445
Total receipts ..		1,89,445

Estimated expenditure:

	Rs.
1 Salaries and allowances of the staff of the Government Analyst.	89,209
2 Superannuation allowance and pension on above ..	892
3 Proportionate cost of certain common staff of the King Institute, Guindy.	1,500
4 Proportionate cost of management and supervision by the Director of Medical Services and Director, King Institute, Guindy.	300
5 Stores, instruments and chemicals including gas and water charges.	22,512
6 Customs duty	Nil
7 Contingencies	7,300
8 Electric current	2,248
9 Cost of stationery, clothing and printing	800
10 Proportionate charges on cost of audit, maintenance, interest and depreciation on buildings, electric installation and other plants.	7,000
Total expenditure ..	1,31,761
Share of the fines accruing to Government by the working of the Madras Prevention of Adulteration Act (10 per cent of total fines plus half the excess over the contribution of the local body to Government towards fee for analysis).	40,850

IV. WORKING OF THE MADRAS PREVENTION OF ADULTERATION ACT.

During the year under report the Madras Prevention of Adulteration Act was in force in 145 bodies in all. Regular quotas were sent from all the 61 Municipalities and 78 Panchayat Boards. Harur and Madukalathur which have no regular quota sent 48 and 15 samples respectively. Gunaseelam, Sriperumbudur, Venkateswarapuram and Mecheri Panchayats which work the Act for the duration of local festivals sent 4, 16, 5 and 2 samples respectively in the year.

The Madras Prevention of Adulteration Act was extended to Gudalur Panchayat Board in Madurai district from 1st January 1955. The provisions of the Act were also extended to Avadi during January 1955 when the All-India Congress Committee was in session and 20 samples were taken for analysis during the period.

It has not been possible to comply with the requests of new panchayat boards to extend the Act to their areas owing to inadequate accommodation and other facilities in the Government Analyst's Laboratory.

The total number of samples taken under the Act during the year in the Madras State was 16,772 of which 7,363 or 43.9 per cent was adulterated. This includes 5,114 samples analysed by the Public Analyst of the Madras Corporation in the Corporation Laboratory.

Table III gives particulars of samples received for analysis from the various classes of local bodies during the year under report. Figures for the previous half year have been included for comparison.

Appendices A and B at the end of this report give details of the total number of samples, number adulterated type of samples, etc., sent by the various local bodies grouped under the various districts and considered individually.

TABLE III.

Number of samples analysed and found adulterated in the Madras State.

	For the year 1954-55.			For the half year 1st October 1953 to 31st March 1954.		
	Number of samples taken.	Number adulterated.	Percentage.	Number of samples taken.	Number adulterated.	Percentage.
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Municipalities.</i>						
18 Class 'A'	4,900	2,015	41.1	2,435	1,014	41.6
14 Class 'B'	1,372	61	43.8	675	291	43.1
29 Class 'C'	1,561	744	47.6	801	326	40.7
<i>Panchayats.</i>						
84 Class 'C'	3,825	1,669	43.6	1,852	753	40.6
Total for 145 local bodies analysed in Government Analyst's Laboratory.	11,658	5,029	43.1	5,763	2,884	41.4
<i>Corporation.</i>						
Madras City	5,114	2,334	45.6	2,870	1,273	44.4
Total for 146 local bodies in Madras State.	16,772	7,363	43.9	8,633	3,657	42.3

The working of the Act during the year shows that adulteration shows no tendency to decrease. This should be attributed to the small number of samples sent by the local bodies and the low fines inflicted in food adulteration cases, although some Magistrates take a serious view of food adulteration. In convicting and sentencing a vendor for the offence of selling adulterated milk a Magistrate observed as follows:—

"It is the common practice of the milk-vendors to adulterate the milk on high level and sell the same at rates at which genuine milk is sold. Ultimately the public are robbed. The health of society is affected. It has been the fate with regard to all necessities of life. I therefore take a deterrent view of the matter and convict and sentence the accused to pay a fine of Rs. 50 in addition to the payment of Rs. 15 which will go to cover the expenses of the analyst of the panchayat board. In default, the accused shall suffer two months' simple imprisonment."

The prescribed quota of samples was sent by most of the local bodies. In order that sampling may be done evenly throughout the month instead of postponing it to the last week or day of the month the Director of Public Health circularized that the Health Officers should send weekly returns giving the number of samples taken. Many Sanitary Inspectors are under the wrong impression that arrears of quotas may be made up at any time. They appear to be ignorant of the Government Order on the subject which states that if the deficiencies of a month are not made up within the subsequent two months they would lapse.

Since the local bodies are ordinarily permitted to send only the prescribed quota of samples, suitable suggestions are given by the Government Analyst about including or excluding the types of food articles for sampling purposes having regard to the nature and frequency of adulteration prevalent in the particular area. For example, some local bodies which sent milk samples only were advised to sample other types of food also. Again, most of the ghee samples received from a few local bodies were found to be adulterated but no samples of butter were taken at all.

The Sampling Inspectors were also advised to seize stocks of food and send samples especially from vendors who had been previously convicted. When the samples are found to be adulterated the stocks are ordered to be confiscated to the local body by the Court. With such consequences threatening him the vendor cannot hope to continue his anti-social activities.

The extra samples sent by local bodies are given in Table IV.

TABLE IV.

Extra samples sent by Local Bodies during 1954-55.

Municipalities name.	Number of extra samples.	Panchayats name.	Number of extra samples.
Madurai	1	Palni	2
Kozhikode	101	Vellore	1
Tirunelveli	30	Periyakulam	1
Kancheepuram	48	Rasipuram	1
Kumbakonam	46	Rajapalayam	1
Tuticorin	81	Nagapattinam	12
Kodaikanal	12	Pudukottai	1
Ootacamund	5	Erode	1
Cuddalore	16	Ayyampet	1
Mayuram	12	Kallidaikurichi	3
Tiruppur	18	Ranpet	1
Tiru annamalai	1	Satvamangalam	8
Minnargudi	4	Tiruchendur	3
Melapalayam	2	Vikramasingapuram	2
Mettupalayam	2	Attur	7
Bodinayakanur	1	Jayankondam	8
Gobichettipalayam	1	Madurantakam	1
Udumalpet	1	Panruti	4
Mangalore	1	Vridhachalam	3

Extra samples sent by Local Bodies during 1954-55—cont.

Municipalities name.	Number of extra samples.	Municipalities name.	Number of extra samples.
Arkonam	1	Tiruvaiyaru	1
Tiruchengode	1	Papanasam	2
Courtallam	1	Tiru ureipundi	1
Muvairi	1	Batlagundu	2
Pallattur	8	Cumbum	1
Shevaroya	5	Arcot	1
Ettayapuram	1	Kurichi	3
Puliyangudi	2	Manapalai	1
Srivaikuntam	6	Kollegal	1
Polar	6	Nallikuppam	1
Sirkali	5	Sattur	1
Ariyalur	1		
Viravanallur	2		
Badagara	3		
Pattukottai	1		
			498

Table V gives particulars about the samples taken in Madras City in the year 1954-55.

TABLE V.

Nature of samples taken in Madras City in the year.

Nature of samples.	Number of samples.	Number adulterated.	Percentage adulterated.
Milk	3,055	1,709	55.9
Ghee	749	220	29.4
Butter	546	194	35.5
Gingelly oil	208	59	28.4
Coconut oil	154	14	9.0
Groundnut oil	125	5	4.0
Coffee powder	121	69	57.0
Tea	22	2	9.0
Ghee substitutes	31	5	16.0
Other articles	103	57	55.0
Total	5,114	2,334	45.6

Table VI gives particulars about the total number of food articles and number found to be adulterated in 146 local bodies of the Madras State including Madras City.

TABLE VI.

Nature of samples taken in 146 Local Bodies (including Madras City) working the Act in the Madras State.

Nature of sample.	Year 1954-55.			Half year October 1953 to March 1954.		
	Total samples.	Number adulterated.	Percentage adulterated.	Total samples.	Number adulterated.	Percentage adulterated.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Milk	10,598	5,658	53.4	5,567	2,940	52.7
Ghee	1,238	398	32.0	689	196	28.3
Butter	770	305	39.6	441	172	38.9
Gingelly Oil	1,273	228	18.0	696	106	15.2
Coconut Oil	583	43	7.3	304	20	6.6
Groundnut Oil	222	26	11.7	63	8	12.7
Coffee Powder	858	253	28.5	390	84	21.7
Sweets	40	27	67.5	19	14	73.7
Turmeric	189	95	50.2	47	14	29.7
Tea	346	59	17.0	159	7	4.4
Honey	86	19	22.1	23	1	4.3
Dhall and flour	370	174	47.0	131	47	35.8
Vegetable Oil product.	43	12	28.0	22	3	13.6
Chicory	11	5	45.5	3	3	100.0
Miscellaneous	115	63	54.7	79	42	53.1
Total	16,772	7,363	43.9	8,633	3,657	42.3

The above table shows that adulteration continues at a high level in the several types of food articles. Over 50 per cent of milk samples are adulterated. There is a steep increase in the adulteration of turmeric and tea. In addition to the presence of excessive amounts of lead, turmeric is found to be adulterated with foreign starches such as tapioca. Tea is adulterated with spent or exhausted tea and colouring matter in the form of coal tar dyes.

If adulteration of foodstuffs is considered from the extent of prevalence in the several districts it is found that a more or less similar pattern is found as in the previous half year as shown in Table VII below. Madurai district as usual shows the lowest adulteration of 32.1 per cent and Coimbatore district the highest.

TABLE VII.

Districts arranged according to the increasing percentage of adulterated samples.

Name of district.	Rank for the year under report 1954-55.	Percentage of adulterated samples.	Rank for previous half year.	Percentage of adulterated samples in previous half year.
(1)	(2)	(3)	(4)	(5)
Madurai	1	32.1	1	29.9
Ramanathapuram	2	34.7	2	33.4
South Arcot	3	35.1	6	39.9
North Arcot	4	41.1	12	46.6
Tiruchirappalli	5	43.5	7	42.1
South Kanara	6	44.0	4	34.7
Malabar	7	44.1	3	34.4
Nilgiris	8	44.7	9	44.1
Chingleput	9	44.7	5	39.3
Madras City	10	45.6	10	44.4
Tirunelveli	11	47.0	13	48.8
Tanjore	12	47.8	8	43.2
Salem	13	51.2	11	46.1
Coimbatore	14	58.8	14	58.4

In Madras City 45.6 per cent of the samples were adulterated. One could easily find an explanation for this in the fact that the average fine imposed in food adulteration cases during the year was only Rs. 21 as compared, for examples, to Rs. 59 in the year 1944 when the adulteration was only 20.7 per cent. The Madras Prevention of Adulteration Act has been working for the last twenty-five years and there is no more justification to impose a lenient punishment in the form of a nominal fine in food adulteration offences.

Among the districts which have shown some improvement during the year are North Arcot and South Arcot. Malabar and Chingleput have deteriorated to some extent. In Salem and Coimbatore districts the adulteration continues to exceed 50 per cent.

V. NOTES ON ADULTERATION.

Noteworthy features on the nature of adulterants met with in analysing the samples are given after table VIII which gives the nature of samples received from 145 local bodies and analysed in the Government Analyst's Laboratory.

TABLE VIII.

Nature of samples received from 145 local bodies in the Madras State and Analysed in the Government analyst's Laboratory.

Nature of samples.	1954-55.			Half year October 1953— March 1954.		
	Total number of samples.	Number adulterated.	Percentage adulterated.	Total number.	Number adulterated.	Percentage adulterated.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Milk	7,543	3,949	52.3	3,897	1,991	51.0
Ghee	489	176	36.0	217	74	33.9
Butter	224	111	49.5	93	62	67.0
Gingelly Oil	1,066	169	15.8	551	70	12.7
Coconut Oil	42	29	6.7	224	17	8.0
Groundnut Oil	97	21	21.6	52	6	11.5
Coff. e Powder	767	184	24.0	337	67	20.0
Sweets	40	27	67.5	19	14	74.0
Turmeric	189	95	50.2	47	14	29.0
Tea	824	57	17.6	140	6	4.3
Honey	86	19	22.1	23	1	4.3
Dhal and flours	370	174	47.0	131	47	35.8
Vegetable oil product	12	7	58.3	13	2	15.3
Chicory	11	5	45.4	3	3	100.0
Miscellaneous	12	6	50.0	16	10	62.5
Total	11,658	5,029	43.1	5,763	2,384	41.3

Milk.—As usual the largest number of samples taken consisted of milk. Out of 7,543 samples 3,939 (52.3 per cent) were adulterated as against 51.0 per cent adulterated in the previous half year. The addition of skimmed milk powder to diluted milk is becoming more common as shown by the high solids-not-fat of 11 and 12 and a correspondingly high protein figure, the figure for fat remaining at the low figure of 4 and below.

In several instances an unusually high amount of formalin was present which gave an apparently high specific gravity and the Sanitary Inspectors concerned were instructed to add the recommended quantity of 1 drop of 40 per cent formalin for every two ounces of the milk.

Milk adulteration was particularly high in Coimbatore district as shown below :—

Name of place.	Number of milk samples.	Number adulterated.
(1)	(2)	(3)
Coimbatore	176	163
Erode	64	46
Mettupalayam	40	36
Gobichettipalayam	48	43

Ghee.—Out of 489 samples 176 (36 per cent) were adulterated as against 33.9 per cent during the previous half year. Ghee adulteration was heavy in Tirunelveli, Palayamkottai, Kallidaikurichi, Srivaikuntam, Tanjore, Alandoor, Madurai and Devakottai.

Butter.—Adulteration of butter is becoming more and more widespread. As usual both excess water and foreign fat were present. Out of 224 samples 111 (50 per cent) were adulterated as against 67 per cent during the previous half year. Thirty-four samples contained excess water, 70 contained foreign fat and both excess water and foreign fat were present in 7.

Sampling Inspectors were specially asked to take suitable action to put down adulteration in butter. Adulteration was strikingly high in Nagapattinam (8 out of 12), Tanjore (8 out of 16), Chidambaram (11 out of 15), Bhuvanagiri (7 out of 8), Coimbatore (13 out of 35).

Oils.—Sixteen per cent of Gingelly oils and 7 per cent of Coconut oils were adulterated with Groundnut oil which being a cheaper oil is the common adulterant. Adulteration in oils is on the decrease when compared to previous years. Adulteration of Gingelly oil was relatively high in Alandoor, Srivilliputtur, Tanjore, Tiruvannamalai and Kancheepuram. Three out of six Coconut oil samples were adulterated in Vaniyambadi.

Coffee powder.—Out of 767 samples 184 (24 per cent) were adulterated, the usual adulterants being exhausted coffee, chicory and wild date; other adulterants infrequently used were clearing nut, Bengal gram and Nathachorri seed. Coffee adulteration was specially high in Tuticorin and Coimbatore. In several instances misleading labels contravening the rules were put up by the manufacturers who had to be warned or prosecuted in case of continuing default.

Detailed investigations of the chemical constants of several varieties of commercial coffee were undertaken in this laboratory and they showed that the Robusta variety may give a rather high caffeine figure exceeding 2 per cent and a correspondingly low fat content, reaching even the low figure of 7.5 per cent. The results were published in "Current Science."

Sweets.—According to the latest rules hotels have to put up notice boards stating which of the sweets and savouries are made in ghee and which are not made in ghee. Sanitary Inspectors were advised to sample only preparations declared to have been made in ghee.

Turmeric.—There has been a considerable increase in the adulteration of turmeric. Lead is found to be present to the extent of even 1000 ppm. Cheap adulterants like tapioca were detected in several samples. Out of 189 samples 95 (50 per cent) were adulterated as against 29 per cent in the previous half year.

Tea.—During the year new methods of adulteration with exhausted tea and artificial coal tar were detected. Out of 324 samples 57 (18 per cent) were adulterated. Pollachi, Udumalpet, Mettupalayam and Avanashi in Coimbatore district may be specially mentioned as the places where vigilant action was recommended to put down adulteration. A vendor in Coimbatore was fined Rs. 115 for selling tea containing exhausted tea, tea stalk and sand.

The analytical figures of a typical sample of adulterated tea are given below. The sample was reported as consisting of 100 per cent exhausted tea.

Water extract—28·7 per cent.

Microscopic appearance—Genuine tea.

Ash—15·4 per cent.

Alkalinity of ash—78·4 per cent.

Caffeine—Nil.

Honey.—Out of 86 samples 19 (22 per cent) were adulterated, the adulterants being excess water over the permitted limit of 25 per cent and cane sugar probably in the form of jaggery solution. Artificial colouring matter was detected in a few samples.

Dhall and flours.—Artificial coal tar colour is commonly found in dhalls. Dhall is thus treated probably to give an attractive appearance even to inferior varieties. Kesari dhall is also freely sold as toor dhall or admixed with the latter.

Chicory.—Chicory derived from the roots of *Cichorium Intybus* is permitted as an adulterant of coffee provided its presence is declared by a label. But wild date has been prepared and sold under such misleading designations as Indian Chicory. The proprietor of Wason Industries was fined Rs. 100 for such an offence.

VI. FINES.

Appendix C at the end of this report gives particulars about the convictions and fines imposed in each local body.

The average fine during the year was only Rs. 36 as in the preceding half-year. In connection with the sale of Kesari dhall flour by the agent of a Raipur Mill at Parvatipuram 4,800 bags of the offending flour were ordered to be destroyed by the Court.

The highest fine imposed during the year was only Rs. 200 at Coonoor. Fines ranging from Rs. 100 to Rs. 200 were levied in 44 local bodies.

In the following local bodies the total fine collected did not even equal the contribution paid by the local body to the Government as analysis charges. The fine collected in an earlier year 1951-52 is given for comparison.

Local body.	Annual contribution to Government.	Fine levied in the year 1954-55.	Fine levied in the year 1951-52.
(1)	(2)	(3)	(4)
Rs.	Rs.	Rs.	Rs.
Madurai	9,000	8,568	14,490
Cuddalore	1,080	875	2,470
Karaikudi	720	640	1,705
Bodinayakanur	540	429	1,195
Srivilliputtur	540	285	595
Arni	360	298	320
Gudiyatham	360	235	410
Aroor	360	223	645
Ranipet	360	234	770
Usilampatti	360	125	470
Kotagiri	360	315	910
Sivaganga	360	282	765
Dharampuri	360	285	1,589

The fine exceeded thrice the annual contribution in the following 15 local bodies only.

Name of local body.	Monthly quota of samples.	Annual contribution to Government.	Fine collected.
(1)	(2)	(3)	(4)
Rs.	Rs.	Rs.	Rs.
<i>Municipalities—</i>			
Coimbatore	24	2,160	9,105
Tanjore	18	1,620	5,055
Kumbakonam	12	1,080	3,512
Tuticorin	12	1,080	5,304
Erode	8	720	2,365
Tiruppur	8	720	2,530
Mettupalayam	4	360	2,336
Tiruvannamalai	4	360	1,152
Dharampuri	4	360	1,166
Mannargudi	4	360	1,340
<i>Panchayats—</i>			
Kollegal	4	360	1,260
Satyamangalam	4	360	1,235
Tiruchengode	4	360	1,795
Manaparai	4	360	1,431
Tenkasi	4	360	1,136

In respect of non-analysis cases arising from the application of Part III rules for exposure of food to flies, dust, etc., and for preventing the Food Inspector from taking samples, etc., some local bodies have collected fines as under :—

Name of local body.	Fine collected.
(1)	(2)
Rs.	Rs.
Tuticorin	616
Aruppukottai	119
Sattur	180
Harur	104
Madurai	77
Nagapattinam	103
Tirukoilur	40
Kollegal	45
Kadayanallur	70

VII. WORK FOR OTHER GOVERNMENT DEPARTMENTS.

Many Government departments sent samples of diet articles for analysis as shown in Table IX below and in greater detail in Table X.

TABLE IX.

Government departments and number of samples received.

Source.	Number of samples received.
(1)	(2)
1 Government Hospitals	7,482
2 Department of Civil Supplies	153
3 Government Milk Factory	181
4 Jails	121
5 Industries and Commerce	15
6 Magistrates and Police	29
7 Other Government Departments.	68
8 Southern Railway	15
9 Unofficial sources	82
	8,146

TABLE X.

Number and nature of samples received from the various Government Departments during 1954-55.

1. Government Hospitals.

	Total number of samples.	Number adulterated or otherwise unsatisfactory.		Total number of samples.	Number adulterated or otherwise unsatisfactory.
(1)	(2)	(3)	(1)	(2)	(3)
Milk	1,191	123	Tamarind .. .	27	..
Bread	1,307	145	Rice	98	..
Butter	554	106	Dhall	834	56
Ghee	710	214	Curry Powder	4	..
Gingelly Oil	595	172	Milk powder	3	3
Coffee powder	650	25	Paper	2	..
Biscuits	261	28	Vanaspady .. .	3	..
Coconut Oil	391	8	Wheat flour .. .	2	..
Sugar	452	1	Chillies	2	..
Jaggery	277	15	Blackgram .. .	3	..
Iddlies	39	..	Honey	3	..
Arrowroot flour	24	14	Sago	2	..
Barley flour	35	5	Ragi	3	..
			Washing Soda	10	..
				7,482	919

2. Department of Civil Supplies.

	Total number of samples.		Total number of samples.
Sorghum	5	Jowar	5
Wheat	15	Boiled Rice .. .	94
Rice	14	Toor dhall	7
Paddy	13		153

3. Government Milk Factory.

Reconstituted Milk	150	Vanaspady	23
Skimmed Milk Powder	7	Toned Milk	1
			181

4. Jails.

Ghee	45	Bread	3
Gingelly Oil	47	Coffee powder .. .	1
Milk	12	Coconut oil	1
Butter	2	Jaggery	1
Rice	2	Chillies	1
Wheat flour	1	Coriander	1
Dhall	3	Tamarind	1
			121

5. Industries and Commerce.

Vanaspady	9	Refined oil	6
			15

6. Magistrate and Police.

Rice	2	Coffee powder .. .	10
Ghee	1	Butter	1
Milk	4	Tea dust	10
		Gingelly oil	1
			29

7. Other Government Departments.

Pattani	2	Wheat	1
Beans	1	Wheat flour .. .	1
Betel nut	1	Athirasam	34
Turmeric	1	Potato	1
Coffee	1	Rice	1
Iddlies	1	Curd	10
Varagu	9	Milk powder .. .	1
Ghee	1	Nut chips	1
		Root	1
			68

2. Southern Railway.

	Total number of samples.		Total number of samples.
Refined groundnut oil ..	1	Coffee seed ..	1
Refined oil	1	Ghee	1
Dhall	5	Rice	2
		Sugar Candy	1
			15

9. Unofficial Sources.

Ghee	55	Vanaspathy ..	4
Rice	1	Butter	1
Milk Powder ..	1	Coffee powder ..	2
Milk	2	Curry powder ..	3
Kardi seed oil ..	1	Sugar	1
Gingelly oil ..	1	Tapioca	1
Groundnut oil ..	4	Flour malt	1
Salad oil	1	Fish meal	1
		Atta	1
			82

1. GOVERNMENT HOSPITALS.

Diet articles are received from Government Hospitals in the State to see whether they conform to specifications. The total number analysed during the year was 7,482 of which 919 were reported as adulterated or otherwise unsatisfactory.

Milk.—The number of milk samples analysed was 1,191 of which 107 contained added water, and 12 were deficient in fat. Four samples were too decomposed and unfit for analysis.

Bread.—Out of 1,307 bread samples 97 had acidity above the permitted limit and four were insufficiently baked.

Butter.—Adulteration in butter is on the increase. Out of 554 samples 106 were reported as unsatisfactory, 37 for containing excess water and 66 for containing foreign fat. Four contained both excess water and foreign fat. One sample was highly rancid.

Gingelly oil.—Out of 595 samples 41 were adulterated with groundnut oil and 131 samples were reported as unfit for human consumption for having acidity above the permitted limit.

Coconut oil.—Eight out of 391 samples were unsatisfactory, four containing groundnut oil and four excessive acidity.

Ghee.—Out of 710 samples, 214 were reported as unsatisfactory. Of these 136 samples contained foreign fat and 78 had excessive acidity.

Coffee powder.—Twenty-five out of 650 samples were unsatisfactory, the common adulterants being wild date powder, chicory, coffee husk and exhausted coffee.

Biscuits.—Out of 261 samples, 16 were reported as unsatisfactory for being rancid and 12 for being unpalatable.

Sugar and jaggery.—Fifteen out of 277 jaggery samples contained less than 85 per cent sugar content and one sample 1.4 per cent sand as against the permitted limit of 0.6 per cent.

Arrowroot.—Only ten out of 24 samples contained genuine arrowroot derived from maranta arundinacea. The remaining 14 samples were reported as unsatisfactory as ten samples consisted of tapioca starch, two of East Indian Arrowroot and two of maize starch.

Barley flour.—Five out of 35 samples were unsatisfactory for containing an excessive proportion of sand and one contained ragi flour as adulterant.

Dhall.—An yellow coal tar colour is being increasingly used to give dhall an attractive appearance even to inferior varieties. Out of 834 samples, 44 were so coloured. Five consisted of Kesari dhall the use of which is prohibited. Five were mouldy and three were infested with insects.

2. CIVIL SUPPLIES DEPARTMENT.

Samples of grains were received for determination of moisture content. Some fumigated samples were analysed for residual hydrocyanic acid before the stock were released for human consumption.

3. GOVERNMENT MILK FACTORY.

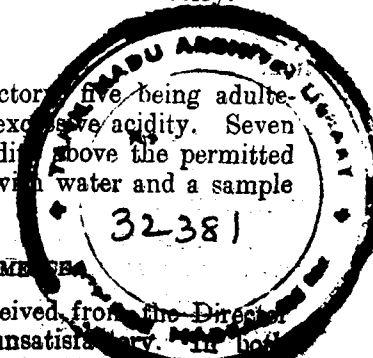
Samples of reconstituted milk were analysed periodically to see whether the percentage of fat (Vanaspathi) and solids-not-fat were present in the correct proportions. Samples of Skimmed Milk Powder and Vanaspathi were also tested for their suitability before they were used for preparing reconstituted milk in the factory.

4. JAILS.

Of 45 ghee samples 11 were unsatisfactory, five being adulterated with foreign fat and six containing excessive acidity. Seven out of 47 gingelly oil samples also had acidity above the permitted limit. A sample of milk was adulterated with water and a sample of butter with excess water.

5. INDUSTRIES AND COMMERCE.

Out of nine samples of Vanaspathy received from the Director of Industries and Commerce, two were unsatisfactory. In both samples the colour obtained with the Badouin Test was less than 2.0 Lovibond red units, the minimum prescribed and one sample



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in addition had a higher melting point than the permitted limit of 33–35° C.

6. MAGISTRATES AND POLICE.

Twelve samples were received from the Magistrates for referee analysis under the Madras Prevention of Adulteration Act. The results agreed with those of the original samples sent by the Sanitary Inspectors in all cases except in one instance.

Three out of ten samples of gingelly oil sent by the Police under a charge-sheet for cheating through the First-class Magistrate, Virudhunagar, were found to be adulterated with groundnut oil. Five samples of coffee powder were received from the same Magistrate, three of which were genuine and two adulterated with chicory.

A sample of tea dust received from the Sub-Magistrate, Tiruvandrum, was reported as treated with artificial colouring matter.

7. OTHER GOVERNMENT DEPARTMENTS.

Six samples of Skimmed Milk Powder received from Health Officers were found to be unfit for human consumption.

Nine samples of varagu were found to be of the poisonous variety.

Samples of potatoes stated to have been treated with D.D.T. were on analysis found to be free from any residual D.D.T.

Two samples of betel nut powder received from a Health Officer were found to be spurious products containing no betel nut at all.

8. SOUTHERN RAILWAY.

Fifteen samples were received from the Southern Railway. Noteworthy features regarding them are given below :—

Four samples of dhal were coloured with artificial colouring matter derived from coal-tar.

A sample of coffee seed was found to be contaminated with sulphuric acid and certified as being unfit for human consumption.

A sample of ghee which was found to contain a free fatty acid content of 3.1 per cent was reported as unfit for human consumption.

VIII. SAMPLES FROM UNOFFICIAL SOURCES.

Out of 55 ghee samples, 11 were found to be adulterated with foreign fat and six had excessive acidity.

A sample of milk powder from Messrs. Wilson and Company, was certified as unfit for human consumption.

A sample of kardi oil received from the Madras Chamber of Commerce contained 5 per cent groundnut oil as adulterant.

Of three samples of curry powder one contained 20 p.p.m. of lead as against the permitted limit of 5 p.p.m.

A sample of tapioca received from a Mangalore merchant had a nitrogen content of 0.49 per cent. A sample of fish meal contained 52 per cent sand, 11.5 per cent fat and 3.6 per cent nitrogen.

A sample of flour sent by a merchant at Coimbatore contained a coal-tar dye.

A sample of honey received from a private party contained 29 per cent water as against the permitted limit of 25 per cent. It was also discoloured and had a metallic taste.

IX. NEW RULES AND CIRCULARS.

Some amendments to the Madras Prevention of Adulteration Rules were issued by Government. Rule 27 relating to prohibition of sale of watered milk was clarified following a Court decision. (G.O. No. 3503, Health, dated 27th December 1954.)

Proviso to Rule 37-D has been deleted so that it is now obligatory on the part of merchants to put up labels on containers of coffee-chicory mixtures.

Rule 40 has been amended so that it is now an offence to sell adulterated turmeric whatever the purpose for which it may be used. (G.O. No. 3549, Health, dated 31st December 1954.)

The sale of beans containing more than 20 p.p.m. of hydrocyanic acid has been prohibited by the new Rules 43 and 44. (G.O. No. 2054, Health, dated 23rd July 1954.) The Andhra Government has also issued the same rule in G.O. No. 1035, Health, dated 20th September 1954.

Specifications for sago have been issued in Rules 45 to 47. (G.O. No. 3503, Health, dated 27th December 1954.)

The Madras High Court issued a circular, dated 31st May 1954, by which Magistrates are required to intimate the prosecution side about the dates of hearing and the results of prosecution. (G.O. No. 1603, Health, dated 12th June 1954.)

The Madras and Andhra Governments have issued orders requiring co-operative societies to supply a copy of their bye-laws to Sampling Inspectors when required in connexion with prosecutions under the Madras Prevention of Adulteration Act.

The Inspector of Municipal Councils and Local Boards issued a notification applying sections 274 to 277 of the District Municipalities Act, to certain village panchayats to facilitate disposal of food declared as unfit for human consumption.

The Secretary, Hindu Religious Endowments Board, issued a circular to the effect that in all religious institutions with an annual income of Rs. 10,000 and above, the lessees of Puthukadai in the temples who do not sell prasadams made in ghee should put up a notice that the prasadams are not made in ghee.

In G.O. Ms. No. 1666, Health, dated 17th June 1954 the Devasthanams in the State have been permitted to have samples of ghee analysed in the Government Analyst's Laboratory at the specially reduced rate of Rs. 10 per sample.

X. HIGH COURT JUDGMENTS.

1. In some cases where Co-operative Societies were found guilty of selling adulterated food the Madras High Court has fixed the responsibility on the Co-operative Stores, as represented by its chief executive officer, and any other person who is proved to have abetted the offence.

(a) In C.A. No. 733 of 1953 the High Court has dealt with the subject exhaustively. The following are extracts from the judgment:—

Appeal under section 417 of the Code of Criminal Procedure, 1898, against the acquittal of the aforesaid respondents (accused 1, 2 and 4) by the Subdivisional Magistrate of Puttur, South Kanara in C.A. No. 31 of 1953 on his file (C.C. No. 349 of 1952) on the file of the Stationary Sub-Magistrate, Kasaragod.

This appeal coming on for hearing on Wednesday, the 21st day, 2nd Thursday, the 22nd days of July 1954 and on Thursday, the 19th day of August 1954 upon perusing the petition of appeal and the record of the evidence and proceedings before the said lower Courts and upon hearing the Public Prosecutor the appellant herein on all the days and Mr. K. Vittal Rao, advocate for the respondents (accused 1, 2 and 4) on all the days and the appeal having stood over for consideration till this day, the Court delivered the following

JUDGMENT.

This is an appeal by the State against the acquittal of the respondents by the Subdivisional Magistrate, Puttur. The respondents are accused 1, 2 and 4 in C.C. No. 349 of 1952 on the file of the Stationary Sub-Magistrate, Kasaragod. The respondents along with another accused, accused 3 in the trial Court, were tried for an offence punishable under rule 29 read with rule 27 (1) of the rules framed under section 20 of the Madras Prevention of Adulteration Act.

Accused 1 and 2 were the joint Secretaries, accused 4, the Manager and accused 3 the Salesman of Co-operative Milk Supply Society at Kasaragod. On 15th October 1952, P.W. 1 the Sanitary Inspector of Kasaragod along with the Executive Officer of the Kasaragod Panchayat Board, P.W. 2 went to the Society's premises and purchased from the salesman, accused 3, 12 oz. of buffalo's milk and sent it to the Government Analyst for analysis

He observed the necessary formalities of dividing the milk purchased by him into three equal parts, putting them in three bottles and sealing all of them then and there. He gave one of the bottles to the Manager, accused 4 enclosing the same in a sealed cover, kept one to himself and sent the other to the analyst. A notice Exhibit P-1 was served on the accused 4 and his acknowledgment was obtained on the original. At the time of the sale accused 2 was not present but accused 1 alone came. The business of the society is to purchase and sell milk. The sample which was sent to the Government Analyst was found according to the report of the Deputy Government Analyst, Exhibit P-3 to be not of the quality as presented by the rules. The sample of milk was found to contain 24 per cent of water and only 4.3 per cent fat and 6.08 per cent solids not fat when it should contain the minimum 4.5 per cent fat and 9 per cent solids not fat. Thus there can be no doubt that the milk was not of the standard prescribed by the rules and it was an adulterated stuff.

The defence of the accused is that the society had employed an expert, who said that the 3 degrees lactometer reading would comply with the rules and that they were following his advice. There is no proof that the milk sold to P.W. 1 showed 3 degrees lactometer reading. It was P.W. 1 who advised the society that 3 degrees lactometer reading would meet the requirements of law, but the milk that was sold was not submitted to him, nor as already stated there is any proof that it was of 3 degrees lactometer reading. In any event on the report of the Deputy Government Analyst there can be no doubt that the milk was an adulterated stuff and was not of the quality prescribed by the rules and that an offence has been committed. The trial Court convicted all the four accused but in appeal the respondents were acquitted. The Appellate Court finds that the accused 4 was only a Manager and his main duty was to write and check up day to day accounts and has nothing to do with sales. It further finds that accused 1, 2 and 4 were not present at the time of the commission of the offence and could not have knowledge of the offence. The contravention of the rules therefore having taken place without their knowledge, the lower Appellate Court finds that they could not be held guilty of the offence. Hence it set aside the conviction and sentences of the respondents, who are accused 1, 2 and 4 in the case.

At the outset, I must mention that the Subdivisional Magistrate, is wrong in coming to the conclusion that the first and the fourth accused were not present at the time. The fourth accused according to the evidence of P.W. 1 was present and it is on him a copy of Exhibit P-1 was served immediately on purchasing the milk and he has acknowledged it in Exhibit P-1 (b), accused though he was not actually present at the time of the purchase came in before the signature is Exhibit P-1 (a). The Subdivision

Magistrate was therefore wrong in having come to the conclusion that accused 1 and 4 were not present at the time. It is true that the accused 2 was not present. The main ground of acquittal was that the contravention took place without their knowledge and therefore they could not be held guilty. This appeal has been preferred more for the purpose of laying down the law rather than actually securing a conviction.

It is necessary to look into the rules to ascertain as to who all can be convicted under circumstances similar to this. Rule 27 under section 20 of the Madras Prevention of Adulteration Act is as follows :—

“ No person shall add any water, or any skimmed or separated milk to milk intended for sale and no person shall either by himself or by any servant or agent, sell or offer or expose for sale, and no person shall have in his possession for the purpose of sale any milk to which any such addition has been made.”

It is clear from the above rule that no person shall either by himself or by any servant or agent sell or offer or expose for sale any milk to which any such addition referred to has been made. The very rule clearly shows that although a servant may sell milk, in contravention of the provisions of this rule, still the principal for whom the servant sells is liable in law. The principal in this case is the co-operative milk society. Under the bye-laws framed by the society the executive management of the affairs of the society vests in a board of directors consisting of not more than seven members. There is another bye-law to the effect that the president shall have a general control over all the affairs of the society and shall ex-officio be the treasurer and shall have the custody of all the properties of the society. Under another bye-law the Secretary is made responsible for the executive administration of the society subject to the control of the President. According to the same bye-law the Secretary shall be the officer to sue or be sued on behalf of the society. There is also a provision for the appointment of an Assistant Secretary to assist the Secretary. This shows therefore that the constitution of the society has provided for the management of the business of the society. One of the objects of the society is to arrange for the sale of milk, and milk is therefore sold by the society. In such cases the question is, when the sale is effected by a servant in contravention of the provisions of law, who is really liable, whether it is only the actual salesman, the servant who sells the milk or whether the society which acts by its executive officers is also liable. With regard to the liability of the society in such circumstances the observations of Hallett J. in *Director of Public Prosecution v. Kent and Sussex*

Contractors, Ltd., (1) are worth quoting Hallett J. observes at page 157 as follows :—

“ With regard to the liability of a body corporate for torts or crimes, a perusal of the cases shows to my mind, that there has been a development in the attitude of the courts arising from the large part-played in modern times by limited liability companies. At one time the existence, and later the extent and conditions of such a body's liability in tort was a matter of doubt, due partly to the theoretical difficulty of imputing wrongful acts or omissions to a fictitious ‘ Person, and it required a long series of decisions to clear up the position. Similarly, the liability of a body corporate for crimes was at one time a matter of doubt, partly owing to the theoretical difficulty of imputing a criminal intention to a fictitious person and partly to technical difficulties of procedure . . . the theoretical difficulty of imputing criminal intention is no longer felt to the same extent.”

In *Pharmaceutical Society v. London and Provincial Supply Association* (2) Lord Blackburn said : If you could get over the difficulty of saying that the word ‘ person ’ here may be construed to include an artificial person, a corporation, I should not have the least difficulty upon these other grounds which have been suggested : “ In *Reg. v. Tular* (3) Rowen L.J. said : ‘ I take it, therefore, to be clear that in the ordinary case of duty imposed by statute, if the breach of the statute is a disobedience to the law, punishable in the case of a private person by indictment the offending corporation cannot escape from the consequences which would follow in the case of an individual by showing that they are a corporation ’. Kay L.J. said ‘ Therefore ’ that part of the arguments, that inasmuch as a criminal act involves a *mens rea* a corporation which has no *mens rea* at all is not subject to criminal proceedings in any case, is untenable.”

Viscount Caldecote C.J. observes : *Director of Public Prosecutions v. Kent and Sussex Contractors, Ltd.* (1) at page 151 as follows :—

“ There is no reason why a warranty should not be given by a corporation. It can give a warranty through its agents, and through its agents it can believe or not believe, as the case may be that the statements in the warranty are true. A similar point has been raised in cases concerning the liability of a corporation in actions which, in the case of an individual, would involve an enquiry into a state of mind, such as fraud, libel or malicious prosecution. It is well settled that a corporation may be liable in all those actions.”

(1) 1944 (1) K. B. 146.

(2) 5 A. C. 857, 870.

(3) 1891 (2) S. B. 938, 594, 597.

(4) 1917 (2) K. B. 936.

These observations clearly show that in cases where the Legislature has prohibited an act or enforced a duty in such words as to make the prohibition or the duty absolute the principal is liable; if the act is in fact done by his servant. As observed by Atkin J. in *Mousell Bros., Ltd. v. London and North Western Railway Company* [1917 (2) K.B. 836] when once it is decided in one of these cases that the principal may be held liable originally for the act of his servant, there is no difficulty in holding that a corporation may be a principal. No *mens rea* is necessary to make the principal liable. A corporation is exactly in the same position as a principal, who is not a corporation. As already stated rule 27 under section 20 of the Madras Prevention of Adulteration Act clearly shows that no person shall either by himself or by any servant or agents, do any of the things prohibited under the rule. A corporate society is therefore undoubtedly liable for the offence committed. As pointed out in *The King v. Patrick and Planner* (1) Leach 253-168 M.R. 2293 it is the corporation, that must prosecute in their corporate name, and if it is to be prosecuted it should be in the corporate name. According to the rules, it is the Secretary of this co-operative society, who shall sue or be sued on behalf of the society. The prosecution should, therefore, be against the Secretary of the Co-operative Society, if it is to make the co-operative society, liable for the offence. This does not mean that the actual persons who sold are not liable. They are liable as abettors, primarily the sale being by the society. In this case the first and the second accused are said to be the Joint Secretaries. There is no provision under the bye-laws for the appointment of Joint Secretaries. It is only the Secretary who will be responsible for the executive administration of the society subject to the control of the president and will sue or be sued upon on behalf of the society. There is no evidence that of the first and second accused as to who exactly was the secretary and who was the Joint Secretary. In the absence of evidence I do not think that either of them can be convicted. As regards the fourth accused the finding of the Subdivisional Magistrate that his main duty was to write and check up day to day accounts and that he has nothing to do with sales is not justified by the evidence in this case. As already stated, Exhibit P-1 was served on him and he has acknowledged it. A reading of Exhibit P-1 shows that he is a seller. He has made no attempt to contradict the fact that he is a seller except by stating in Court that it is the salesman that purchases and sells the milk and that he has not committed the offence, it is true that this conduct in not denying immediately when Exhibit P-1 was served on him and acknowledged by him that he is a seller will ordinarily be sufficient along with other circumstances to prove that he is a seller. Still in appeal against the acquittal I am not prepared to rely solely on this conduct alone and find accused 4 guilty of the offence. In my view in all such cases, where a co-operative society or a corporation

is involved, it is necessary to find a complaint against the society as such by its Secretary, as in the present case who under the bye-laws is to sue or be sued or by such other officer, who represents the society. In this case, if accused 1 or accused 2 has been proved to be the secretary, there would be no difficulty in convicting him of the offence. But as already stated there is no proof as to who exactly of the two was the secretary. Neither of them therefore can be found guilty of the offence. In the result the acquittal was to be maintained, though not for the reasons given by the Subdivisional Magistrate. The appeal is dismissed.

(b) *C.A. Nos. 454 and 455 of 1954.*—In this case the High Court state "The appeal is against the Co-operative Stores. It must be represented either by the President or the Secretary, whoever it may be, the conviction against the Co-operative must be registered". The following is a complete copy of the judgment :—

Criminal Appeal No. 454 of 1954.—Appeal under Section 417 of the Code of Criminal Procedure, 1898, against the acquittal of the aforesaid respondent (accused 4) by the Subdivisional Magistrate of Tuticorin in C.A. No. 37 of 1954 on his file.

(C.C. No. 257 of 1954 on the file of the Court of the Stationary Sub-Magistrate, Tuticorin.)

Criminal Appeal No. 455 of 1954.—Appeal under Section 417 of the Code of Criminal Procedure, 1898 against the acquittal of the aforesaid respondent (accused 1) by the Stationary Sub-Magistrate, Tuticorin in C.C. No. 257 of 1954 on his file.

These appeals coming on for hearing upon perusing the petitions of appeals and the record of the evidence and proceedings before the said lower Courts and upon hearing the Public Prosecutor, the appellant in both the appeals and Mr. C. K. Venkatanarasimhan, advocate for the respondent in both the Appeals the Court delivered the following

JUDGMENT.

The two appeals arise out of C.C. No. 257 of 1954 on the file of the Stationary Sub-Magistrate, Tuticorin. In that case, four accused were charged for an offence under Rules 28-D read with Section 29 framed under section 20 of the Prevention of Food Adulteration Act. The first accused was the Co-operative stores, the second accused was the salesman, the third accused a bill clerk and the fourth accused, the Manager. The prosecution has been launched in connection with the sale of toor dhal which was found to be adulterated. The Trial Court convicted the Manager alone and acquitted the rest. In appeal the Manager was acquitted. Hence these two appeals have been preferred, one against the acquittal by the trial Court of the first accused and the other against the acquittal of the Manager by the Appellate Court. I

have held in C.A. No. 733 of 1953, that when a co-operative society which is selling foodstuffs which are found to be adulterated, it is the co-operative society that must be charged. In such case, the co-operative society is either represented by the President or the Secretary according as the rules vest the management in either the President or the Secretary. In this case the first accused has been charged only because he was a Manager. In the absence of any specific rules, that the executive management vests in him, he cannot be convicted. Therefore Criminal Appeal No. 454 of 1954 which is filed against the acquittal is dismissed.

As regards Criminal Appeal No. 455 of 1954, the appeal is against the Co-operative Stores. It must be represented either by the President or the Secretary. Whoever it may be, the conviction against the Co-operative Stores must be registered. Therefore Criminal Appeal No. 456 of 1954 is allowed and the Co-operative stores is convicted and is sentenced to a fine of Rs. 25. The fine will be paid by either the President or the Secretary whoever is the executive management of the stores.

In the result C.A. No. 454 of 1954 is dismissed and C.A. No. 455 of 1954 is allowed.

(c) C.A. No. 755 of 1954.—In convicting the Co-operative Stores, the Hon'ble High Court Judge states "But I am unable to see any impediment to the stores, which is a corporate body being convicted for exhibiting adulterated oil for sale." The following is a full copy of the judgment:

Appeal under section 417 of the Code of Criminal Procedure, 1898, against the acquittal of the aforesaid respondent (accused) by the Sub-Magistrate (II Class) of Turaiyur in C.C. No. 62 of 1954 on his file.

This appeal coming on for hearing upon perusing the petition of appeal and the record of evidence and proceedings before the lower Court and upon hearing the Public Prosecutor, the appellant and Mr. V. Venkatesan, advocate for the respondent (accused) the Court delivered the following

JUDGMENT.

That the Sanitary Inspector, Panchayat Board, Turaiyur, found within the premises of the Turaiyur Co-operative Stores, Limited, Turaiyur, adulterated gingelly oil for sale containing 11 per cent of groundnut oil at about 11 a.m. on 27th October 1953 cannot be disputed and has not been disputed.

2. The only point for consideration was who was responsible, viz., the Stores and or the President or the Accountant or the Secretary. The lower court rightly held that the evidence has not

disclosed that these officials were personally responsible. Therefore the acquittal of these people cannot be interfered with and no appeal has been preferred against them.

3. But I am unable to see any impediment to the stores which is a corporate body being convicted for exhibiting adulterated gingelly oil for sale and which is an offence under rule 29 read with rule 27-A under section 20 of the Madras Prevention of Adulteration Act, 1918, as amended. The Government Order which is cited before me has no relevancy. It merely reiterates the wellknown principle that the officer of a society cannot be held liable unless they are personally found responsible.

4. I set aside the acquittal of the lower court and convict the stores as charged and sentence the stores to pay a fine of Rs. 5 coupled with a warning that a repetition will entail severe penalties.

2. C.A. Nos. 507 to 510 of 1954.—In a case where adulterated Coffee was seized from a firm, the Sub-Magistrate remarked that he was unable to detect any adulteration from the colour, etc. The Hon'ble High Court Judge while convicting the merchant states the Magistrate committed two errors, one in law and one in fact and that he (the Magistrate) has no business to substitute his own opinion for the expert opinion in the Government Analyst's certificate. The following are extracts from the High Court judgment:—

Appeals under section 417 of the Code of Criminal Procedure, 1898, against the acquittal of the aforesaid respondent (accused) by the Sub-Magistrate of Tirupattur, in C.C. Nos. 47, 48, 49 and 50 of 1954 on his file.

These appeals coming on for hearing upon perusing the petitions of appeal and the record of the evidence and proceedings before the lower Court and upon hearing the Public Prosecutor, the appellant in all the appeals and the respondent not appearing in person or by advocate the Court delivered the following

JUDGMENT.

These are four appeals preferred by the State of Madras against the acquittal of one and the same person, called V. A. Abdul Mallick Sahib, the proprietor of Sai Baba Coffee Manufacturing Company, by the Magistrate, Tirupattur, North Arcot district in C.C. Nos. 47 to 50 of 1954 the accused had been charged under rule 37-A (a) framed under the Madras Prevention of Adulteration Act as regards C.C. No. 48 of 1954, and under rule 37-A (c) regarding C.C. Nos. 47, 49 and 50 of 1954. In C.C. No. 48 of 1954 the appellant was stated to have added 95 per cent of roasted wild date seeds powdered along with 5 per cent of coffee powder in a

tin—and sold it as coffee powder. The chemical analysis showed that in that particular tin only 5 per cent was genuine coffee powder and the balance of 95 per cent consisted of roasted wild date seeds powder. As only chicory could be added legally to coffee powder intended for sale, and the addition of any substance other than chicory would amount to an offence under rule 37-A (a), the prosecution had contended that the accused was clearly guilty. But the learned Sub-Magistrate held that it was doubtful whether the sample sent to the Government Analyst for analysis, and analysed by him as containing 5 per cent genuine coffee powder and 95 per cent roasted wild date seeds powder, corresponded with the powder in the jar seized from the accused. On that ground he gave the benefit of the doubt to the accused and acquitted him. In doing so, he committed two errors, one in law and one in fact, according to the learned Public Prosecutor, who wants the acquittal to be set aside. The accused-respondent in all the four appeals is absent.

After scrutinizing the entire records, I agree with the learned Public Prosecutor that there was a gross error of law and fact in C.C. No. 48 of 1954 vitiating the acquittal therein. The error of law consisted in the fact that under the proviso to section 16 of the Act, the accused had the right to challenge the correctness of the sample sent for analysis and to have a sample from the tin alleged by him to be the correct one stocked and sold by him sent for analysis. If he did not exercise that right, as here he has no right to challenge the analysis and set up this kind of defence. The error of fact arose by the learned Magistrate, a layman, examining the contents of jar involved in this case himself and arriving at the conclusion that the colour of the coffee in the tin would be brown even if powdered roasted wild date seeds had been mixed and would not be ash colour. It is notorious that colour is a frail thing to rely on, as it changes with lapse of time, and a layman, like a magistrate, had no business to substitute his own opinion for the expert's opinion, especially when he did not claim to have any personal experience of mixtures of coffee powder and powdered wild dates. Though, usually, courts will be averse to set aside acquittals, in view of the above two gross errors, this acquittal deserves to be set aside. I set it aside accordingly and convict the appellant, under rule 37-A (a) read with rule 38, and sentence him to pay a fine of Rs. 100 (one hundred rupees) or in default, to undergo simple imprisonment for one month. Time for payment of fine into the trial Court is given till 1st March 1955, failing which the trial Court will take steps to commit the accused in C.C. No. 48 of 1954 to jail for default.

Now I come to the other three appeals. Even here there are the two errors of fact and law, as in C.C. No. 48 of 1954. But still, these three cases stand on a totally different footing. The prosecution in all those three cases was under rule 37-A (c). The accused was said to have had in his possession tobacco dust and sand sweepings in a tin in one case, tamarind rind powder in a tin in another

case, and groundnut cakes in a tin in a third case. Because of such possession of tins containing the above substances, the prosecution wanted to raise the presumption that the accused meant these substances to be added to coffee powder intended for sale. The accused denied that he had kept these for admixture with coffee powder. It is obvious that it is a matter for applying sense and common sense before acting on the presumption. So far I have not come across any case in our State or country where a man has tried to mix tobacco dust and sand sweepings with coffee powder, or groundnut cake powder with coffee powder, or powdered tamarind rind powder (not tamarind seeds powder) with coffee powder. The learned Public Prosecutor urged that the times are such and unscrupulousness in adulteration had advanced to such a degree, that such adulteration, though not heard of before, may very well take place now-a-days. I am not prepared to act on this argument, however, fascinating it may sound. If the accused had been found in possession of a tin containing coffee powder mixed with any one or of these substances, tobacco dust and sand sweepings, groundnut cake and tamarind rind powder, there might have been a case for acting on the presumption under rule 37-A (c) but no tin containing any such mixture was admittedly seized from the accused. Keeping groundnut cakes in a tin is not at all objectionable or criminal and is a common act. It may be even praiseworthy as often groundnut cakes are kept loose in the windows, sills, etc., instead of in neat tins. Keeping sand sweepings and tobacco dust in tins, along with coffee powder is not laudable but is not criminal. Keeping powdered tamarind rind comes in between. As the benefit of the doubt has to be given in every case to the accused, and never to the prosecution and as these are appeals against acquittals, I have no hesitation in holding that the presumption under rule 37-A (c) cannot be applied with certainty in any of these three cases. So, in spite of the fact that the lower Court committed the two errors mentioned above, that the lower Court committed the two errors mentioned above, I am not one in law and one in fact even in these three cases as on merits interfering with the acquittals in these three cases as on merits the prosecution will not succeed. So I dismiss criminal appeals Nos. 507, 509 and 510 of 1954.

3. C.A. No. 467 of 1954.—The Dairy Assistant employed by the Co-operative Department gave evidence in this case stating that there are two varieties of butter, namely, "Creamery Butter" and "Desi Butter" and that the standard for moisture prescribed under the Act cannot be applied to "Desi butter". Although the Sub-Magistrate convicted the accused, the District Magistrate set aside the conviction. On further appeal the High Court dismissed such a frivolous plea remarking that the rules make no such distinction and applied to all types of butter. The following is an extract from the judgment:—

Appeal under section 417 of the Code of Criminal Procedure, 1898, against the acquittal of the aforesaid respondent (accused 1

and 2) by the City First-class Magistrate of Madurai in C.A. No. 29 of 1954 on his file. (Preferred against the order in C.C. No. 617 of 1953 on the file of the Additional Sub-Magistrate, Madurai.)

This appeal coming on for hearing on this day upon perusing the petition of appeal and the record of the evidence and proceedings before the City First-class Magistrate, Madurai, and upon hearing Mr. R. Santhanam for Public Prosecutor for the appellant and Mr. K. C. Srinivasan, advocate for the respondents (accused 1 and 2) the Court delivered the following

JUDGMENT.

This is an appeal by the State against the acquittal of the two respondents by the City First-class Magistrate of Madurai in appeal. The two accused were prosecuted under the Madras Prevention of Food Adulteration Act in that they were selling butter which contained water in excess of allowed quantity. According to the rules 20 per cent of water is allowed in cases of butter. On analysis it was found that it contained 24.3 per cent of water. The trial Court rightly convicted the two accused and sentenced the first accused, the proprietor of the shop, to pay a fine of Rs. 30 and the second accused, the servant in the shop, to pay a fine of Rs. 20. The fact of the analysis showing 4.3 per cent of excess water cannot be disputed and is not disputed. What is contended is that there are two kinds of butter, one creamery butter and the other desi butter. According to the evidence of the Analyst desi butter may contain up to 40 per cent of water, whereas the creamery butter should not contain. But in the evidence the Analyst says even the water contents in desi butter may be reduced to 20 per cent. The contention of the accused is that the butter sold by them was desi butter and therefore the excess of water found is not unusual and should not be the subject of the prosecution. What the rule says is "where the proportion of water in a sample of butter made from cow's or buffalo's milk or cream exceeds 20 per cent, it shall be presumed for the purposes of this act, until the contrary is proved, that the butter is not genuine by reason of the excessive amount of water therein". As pointed out by Mr. Santhanam for the Public Prosecutor it makes no difference between the desi butter and the creamery butter. In fact under the rule it is open to the accused to show that it was genuine butter, that is to say that it was desi butter, to which he has not added any water but the water contents contained in it was natural. He merely sold the butter without whatsoever in that way. He merely sold the butter without even indicating that it was desi butter. However in the face of the rule which makes no exception whatsoever in favour of desi butter, I should think the finding of excess water of 4.3 per cent

brings the butter within the scope of the section, and the accused are therefore guilty of the offence with which they are charged. The trial Court rightly convicted them, and that conviction and sentence of the two accused passed by the trial Court and set aside by the Appellate Court are restored, that is, the first accused is sentenced to pay a fine of Rs. 30, in default, to undergo simple imprisonment for six weeks, and the second accused is sentenced to pay a fine of Rs. 20 and in default to undergo simple imprisonment for one month.

4. C.A. Nos. 695 of 1954 and 694 of 1955.—Although the High Court has held in previous judgments that no mahazar is necessary to attest sampling still some magistrates have acquitted the accused because no mahazar was prepared. In these two appeals the High Court again reiterated their previous decision that "there is no necessity to insist upon a mahazar being prepared, nor is there any need to examine the persons who were present at that time". The following is a copy of the judgment in C.A. No. 695 of 1955:—

Appeal under section 417 of the Code of Criminal Procedure, 1898, against the acquittal of the aforesaid respondent (accused) by the Second-class Magistrate of Salem town in C.C. No. 1443 of 1954 on his file.

This appeal coming on for hearing this day upon perusing the petition of appeal and the record of the evidence and proceedings before the Second-class Magistrate, Salem town, and upon hearing the Public Prosecutor, the appellant and the respondent not appearing in person or by advocate the Court delivered the following

JUDGMENT.

This is an appeal by the State against the acquittal of the respondent by the Second-class Magistrate, Salem town. The respondent was prosecuted for an offence under section 5 (1) (d) read with rules 28 and 29 of the Madras Prevention of Adulteration Act III of 1918.

On 24th May 1954, at about 9-30 a.m., P.W. 1, the Sanitary Inspector, saw the accused coming out of the Salem Town Railway station, with a basket on her head, which contained four pots of ghee. He immediately purchased 1/8th viss from her for As. 10. Then he followed the usual procedure. He poured the ghee he purchased into three bottles—Sample No. 3255—and sealed the bottles in her presence with his seal. He then gave one bottle to the accused and got the necessary receipt from her. The sample was sent to the Government Analyst, who, in his certificate, Exhibit P-1, gave the opinion that the sample sent to him—Sample No. 3255—contained 84 per cent of ghee and 16 per cent of fat not derived from milk or cream. There can be no doubt that the ghee was adulterated. But the learned Magistrate acquitted the accused for

reasons with which I do not agree. He says in paragraph 5 of his judgment that though P.W. 1 would admit that there were some hotel proprietors present at that time, no mahazar was prepared for the taking of the sample ghee from the accused. He also says that none of these hotel proprietors had been examined as a witness. The third reason which he gives is that there is no record to show that the sample taken from the accused has been sent to the Government Analyst and also when it was sent to him. The learned Magistrate also says that there was the further circumstance that no bottle containing the sample ghee seized from the accused has been sent to the Court. For these reasons he has acquitted the accused.

Now, as regards the criticism that no mahazar was prepared for the seizure of the ghee and none of the persons present at such seizure was examined, it may be remarked that in cases like these, there is no necessity to insist upon a mahazar being prepared, nor is there any need to examine the persons who were present at that time. The whole question for the Magistrate will be whether to believe P.W. 1 or not. As regards the criticism that there is no proof to show that the sample ghee was sent to the Government Analyst, one has only to read the report of the Government Analyst, Exhibit P-1. It clearly refers to Sample No. 3255. It also shows that that sample was sent to him. If the accused thought that the ghee which had been taken from her and sent to the Government Analyst for opinion was pure ghee and that the Government Analyst's report should not be given any weight then it was open to the accused to have the sample with her tested. Nothing of that kind has been done.

The lower Court's view of the case is entirely erroneous. The case against the accused has been established beyond all doubt by the evidence of P.W. 1 and the report of Analyst. His evidence on material points has not been challenged at all. In these circumstances there is no reason for rejecting his testimony.

The appeal is allowed and the respondent is convicted and sentenced to pay a fine of Rs. 25, in default, to undergo two weeks simple imprisonment.

5. C.A. No. 696 of 1954.—When adulterated ghee was served in a meals hotel only the cook was fined and the proprietor was let off by the Sub-Magistrate. The proprietor is the person who supplied the adulterated ghee to his cook for serving. The High Court exhaustively dealt with the question and decided that the master was liable and accordingly convicted him. The following is an extract from the High Court judgment:—

This is an appeal preferred by the State of Madras against the order of acquittal passed by the learned Sub-Magistrate of Tiruvannamalai in C.C. No. 662 of 1954.

The facts are.—In Tindivanam Road in Tiruvannamalai there is a hotel by name "Madras Cafe". The proprietor of this hotel is Narayanaswami Reddiar and the head cook who is in charge of the supply of meals at the hotel is C. S. Harihara Iyer. On 30th November 1953 the Sanitary Inspector of Tiruvannamalai, Sri N. Ramachandra Rao, took samples of ghee prepared for sale along with the meals and sent the same for analysis. The Government Analyst had found that there was an admixture of adulterated fat of 78 per cent. Therefore a prosecution was launched against the proprietor and the head cook who pleaded guilty was convicted and sentenced to pay a fine of Rs. 20 and the proprietor who pleaded "not guilty" was acquitted on the ground that he was not present at the hotel that day. This appeal has been filed on the ground that the proprietor was equally responsible notwithstanding his absence for the sale through his employee of the adulterated ghee.

The contention of the learned Public Prosecutor raises the important question of criminal liability of a master for the acts of his servant under a special statute like the Madras Prevention of Adulteration Act III of 1918, section 5.

Section 5 lays down that every person who offers for sale ghee which is not up to the standard of purity prescribed by the State Government shall be punished for the first offence with a fine which may extend to Rs. 100 and for every subsequent offence with fine which may extend Rs. 500.

Therefore before a person can be convicted of the offence of offering for sale ghee which is not up to the standard of purity prescribed and which would incidentally make it to be not of the nature substance or quality which it purports or is represented to be there must be evidence to show that the ghee was adulterated and that the ghee was offered for sale. Whether the ghee is to be deemed to be adulterated or not is a question of law and it is not a matter on which the Chemical Examiner should be required to express an opinion. What he has to do is to state the result of his analysis and leave it to the Court to determine whether on those results of the offence charged is proved or not. *Narainjan Dass v. Emperor* (A.I.R., 1930 Rang., 51 and 35 Cr.L.J., 681). This has been done in this case and I have already reproduced the report of the Analyst that the ghee contained 78 per cent of fat not derived from milk or cream. I need not point out that section 5 does not exempt from punishment a person because the amount adulteration is negligible or is universally tolerated. This may affect the question of sentence but cannot affect the conviction. *Budh Sen v. Emperor* (A.I.R., 1934 All., 329).

The prosecution has further shown that this adulterated ghee was offered for sale. The hotel-keeper who stores and serves to his customers with their meal ghee which is found to be adulterated

commits an offence under section 5 (1) (b) of the Act: (*Public Prosecutor v. Narayana Ayyar*) (1939 M.W.N., 1128). The hotel-keeper will also be guilty of a sale if his employee in the shop sells the ghee in his master's absence by giving the Sanitary Inspector a sample by purchase. It is quite true that in *Public Prosecutor v. Srinivasa Rao* (1938 M.W.N., 317), Lakshmana Rao J. held that a secretary and accountant of a co-operative society supplying butter to the Sanitary Inspector under section 14 cannot be convicted under section 5 (1) (d) and rules 24, 28 and 29 framed under section 20 (2) as supply of sample to the Sanitary Inspector under section 14 is not a sale nor can the Secretary or the accountant be said to offer the butter for sale. Subsequently Horwill J. in *In re. Bellamkonda Kanakayya* (1942 M.W.N. 439, Cr. 107) adopted the view of Lakshmana Rao J. These rulings were considered by Kuppuswami Ayyar J. in *Public Prosecutor v. Narayana Singh* (1944 M.W.N. 559, Cr. 131) by Govinda Menon J. in *Public Prosecutor v. Ramachandrayya* (1948 M.W.N. 159, Cr. 32) and by me in *Public Prosecutor v. Dada Haji Ibrahim Hilari* (1952 M.W.N. 748, Cr. 196) and *Public Prosecutor v. Annamalai Chettiar* (1953 M.W.N. 395) and we came to the conclusion that this transaction would amount to a sale. Therefore, if the adulterated ghee is stored and then served to the customers along with the meal or the ghee is sold even though by way of sample to a Sanitary Inspector, the transaction would be an offence either under section 5 (1) (b) or 5 (1) (d). In this case we are concerned with section 5 (1) (d).

A person who sells ghee which is found to be below the standard is liable to a conviction unless he successfully establishes the defences which are set out in the Act. It is not defence to a charge under section 5 that the accused was not regularly engaged in selling ghee. *Emperor v. Nur Amhad* (A.I.R. 1934 All., 342).

The only point for consideration therefore is:—

Whether the master is liable for the act of his servant done in his absence.

In English Criminal Law, a master is not criminally liable at common law for the acts of his servant, provided that an indictment lies against a master for a public nuisance committed by the servant within the scope of his employment (*R. V. Stephense*—1866 L.R. 1 Q.B., 702). Except under or by necessary implication from the express terms of a statute creating a criminal offence, a master is not liable under such statute for the act of his servant per *Pollock, B. in Budd v. Lucas* (1891 1 Q.B., 408), per *Collings J. in Hardcastel v. Bielby* (1892 1 Q.B. at page 712). The rule at common law was that to constitute a criminal offence the *actus reus* must be accompanied by a *mens rea* (*R. V. Holbrook*—1878 4 Q.B.D., 42), *Chisholm v. Doulton* (22 Q.B.D., at page 739), *R. V. Prince* (44 L.J.M.C., 122). It followed that the

rule of the liability of a master for the acts of his servant done within the scope of his employment had no application to the criminal law (*Woodgate v. Knatchbull*—2 T.R., 148); per *Ashurst J. R. V. Barry* (1865 4 F. 389), per Martin B. The master was liable criminally only in the case of such act of his servant as he knowingly aided and abetted or procured or in the case of felonies where he was knowingly an accessory after the fact to his servant's acts; see *E. G. Howells v. Wynne* (32 L.J.M.C., 241), *Gough v. Rees* (1930 142 L.T., 424). The exception in the case of proceedings for a public nuisance is explained by the consideration that though these proceedings are in form criminal, they exist in substance for the enforcement of civil rights, so that evidence which will support the action will support the indictment (*R. V. Stephens*—1866 L.R. 1 Q.B., 702). Therefore, for any public nuisance committed by the servant in the carrying of his master's business the latter is criminally liable though he may not have known of the servant's act and has in fact forbidden it; see per *Pollock, B. in Budd v. Lucas* (1891 1 Q.B., 408).

In other words, this analysis covered two classes of crimes; crimes requiring *mens rea* including those requiring heightened or specialized forms of *mens rea* and crimes requiring negligence or inadvertent negligence. In India also the same that is to say, inadvertent negligence. In India also the same principles have been applied though there is generally no room for the application of the doctrine that an act does not make a man guilty without a guilty intention in the Indian statutes as their terms are precise and contain within themselves the precise and particular elements that go to make up the offences referred to in those statutes. Where the doctrine or *mens rea* is intended to come into operation and guilty mind is deemed essential for the proof of an offence, the statute itself uses the words like "knowingly", "willingly", "fraudulently", "negligently" and so on. In cases where it is not an essential element of the offence forming the subject-matter of any penal law it is omitted and the mere omission of an act or the failure to do it are deemed enough to bring the person charged within its language. In the first of these cases *mens rea* has to be proved by the prosecution to establish the offence which it desires to bring home to the accused and in other cases it may or may not form a ground of defence and where it so forms even, it has to be established by the defence. In cases where the statutes require an intention to be proved as an essential part of the crime the prosecution must fail if it is not proved. To such cases, the general defence that is advanced is the absence of *mens rea* or as it generally put in the language of Indian Criminal Jurisprudence, a *bona fide* claim of right or of the honest and reasonable belief entertained by the accused of the existence of facts which, if true, would make the act charged against the accused, an innocent one.

But both in England and in India there is a third group of crimes which do not require any kind of legal fault on the part of the accused. They may be subdivided into crimes requiring fault on the part of some one but not the accused (vicarious responsibility) and those not requiring fault on the part of any one (strict responsibility, absolute prohibition). Crimes of strict responsibility are those in which the necessity for *mens rea* or negligence is wholly or partly excluded. Vicarious responsibility arises when the master is made liable where his servant did the act within the scope of his employment whether or not the master knew of or forbade the act. In recent years the distinction between strict and vicarious responsibility is becoming more and more blurred. At first sight it might seem as though the two are related as concentric circles, the defendant is affected by the act of a stranger as well as by that of his servant, whereas in vicarious responsibility he is affected only by the act of his servant and not always then. This distinction though partly true does not state the full legal difference. The full difference is this; strict responsibility does not dispense with something like personal *actus reus* whereas vicarious responsibility does. Conversely strict responsibility dispenses with the need for *mens rea* altogether whereas vicarious responsibility does not dispense with the need for *mens rea* on the part of the servant. (See Professor Glanville Williams' Criminal Law General Part, 1953 Ch. VII and VIII—Stevens & Sons, Ltd.)

The same statute may, of course, create both strict and vicarious responsibility. But this is seldom the case. We are concerned here only with vicarious responsibility. These statutes dispensing with the need for a *mens rea* or requiring it in a modified form in public welfare offence relate to (a) offences connected with sale, (b) offences of possession, (c) road traffic and (d) master and servant. We are concerned here with the last category.

The concepts of strict and vicarious responsibility have come in for severe criticism at the hands of distinguished jurist consults, the latest being Professor Glanville L. Williams in his Criminal Law (General Part), 1953, Chapters 7 and 8, at page 238, and following. Even Judges have come to view the tendency to dispense with *mens rea*; with some, per Atkin L.J. in *Re. is Pahani* (1921) 2 K.B. at 73 (C.A.) and *Goddard C.J. in Evans v. Del* (1937) 1 All. E.R. 349 and again in *Brend v. Wood* (1946) 175 L.T., at 307, 62 T.L.R. at 463, and *Harding v. Price* (1948) I.K.B. at 700 and *Young Husband v. Luftg* (1949) 2 K.B. at 370.

In fact the legislature itself realizing the harsh results arising from these concepts has sought to mitigate it by introducing what is known as the third party procedure and an example of which is to be found even in the very prevention of Adulteration Act, under section 6 (3).

To the increasing large number of modern statutes under which the master is liable where his servant does the act (with the necessary *mens rea*, if any as required by the statute) within the scope of his employment whether or not the master knew of or forbade the act per *Goddard C.J. at 1950, 2 All. E.R. at page 827. In Barker v. Levingson* the prevention of Adulteration Act has been added, other categories being offences against revenue, forest laws, etc. The penalty is directed against either public welfare cases or those in which though the proceedings are criminal in form they are only summary modes of enforcing civil rights per *Wright J. in Sherrins v. De Rutzen* (1895 I.Q.B., at 922.

The vicarious responsibility in such matters is erected on the following grounds: In the case of public licensees like hotel-keepers, licences are only granted to persons of good personal character and it is obvious that the object of so restricting the grant of licences would be defeated if the licensed person could by delegating the control and management of the house to another person who is altogether unfit to keep it free himself from responsibility for the manner in which the house was conducted per *Cave J. in Massey Morris* (1894 2 Q.B., 412). Secondly, the law would be stultified if the licence holder could evade responsibility by keeping out of the way per *Lord Russel, C.J. in Commissioner v. Cartmen* (1896 I.Q.B. at 655). In such cases knowledge is imputed to the master who puts his servant in his place so as to represent him for the purpose of acquiring such knowledge *Somerset v. Hart* (1999). 12 Q.B.D. *Allen v. Whitehead* (1930) I.K.B., 211—See also *Wilson v. Murphy* (1937), I.A.E.R. 375. Thirdly, it may be said that a person may properly be punished for the crime of his subordinate because the threat of such punishment may induce him and others to exercise supervision over the subordinates. Fourthly, vicarious responsibility is thought to be necessary in tort because the servants' pocket is usually too shallow to bear the damage that he may negligently occasion; similarly criminal punishments which are usually fines in the case of these statutes, would be equally futile if pauper servants are proceeded against leaving it open to the master to employ a succession of such servants and thereby defeating the operation of the statutes enacted for the advancement of public welfare. Fifthly, the master can always resort to third party procedure and in nearly all the public welfare offences that come before the courts there has been at least negligence on the part of the defendant or his servants. Where it is the servant who has been solely negligent the defendant can escape when the third party procedure is open to him. It is only rarely that a person is convicted of public welfare offences where the real fault was that of a third party over whom the defendant had no control. In short, the responsibility of the master subject to the third party procedure is absolute and under

these statutes a master is liable where his servant did the act (with the necessary *mens rea*; if any is required by the statute within the scope of his employment whether or not the master knew of or forbade the act (*Redgate v. Haynes*, 33 L.T., 729; *Police Commissioner v. Cartmen*, 1896 1 Q.B., 655; *Devies v. Harvey*, L.R. 9 Q.B., 433; *Booth v. Helliwell*, 1914 3 K.B., 252; *Holt Brewery Co. v. Thompson*, 36 L.R.; *Mellor v. Lydicate*, 1914 3 K.B., 1141; *Spiers and Pond v. Bennett*, 1896 2 Q.B., 65; *Pearks Dairies*, etc., 120 L.T. 84.)

Typical illustrative decisions relating to strict and vicarious responsibility which as pointed out by Glanville Williams are fast getting entangled with each other are: A licensee was charged under section 16 of the Licensing Act, 1872, with the offence committed by a licensed person who supplies liquor to a constable on duty without the authority of his superior officer. His servant had knowingly supplied liquor in such circumstances without the knowledge of his master. Held, the licensee was liable. *Mullins v. Collins* (1874 L.R. 9 Q.B., 292). A licensed occupier of a slaughter-house was prosecuted under a by-law under which an offence is committed by licensed occupier who slaughters sheep in the pound of the slaughter-house or in view of other sheep. The act had been done knowingly by his servant in disobedience of orders, and so as to save himself trouble. Held, the act was done by the servant within the scope of his employment and the master was guilty, *Collman v. Mills* (1897 I.Q.B. 396). An occupier of premises is liable to be convicted under section 44 of the Metropolitan Police Act, 1839, of knowingly suffering prostitutes to meet together in his refreshment house and remain therein, where he delegates the conduct of the house to his manager, who knowingly allows prostitutes to meet and remain there; *Allen v. Whitehead* (1930 I.K.B., 211). In *Provincial Motor Cab Co. v. Dunning* (1909 2 K.B., 599) a statute required vehicles to have an illuminated number plate. A limited company, cab proprietors, had properly fitted a cab and had appointed a foreman to see that their cabs complied with the regulations; but a driver altered his lamp so that it hung too low. The Magistrate found the company careless and convicted it of abetting the driver's offence and the conviction was affirmed on appeal. In *Mosell Brothers, Limited, L. and K.N.W. Ry.* (1917 2 KB. 836) a statute made it an offence for an owner or person having the care of goods to give a false account with intent to avoid payment of tolls. This statute was held to saddle such owner or person with vicarious responsibility. In *Burns v. Scholfield* (1922 128 L.T. 382) a master was held responsible for the act of his servant in abstracting water from a street hydrant. Similarly in *Griffiths v. Studebakers, Limited* (1924 1 K.B. 102) responsibility was imposed for the act of a servant in exceeding his master's motor

car licence, in *Barker v. Levinson* (1951 1 K.B. 342), the question turned on the landlord and the tenant (Rent Control) Act, 1949, section 2 (1) which provides that a person shall not as a condition of the grant, etc., of a tenancy require the payment of a premium. The defendant who managed a block of flats on behalf of the owners, authorized a rent collector to let one of the flats to Mrs. S. but there was no evidence that he authorized the collector to negotiate the terms of the tenancy. The collector illegally demanded a premium. A prosecution of the defendant failed, because on the opinion expressed by Denning L.J. the master is not criminally responsible except for what he was expressly or impliedly authorized. In *Slatcher v. George Mence Smith, Limited* (1951 2 K.B. 631) it was held that a defendant did not 'act' innocently under the Merchandise Marks Act if his servant acted wrongly.

Bearing these principles in mind if we examine the facts of this case, there are no grounds whatsoever to acquit the respondent. This master has not resorted to the third party procedure open to him under section 6 (3). Therefore, he must be attributed with the knowledge of his servant whom he has put in his place so as to represent him for the purpose of acquiring such knowledge. In such a case upon evidence being given of the commission of the forbidden act by the servant, concerning which there is no dispute, the master is liable.

I, therefore, set aside the order of acquittal by the lower court and convict the respondent as charged and sentence him to pay a fine of Rs. 20 or in default to undergo simple imprisonment for two weeks. Time to pay the fine is ten days, from the date of receipt of these records in the lower court.

XI. ANALYSIS OF DRUGS.

The number and categories of drugs analysed in the Government Analyst's Laboratory during the year are given in Table XI below :—

TABLE XI.

Number and category of drugs analysed in the Government Analysis Laboratory.

Category. (1)	Number of samples. (2)
Under the Drugs Act	145
From Government Hospitals and other Government sources.	379
From unofficial sources	7
Total ..	531

The total of 531 samples received from the Madras State alone during the year under report shows a considerable increase when compared to a total of 202 and 252 for the years 1950-51 and 1951-52, respectively, for the undivided Madras State. There has however been no corresponding increase in the staff and accommodation. Inadequacy of laboratory space to which reference has been made in previous reports continues to be a pressing problem. This laboratory has kept pace with the progress in analytical technique adopted in advanced countries and it has been a serious problem to house the various costly instruments which are in frequent use. Sale of adulterated and spurious drugs is rampant and if it should be controlled to any appreciable extent sampling should be done on a much larger scale. But the prerequisite is the starting of more laboratories. Reports of analysis are being considerably delayed at present and such delay certainly detracts from the usefulness of the report.

Details about the number and nature of drugs received under the Drugs Act during the year are given in Table XII. Particulars of unsatisfactory samples received under the Drugs Act are given in Table XIII.

TABLE XII.

Drugs received under the Act.

	Total.	Number not analysed.	Number below standard.	Percentage below standard.
Proprietary preparations	42	4	18	43
Pharmacopeal preparations	93	..	33	34

TABLE XIII.

*Particulars of drugs received under the Drugs Act reported as unsatisfactory.**Proprietary preparations.*

Name of drug.	Ingredients estimated.	Strength as declared on label.	Result of analysis.
1 Resoliver with folic acid.	Vitamin B-1 ..	0.5 mg. ..	86 per cent deficient.
2 C.B. Complex	Syrup glycerophosphate.	2 fl dr. ..	70 per cent excess.
3 Blatazene	Phenazone ..	3.8 gr. ..	29 per cent deficient.
4 Saridon .. ..	.. ..	.. ..	Ingredients stated on the label absent. Boric Acid, Aspirin present.

Proprietary preparations—cont.

Number.	Ingredients estimated.	Strength as declared on label.	Result of analysis.
5 Anacin	Aspirin ..	.. ..	Quinine, phenacetin and caffeine absent.
6 Geletta with extra mild.	Haemoplastica extra nicotina.	Manganese sulphate.	0.05 gr. .. 90.0 per cent deficient.
7 Pulmo fort	Amm. Chloride.	0.4 gr. ..	37.5 per cent deficient.
8 Vitamin B-1 tablets ..	Thiamine hydrochloride.	5.0 mg. ..	14 per cent deficient.
9 Syrup I.B.L.	Ferrous Gluconate.	15.0 gr. ..	66 per cent deficient.
10 Aspirin .. ..	.. ..	.. ..	Paraffin wax present.
11 Malariana	Quinine sulphate.	6.0 gra. ..	13 per cent deficient.
12 Liq. Iodi Mitis (Methylated).	Iodine ..	1.5 per cent w/v.	53 per cent deficient.
13 Panlyn	Nicotinamide.	30.0 mg. ..	1.85 per cent excess.
14 Ext. Kurichi Liq. ..	Total alkaloids	0.95—1.05 per cent.	Nil.
	Alcohol ..	75—80 per cent Ethyl Alcohol.	13 per cent deficient.
	Do. ..	Do. ..	Do. ..
15 Do.	Calcium hypophosphite	24 gra/oz ..	16.7 per cent deficient.
16 Calcidex	Ferrous Sulphate.	1 gra./oz. ..	36 per cent excess.
17 Liviron	Aromatic spirit of ammonia.	40 m. ..	65 per cent deficient.
18 Iodisal .. ..	.. ..	.. ..	.. ..

Pharmacopeal preparations.

19 Tinc. Nuxis Yomica BP.	Alcohol ..	43—46 per cent.	14 per cent deficient.
20 Tinc. Iodine	Iodine ..	2—5 per cent.	21 per cent deficient.
	Pot. Iodide ..	.. ..	23 per cent excess.
21 Liq. Tolutanus BPC. 1249.	Wt. per ml. ..	140	0.986.
22 Tinc. Aristolochie Iochie IPL 46.	.. ..	.. ..	Contains coal tar dye.
23 Do. .. ..	.. ..	.. ..	Do. ..
24 Tinc. Jalap BPC. 1949.	Wt. per ml. ..	0.85	0.887
	Resin	1.45 per cent 1.55.	98.6 per cent deficient.
25 Spt. Aetheris Nitrosi BP.	Ethyl Nitrite ..	1.25—2.5 per cent.	56.8 per cent deficient.
	Acidity .. ..	.. ..	Does not conform BP. limit.
26 Spta. Etheri Nitrosi BP. 48.	Ethyl Nitrite.	1.25—2.5 per cent ..	9.6 per cent deficient.

Pharmacopoeal preparations—*cont.*

Name of drug.	Ingredients estimated.	Strength as declared on label.	Result of analysis.
27 Tr. Calendulae BPC. 34. ..	Alcohol ..	85—88 ..	2.3 per cent excess.
	Alcohol sol. extractive.	3.6 per cent W/V.	0.14 per cent W/V.
28 Tr. Rauwolfia IPL ..	Alkaloid ..	0.23 per cent.	Nil.
29 Tr. Benzoin BPC. 49 ..	Wt. per ml. ..	0.850 ..	0.842
30 Tr. Castorei BPC. 34 ..	Alcohol sol. extractives.	1.75 ..	92 per cent. deficient.
31 Spts. Amm. Aromat ..	Free Ammonia.	1.12—1.25 ..	16 per cent excess.
	Alcohol ..	64—70 ..	2.2 per cent excess.
	Wt. per ml. ..	0.885 ..	873
32 Tr. Auranti BP. 53 ..	Alcohol ..	73—78 per cent.	2.6 per cent excess.
33 Eucalypts Oil IPL. ..	Specific gravity.	0.9065 ..	0.9044
34 Syrupus Ferri Phosphatis Comp.	Iron ..	0.85—0.95 ..	43.5 per cent deficient.
35 Liq. Camph. Ammonia BP.	Ammonia ..	5.0—7.5 ..	32 per cent deficient.
36 Tr. Ipecac BP. ..	.. ..	.. ..	Coal tar dye present.
37 Tr. Podophylli BPC. 49 ..	Wt per ml. ..	0.840 ..	0.838. Coal tar dye present. Resin absent.
38 Tr. Buchu ..	Do. ..	0.923 ..	0.911. Coal tar dye present.
39 Tinc. Tinospra IPL ..	.. ..	.. ..	Coal tar dye present.
40 Tr. Kumaerise BPC. ..	Wt. per ml. Alcohol sol. extractive.	0.929 ..	0.911. 99 per cent deficient. Coal tar dye present.
41 Tr. Cascarillae BPC. 1949.	Do. ..	.. ..	91 per cent. deficient. Coal tar dye present.
42 Tr. Myrrh BPC. ..	Do. ..	.. ..	99 per cent deficient. Coal tar dye present.
43 Easton's Syrup BPC ..	Iron ..	1.62 per cent 1.98.	66 per cent deficient.
44 Syrup Auranti ..	Alcohol Wt. per ml.	1.28 ..	70 per cent 1.31 deficient.
45 Tr. Kolae Liq BPC ..	Alkaloid ..	.. ..	Absent.
46 Tr. Aristolochiae ..	Alcohol ..	.. ..	2.6 per cent excess.
47 Tr. Sambul BPC. ..	Alcohol ..	....	4.5 per cent excess. Coal tar dye present.

Pharmacopoeal preparations—*cont.*

Name of drug.	Ingredients estimated.	Strength as declared on label.	Result of analysis.
48 Tr. Tinosporae IPC. ..	....	....	Coal tar dye present.
49 Tr. Jalap BPC. ..	Alcohol wt. per ml. Resin.	0.895	2.9 per cent excess. 0.887 absent.
50 Tr. Zingiberis BP 53 ..	Alcohol sol. extractive.	....	24 per cent deficient.

Some comments on the above samples are given below :—

As judged from the samples received there appears to be practically no drug manufacture in the strict sense of the term in the Madras State. The activities consist of blending of imported medicines, brewing of obsolete tinctures and tableting of some drugs. There is a pressing demand in this country for such essential drugs as salicylates, barbiturates, insulin, analgesics, sulphonamides, vitamins, hormones, antibiotics, etc., and it is a pity that instead of attempting their manufacture the drug industry confines itself to the compounding of a few proprietary drugs and tablets using imported ingredients. Even in this limited field proper care is not exercised. Coal tar colors are used indiscriminately; the labels besides failing to describe the proportions of ingredients present infringe the rules in other ways also. For example, the preparation 'Calcidex' carried a leaflet claiming the stuff to be a very pleasant and effective means of curing tuberculosis.

Deficiency of the important ingredients is observed in several preparations although in some instances they are present in considerable excess, obviously due to carelessness in compounding. A syrup called C.B. Complex contained a 70 per cent excess of Syrup of Glycerophosphates. Another preparation Syrup IBL was deficient in ferrous gluconate to the extent of 66 per cent. There was a 36 per cent excess of ferrous sulphate in 'Liviron.' A vitamin syrup called 'Panlyn' prepared in Calcutta was found to contain nearly thrice the declared quantity of nicotinamide.* 'Iodisal' was deficient in aromatic spirit of ammonia to the extent of 65 per cent.

As has been already referred to in previous reports, some firms appear to specialise in the manufacture of obsolete tinctures, the only standard for which is the alcohol content. Their drug content is nil and they leave no residue on evaporation. Aristolochia, Jalap, Calendulae, Castorei, Podophylli, Buchu, Tinospora, Krameria, Cascarillae, Myrrh, Kola, Sumbul—these are some of the favourite tinctures which quench the thirst of the addict and swell the coffers of the manufacturer and the smuggler.

The world-wide publicity for the Indian hypotensive drug "Rauwolfia Serpentine" has been exploited by at least one manufacturer who has christened his brand of alcohol as "Tincture Rauwolfia" though it did not contain any extract from the drug.

The eradication of this evil is a matter in which the drug trade and the medical profession must co-operate with the Government.

The number of drugs including prescribed hospital mixtures and other proprietary preparations received from Government Institutions was 279 and 25 respectively making a total of 304. The number received from the various hospitals is given in Table XIV.

TABLE XIV.

Number of drug samples received from the Government Hospitals of the Madras State.

Name of Hospital.	Number of hospital mixtures.	Number of proprietary drugs.	Total.
(1)	(2)	(3)	(4)
1 Government General Hospital, Madras.	6	3	9
2 Government Stanley Hospital, Madras.	18	1	19
3 Government Royapettah Hospital, Madras.	4	..	4
4 Government Mental Hospital, Madras.	2	..	2
5 Government R. S. R. M. Lying-in-Hospital, Madras.	3	1	4
6 Kasturba Gandhi Hospital for Womed and Children, Madras.	23	6	29
7 Women and Children Hospital, Egmore, Madras-8.	8	..	8
8 Lady Willingdon Leprosy Sanatorium, Tirumani.	7	..	7
9 Erskine Hospital, Madurai ..	9	..	9
10 Headquarters Hospital, Tiruchirappalli.	49	..	49
11 Headquarters Hospital, Kozhikode.	22	3	25
12 Women and Children Hospital, Kozhikode.	4	..	4
13 Headquarters Hospital, Salem ..	5	..	5
14 Government Hospital, Attur ..	3	..	3
15 Headquarters Hospital, Ramnathapuram.	28	..	28
16 R. M. Hospital, Tanjore	15	13	28
17 Headquarters Hospital, Cuddalore.	17	..	17
18 Headquarters Hospital, Palayamcottai.	4	..	4

Number of drug samples received from the Government Hospitals of the Madras State—cont.

Name of Hospital.	Number of hospital mixtures.	Number of proprietary drugs.	Total.
(1)	(2)	(3)	(4)
19 Government Hospital, Villupuram.	6	..	6
20 Government Hospital, Nagapattinam.	3	..	3
21 Government Hospital, Puttur ..	3	1	4
22 Government Hospital, Tenkasi ..	1	..	1
23 Government Hospital, Tiruchengode.	2	..	2
24 Government Hospital, Arialur ..	1	..	1
25 Government Hospital, Gudalur ..	7	..	7
26 Government Hospital, Erode ..	2	..	2
27 Government Hospital, Ustilampatti.	2	..	2
28 Government Hospital, Dindigul ..	4	..	4
29 Government Hospital, Ponnani ..	..	1	1
30 Government Hospital, Kancheepuram.	8	..	8
31 Police Hospital, St. Thomas Mount, Madras-16.	2	..	2
32 Government Analyst, Drugs Special King Institute, Guindy.	..	5	5
33 Director of Medical Services, Madras-6.	1	..	1
Total ..	269	35	304

Many mixtures sent from the hospitals were found to be inaccurately dispensed. Deficiencies in common ingredients like Sodium Salicylate, Sodium bicarbonate, Iodides, Quinine, ferrous Sulphate, Ammonium Salts, magnesium Sulphate ranged up to 100 per cent; occasionally the ingredients were present in excess. In fact these defects have been noticed during the previous years and commented upon in the annual reports. Pharmacists and compounders in the State Hospitals do not appear to take proper care in making up the mixtures. It should be possible for the hospital authorities to take a personal interest in the matter and devise ways and means to improve the position and ensure the administration of medicines in full strength to the patients.

While dispensing of medicines generally speaking is not satisfactory in the State Hospitals which have been sending samples, it is reasonable to infer that the position may be equally bad in the remaining State hospitals and also in private dispensaries. With the existing accommodation and facilities in this laboratory, more extensive sampling, though desirable, cannot be recommended

now. In due course it would be necessary to create ample laboratory facilities and then permit sampling under the Madras Drugs Rules to cover private dispensaries also.

A few Government Hospitals have been sending proprietary drugs also such as Vitamin preparations to ascertain their strength and potency. But it has not been possible to send the analytical reports quickly owing to the absence of adequate staff and other facilities.

Spurious drugs sent by the Magistrates and Police are given in Table XV.

TABLE XV.

Spurious samples sent by Magistrates and Police.

<i>Name of sample.</i>				<i>Number of samples.</i>
(1)				(2)
Talcum Powder	...	...	...	24
Perfumes	...	...	...	3
Hair Oils	...	...	...	2
Face Cream	...	...	...	2
Tinctures	...	...	...	3
Woodwards Gripe Water	...	...	...	8
Gorochanai	...	...	...	2
Powder of unknown composition	...	...	...	2
Authentic samples for comparison purposes.				29
Total ..				75

All the suspected samples proved to be spurious on analysis. In all cases the object of the dealer is to put on the market preparations resembling the authentic ones in get-up, printing of label, container, etc., but the important ingredients are absent. The ordinary purchaser would be unable to distinguish the genuine and spurious varieties. Fraudulent imitations of Woodward's Gripe Water for example were highly deficient in Sodium Bicarbonate and contained Saccharin as the sweetening agent in the place of sugar. Anacin contained only aspirin and not the ingredients of the genuine product. Likewise "Saridon" contained aspirin and boric acid. A large number of imitations of well known cosmetics—face powders, creams, etc., were also received. Considerable work is involved in identifying and estimating the ingredients present in these spurious products.

Spurious imitations were found in the case of ayurvedic preparations also. Two samples of "Gorochanai" sent by a Magistrate were found to consist of a mixture of gram starch and tapioca

coloured with a coal tar dye. An authentic specimen analysed in this connection was found to consist mainly of bile pigments. Genuine "Gorochanai" is a very costly product prized for its medical properties.

Drugs from Unofficial sources.

Of the seven samples received for analysis, Epsom Salt, Saccharin, Eucalyptus Oil and Plaster of Paris were of Standard Quality. Two samples of Tinct. Aloes et Myrrhae and Mist Bismuth Co were found to be not of standard quality. But particular mention should be made of a sample of "Hetrazan" received from a private dealer who suspected its purity. Packed in a container bearing the label of a well known foreign firm, the sample contained no hetrazan at all but actually consisted of a mixture of boric acid and starch. One can well imagine the disastrous consequences that would have followed, had this stuff been administered in heavy doses to a patient as a remedy for filaria.

XII. MISCELLANEOUS.

A paper entitled "Chemical Standards for Coffee Powder" was published by S. Narayana Iyer and K. Ramachandran in Current Science, June 1954.

During the Refresher Course for Health Officers held at Madras, Tanjore and Coimbatore in 1954 the Government Analyst discussed with the Health Officers various aspects of the working of the Madras Prevention of Food Adulteration Act.

The Government Analyst suggested amendments to the Draft Rules proposed by the Government of India under the Prevention of Food Adulteration Act, 1954.

The Government Analyst continued to be a member of the Drugs Technical Advisory Board and attended meetings of the Board in October 1954 and February 1955.

The Government Analyst attended the Drug Analysts' Conference convened by the Director, Central Drugs Laboratory, Calcutta, in May 1954.

THE KING INSTITUTE, GUINDY,
MADRAS-15,
13th October 1955.

S. NARAYANA AYYAR,
Government Analyst.

APPENDIX A.

Number of samples received and found adulterated from Municipalities and Panchayat Boards working the Prevention of Adulteration Act in the districts of the Madras State during the period from 1st April 1954 to 31st March 1955.

Serial number and name of district.	Samples.			Milk.		Ghee.		Butter.		Gingelly oil.		Coconut oil.	
	Total received.	No. adul- terated.	Percentage adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1 North Arcot ..	705	293	41.5	460	246	41	11	3	1	76	12	50	7
2 South Arcot ..	692	243	35.1	411	174	37	9	31	24	95	12	42	2
3 Coimbatore ..	1,144	673	58.8	768	548	24	8	40	15	69	7	26	..
4 Chingleput ..	557	251	45.0	287	143	41	17	9	6	117	56	30	2
5 Madurai ..	2,071	665	32.1	1,172	501	56	24	57	22	243	26	123	11
6 Malabar ..	700	309	44.1	411	231	35	7	8	4	45	..	16	..
7 Nilgiris ..	411	184	44.7	280	134	18	5	3	1	7	..	..	..
8 Ramanathapuram ..	958	333	34.7	643	262	30	13	4	3	99	13	40	5
9 Salem ..	765	392	51.2	618	357	26	9	2	..	36	1	21	..
10 South Kanara ..	311	137	44.0	212	125	16	3	7	1	9	..	8	..
11 Tanjore ..	1,201	575	47.8	847	474	43	19	36	22	138	22	31	1
12 Tiruchirappalli ..	910	396	43.5	632	327	63	20	14	5	71	6	29	1
13 Tirunelveli ..	1,253	589	47.0	829	438	59	31	10	7	61	14	14	..
Grand Total ..	11,678	5,040	43.1	7,560	3,960	489	176	224	111	1,066	169	430	29

Serial number and name of district.	Groundnut oil.		Coffee.		Tea.		Sweets.		Turmeric.		Dhal and flour.		Miscellaneous.	
	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.
(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
1 North Arcot ..	20	..	14	4	9	1	3	1	6	1	11	5	12	4
2 South Arcot ..	6	3	29	8	4	..	1	1	15	6	13	4	8	..
3 Coimbatore ..	6	..	73	21	64	22	7	5	30	14	37	29	10	4
4 Chingleput ..	18	5	31	10	3	..	..	..	5	3	9	5	7	4
5 Madurai ..	12	3	243	42	52	6	2	..	39	17	51	9	21	4
6 Malabar ..	1	..	17	4	87	12	3	2	15	12	59	37	3	..
7 Nilgiris ..	2	..	28	5	13	1	..	..	13	5	44	32	3	1
8 Ramanathapuram ..	16	6	65	13	13	1	3	2	13	7	21	5	11	3
9 Salem ..	7	2	13	4	3	..	..	..	22	11	14	5	3	3
10 South Kanara ..	..	..	23	2	27	6	..	..	..	..	6	..	3	..
11 Tanjore ..	4	1	43	11	3	..	1	..	10	7	26	10	19	8
12 Tiruchirappalli ..	..	..	70	24	4	1	5	4	13	8	5	..	4	..
13 Tirunelveli ..	6	1	118	36	42	7	15	12	8	4	74	33	17	6
Grand Total ..	98	21	767	184	324	57	40	27	189	95	370	174	121	37

APPENDIX B.

Number of samples received and found adulterated from Municipalities and Panchayat Boards working the Prevention of Adulteration Act in the Madras State during the period from 1st April 1954 to 31st March 1955.

Serial number and places.	Samples.				Milk.		Ghee.		Butter.		Gingelly oil.		Coconut oil.	
	Annual quota.	Total received.	Number adulterated.	Percentage of adulteration.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
I. North Arcot district—														
1 Vellore (M) ..	144	144	64	44.4	96	55	11	1	1	..	9	3	8	..
2 Tiruvannamalai (M) ..	72	73	45	61.6	48	35	1	1	..	..	7	3	11	2
3 Tirupattur (M) ..	48	48	18	37.5	37	15	2	1	..	..	2	..	2	1
4 Gudiyatham (M) ..	48	48	8	16.7	22	6	6	..	..	..	6	..	1	..
5 Vaniyambadi (M) ..	48	48	29	60.4	28	21	8	4	..	..	1	..	6	3
6 Walajapet (M) ..	48	48	4	8.3	27	1	3	1	..	..	10	1	8	1
7 Ambur (M) ..	48	47	23	48.9	30	20	3	..	..	..	7	2	4	..
8 Arni (M) ..	48	48	23	47.9	33	19	3	3	..	..	8	1	2	..
9 Arkonam (P) ..	48	49	27	55.1	40	24	..	..	..	..	5	1	..	..
10 Arcot (P) ..	48	49	12	24.5	38	11	..	..	2	1	7	..	..	..
11 Ranipet (P) ..	48	49	12	24.5	24	11	3	..	..	..	6	1	5	..
12 Polur (P) ..	48	54	28	51.9	37	28	1	..	..	..	8	..	3	..
Total ..	..	705	293	41.5	460	246	41	11	3	1	76	12	50	7
II. South Arcot district—														
1 Cuddalore (M) ..	144	160	33	20.6	81	24	11	..	5	3	32	1	13	..
2 Chidambaram (M) ..	96	96	31	32.2	34	13	10	3	15	11	13	..	7	..
3 Villupuram (M) ..	96	95	36	37.8	63	27	6	1	..	..	7	2	5	..
4 Tindivanam (M) ..	48	48	23	47.9	33	17	3	3	..	..	3	..	2	..
5 Bhuvanagiri (P) ..	48	48	21	43.8	22	12	..	..	8	7	11	2	3	..
6 Kallakurichi (P) ..	48	45	17	37.7	41	16	1	..	..	..	2	1	..	..
7 Nellikuppam (P) ..	48	49	19	38.7	34	16	2	..	..	..	6	1	..	..
8 Panruti (P) ..	48	52	20	38.4	42	18	1	..	..	..	6	1	2	..
9 Tirukoilur (P) ..	48	48	14	29.1	18	6	3	2	..	..	13	3	8	2
10 Virudachalam (P) ..	48	51	29	56.8	43	25	..	..	3	3	2	1	2	..
Total ..	..	692	243	35.1	411	174	37	9	31	24	95	12	42	2
III. Coimbatore district—														
1 Coimbatore (M) ..	288	300	204	68.0	176	162	8	3	35	13	13	1	10	..
2 Erode (M) ..	96	96	54	56.2	64	46	1	1	..	..	7	..	2	..
3 Pollachi (M) ..	114	144	65	45.1	68	47	1	..	1	1	15	..	8	..
4 Tiruppur (M) ..	96	114	60	52.6	89	55	2	..	..	..	12	2	2	..
5 Udumalpet (M) ..	96	94	42	44.7	40	19	4	..	1	..	8	2	1	..
6 Dharapuram (M) ..	48	48	32	66.8	30	24	..	..	..	..	2	..	2	..
7 Mettupalayam (M) ..	48	54	44	84.6	40	36	1	1	..	..	2	..	..	..
8 Gobichettipalayam (M) ..	48	49	42	85.7	48	42	1	..	..	..	..	..	..	..
9 Avanashi (P) ..	48	46	27	58.7	33	22	..	..	2	1	1	..	..	..
10 Bhavani (P) ..	48	46	23	50.0	35	22	..	..	..	..	6	1	..	..
11 Kurichi (P) ..	48	49	18	36.7	45	18	..	..	..	..	2	..	1	..
12 Satyamangalam (P) ..	48	56	29	51.8	55	29	..	..	..	..	..	..	..	..
13 Kollegal (P) ..	48	48	33	68.7	35	26	6	3	1	..	1	..	..	..
Total ..	..	1,144	673	58.8	758	548	24	8	40	15	69	7	26	..
IV. Chingleput district—														
1 Conjeevaram (M) ..	144	192	73	38.0	114	45	13	3	1	..	48	22	5	..
2 Chingleput (M) ..	48	48	19	39.6	19	11	5	3	1	1	12	1	4	..
3 Tiruvallur (M) ..	48	48	25	52.1	23	11	4	2	..	..	10	7	4	..
4 Alandoor (P) ..	48	48	24	50.0	18	10	5	5	2	1	14	6	2	..
5 Madurantakam (P) ..	48	47	20	42.6	31	14	3	1	2	2	5	2	2	..
6 Tambaram (P) ..	48	48	32	66.8	30	24	5	3	2	1	4	3	3	..
7 Poonamallee (P) ..	48	48	16	33.3	9	3	2	..	..	..	12	7	6	..
8 Tiruvottiyur (P) ..	48	42	23	54.7	19	9	1	..	1	1	7	5	2	..
9 Sriperumbudur (P) ..	..	16	8	50.0	7	5	3	..	..	..	4	3	1	..
10 Avadi (P) ..	..	20	11	55.0	17	11	..	..	..	..	1	..	1	..
Total ..	..	557	251	45.0	287	143	41	17	9	6	117	56	30	2

Number of samples received and found adulterated from Municipalities and Panchayat Boards working the Prevention of Adulteration Act in the Madras State during the period from 1st April 1954 to 31st March 1955—cont.

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Serial number and places.	Groundnut oil.		Coffee.		Tea.		Sweets.		Turmeric.		Dhall and Sours.		Miscellaneous.	
	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.
	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
I. North Arcot district—														
1 Vellore (M) ..	2	..	2	..	4	1	3	1	..	..	2	..	6	3
2 Tiruvannamalai (M) ..	..	..	1	..	..	..	..	..	..	..	5	4	..	..
3 Tirupattur (M) ..	2	..	2	..	..	..	..	..	1	1	..	..	..	..
4 Gudiyatham (M) ..	3	..	2	1	..	..	..	..	4	..	3	1	1	..
5 Vaniyambadi (M) ..	..	..	1	1	1	..	..	..	..	..	..	..	3	..
6 Walajpet (M) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7 Ambur (M) ..	..	..	1	..	1	..	..	..	..	..	..	..	1	1
8 Arni (M) ..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
9 Arkonam (P) ..	1	..	2	2	..	..	..	..	1	..	..	..	..	..
10 Arcot (P) ..	..	..	2	..	..	..	..	..	..	..	..	..	..	..
11 Ranipet (P) ..	10	..	..	..	1	..	..	..	..	..	..	..	..	..
12 Polur (P) ..	..	..	1	..	2	..	..	..	..	..	1	..	1	..
Total ..	20	..	14	4	9	1	3	1	6	1	11	5	12	4
II. South Arcot district—														
1 Cuddalore (M) ..	4	3	4	..	1	..	..	..	5	2	2	..	2	..
2 Chidambaram (M) ..	1	..	6	2	2	..	..	..	3	2	3	..	2	..
3 Villupuram (M) ..	..	..	2	1	..	..	1	1	4	1	6	2	1	..
4 Tindivanam (M) ..	..	..	3	1	..	..	..	..	1	1	2	1	1	..
5 Bhuvanagiri (P) ..	..	..	2	..	..	..	..	..	2	..	..	..	..	..
6 Kalakurichi (P) ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
7 Nellikoppam (P) ..	..	..	6	2	..	..	..	..	..	..	..	..	1	..
8 Panruti (P) ..	..	..	1	1	..	..	..	..	..	..	..	..	..	..
9 Tirukoilur (P) ..	..	..	5	1	1	..	..	..	..	..	..	..	..	..
10 Virudachalam (P) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	6	3	20	3	4	..	1	1	15	6	13	4	8	..
III. Coimbatore district—														
1 Coimbatore (M) ..	5	..	12	6	17	4	4	3	6	3	9	9	5	..
2 Erode (M) ..	..	..	13	5	3	..	..	..	12	7	3	..	..	..
3 Pollachi (M) ..	..	..	19	3	19	7	..	..	..	..	..	..	..	..
4 Tiruppur (M) ..	..	..	5	2	..	..	..	..	1	..	..	..	..	..
5 Udumalpet (M) ..	..	..	6	1	11	3	..	..	3	..	15	4	..	..
6 Dharapuram (M) ..	..	..	5	2	2	..	..	..	..	..	..	..	..	..
7 Mettupalayam (M) ..	..	..	2	..	9	7	..	..	..	..	..	..	..	..
8 Gobichettipalayam (M) ..	..	..	..	..	1	1	..	..	..	..	..	..	..	..
9 Avanashi (P) ..	..	..	6	1	..	..	..	..	..	..	..	..	..	..
10 Bhavani (P) ..	..	..	2	..	2	..	..	..	..	..	..	..	..	..
11 Kurichi (P) ..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
12 Satyanangalam (P) ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13 Kollegal (P) ..	1	..	1	1	..	..	3	3	..	..	..	..	..	..
Total ..	6	..	73	21	64	23	7	5	30	14	27	28	10	..
IV. Chingleput district—														
1 Conjeevaram (M) ..	6	3	3	..	2	..	..	..	..	..	..	..	..	..
2 Chingleput (M) ..	1	1	5	2	..	..	..	..	..	..	..	..	..	..
3 Tiruvellore (M) ..	1	1	..	..	..	..	..	..	..	..	..	..	..	..
4 Alandoor (P) ..	..	..	6	2	..	..	..	..	..	..	..	..	..	..
5 Madurantakam (P) ..	..	..	2	1	..	..	..	..	..	..	..	..	..	..
6 Tambaram (P) ..	..	..	4	..	..	..	..	..	..	..	..	..	..	..
7 Poonamallee (P) ..	7	..	5	1	..	..	..	..	4	1	..	..	..	..
8 Tiruvattiyur (P) ..	1	..	6	4	1	..	..	..	..	..	..	..	..	..
9 Sriperumbudur (P) ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
10 Avadi (P) ..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Total ..	19	5	31	10	8	..	..	..	15	8	9	9	7	..

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Number of samples received and found adulterated from Municipalities and Panchayat Boards working the Prevention of Adulteration Act in the Madras State during the period from 1st April 1954 to 31st March 1955—cont.

Serial number and place.	Annual quota.	Samples.		MIL.	Ghee.		Butter.		Gingley oil.		Coconut oil.	
		Total received.	Number adulterated.	Percentage of adulteration.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.
V. Madurai district—												
1 Madurai (M)	1,200	1,202	334	27.8	621	241	47	19	141	6	76	7
2 Dindigul (M)	96	96	42	43.7	77	37	..	..	13	1	3	2
3 Palani ..	96	96	54	55.1	91	54	..	..	13	1	1	1
4 Bodinayakanur (M)	72	73	21	28.7	50	16	..	..	8	2	2	..
5 Kodalkanal (M)	48	60	19	31.6	50	18	..	..	3	2	3	2
6 Periyakulam (M)	48	49	29	59.2	28	22	1	1	8	2	3	2
7 Allinagaram (P)	48	48	18	37.5	29	11	1	..	7	2	3	..
8 Ayyakudi (P)	48	47	17	34.0	36	17	..	..	4	..	4	..
9 Battagundu ..	48	50	14	28.0	5	8	..	..	3	..	1	..
10 Chinnamanur (P)	48	49	32	44.9	28	20	2	2	4	..	4	..
11 Cumbum (P)	48	50	10	20.0	35	9	..	..	2	..	2	..
12 Melur (P)	48	49	22	44.9	38	17	..	..	1	..	1	..
13 Nilakottai ..	48	47	8	17.0	20	3	..	..	11	1	6	..
14 Sholavandan (P)	48	45	21	46.6	20	13	1	..	10	3	3	..
15 Tirumangalam (P)	48	48	17	35.4	20	11	1	..	12	3	3	..
16 Usilampatti (P)	48	48	13	27.0	18	6	..	..	13	5	11	..
17 Gudalur (P)	* 12	12	4	33.3	6	3	..	..	1	..	1	..
Total		2,071	605	32.1	1,172	501	57	22	243	26	123	11
VI. Madhar district—												
1 Kozhikode (M)	238	290	97	33.4	120	60	5	2	33	..	6	..
2 Palghat (M)	144	144	84	58.3	108	76	2	2	3	..	2	..
3 Cannanore (M)	96	96	37	38.5	54	23	..	..	..	..	..	..

4 Cochin (M)	48	48	19	39.6	29	11	1	..	4	..	6	..
5 Tellicherry (M)	72	71	30	42.3	33	21	..	..	..	..	2	..
6 Badagara (P)	48	51	43	82.4	37	31	..	..	3	..	1	..
Total		700	309	44.1	411	231	5	4	45	..	16	..
VII. Nilgiris district—												
1 Ootacamund (M)	216	221	104	47.1	165	83	1	..	..	..	..	..
2 Coonoor (M)	144	144	69	47.9	76	40	2	1	6	..	..	..
3 Kotagiri (P)	48	46	11	23.9	39	11	..	..	1	..	..	..
Total		411	184	44.7	280	134	3	1	7	..	..	..
VIII. Ramanathapuram district—												
1 Virudhunagar (M)	96	96	32	33.3	28	8	3	2	21	4	3	..
2 Karakkudi (M)	96	96	41	42.7	76	36	..	..	8	1	3	..
3 Devakottai (M)	72	72	33	45.8	52	28	..	..	1	..	..	..
4 Rajapalayam (M)	72	73	19	26.0	38	18	..	..	21	1	..	..
5 Srivilliputhur (M)	72	72	29	40.3	48	18	1	1	9	5	2	..
6 Aruppukkottai (M)	48	48	23	47.9	36	21	..	..	4	..	..	..
7 Sivakasi (M)	48	48	19	39.6	39	19	..	..	3	..	..	..
8 Mudukulathur (P)	48	46	3	20.0	11	3	..	..	..	..	..	..
9 Kilakarai (P)	48	48	18	37.5	26	10	..	..	3	..	..	..
10 Kandanoor (P)	48	49	15	30.6	40	12	..	..	1	..	..	..
11 Pallattur (P)	48	52	12	23.0	46	10	..	..	1	..	..	..
12 Paramakudi (P)	48	46	11	23.9	18	6	..	..	1	..	..	..
13 Ramanathapuram (P)	48	47	17	34.0	33	9	..	..	1	..	..	..
14 Rameswaram (P)	48	46	16	37.0	43	17	..	..	1	..	..	..
15 Sattur (P)	48	49	12	24.5	27	7	..	..	6	..	..	..
16 Sivaganga (P)	48	48	22	45.8	44	21	..	..	1	..	..	..
17 Tirupattur (P)	48	48	20	41.7	38	19	..	..	4	..	..	..
18 Venkateswarapuram (P)	..	5	..	..	..	..	..	..	3	..	..	..
Total		958	333	34.7	643	263	4	3	99	13	40	5

* From January 1955.

Number of samples received and found adulterated from Municipalities and Panchayat Boards working the Prevention of Adulteration Act in the Madras State during the period from 1st April 1954 to 1st March 1955—cont.

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	Groundnut oil.		Coffee.		Tea.		Sweets.		Turmeric.		Dhall and Sour.		Miscellaneous.	
	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.
	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)
V. Madurai district—														
1 Madurai (M)	1	..	184	26	32	..	1	..	19	8	29	7	13	..
2 Dindigul (M)	..	..	4	..	..	..	..	..	..	..	..	..	..	..
3 Palni (M)	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4 Bodinayakanur	..	..	9	..	..	..	..	..	..	..	..	..	..	..
5 Kodaikanal (M)	..	..	4	..	..	..	..	..	..	..	..	..	..	..
6 Periyakulam (M)	1	..	4	1	1	..	..	..	..	..	..	..	1	..
7 Allinagaram	..	..	5	..	1	..	..	..	..	..	..	1	1	..
8 Ayyakudy (P)	2	..	1	..	..	..	..	..	..	..	..	..	..	..
9 Batlagundu (P)	..	..	6	2	1	..	..	..	..	..	..	1	1	..
10 Chinnamanur (P)	1	..	2	..	2	..	..	..	10	4	5	..	1	..
11 Cumbum (P)	..	..	2	..	8	1	..	..	2	..	1	..	1	..
12 Melur (P)	..	..	4	3	1	..	..	..	..	..	2	..	2	..
13 Nilakottai (P)	..	..	5	..	..	..	..	..	2	2	..	..	..	..
14 Sholavandan (P)	4	1	4	..	..	..	..	..	1	1	..	..	..	..
15 Tirumangalam (P)	3	2	1	..	2	..	1	..	2	1	1	..	1	..
16 Usilampatti (P)	..	..	4	1	1	..	..	..	..	..	..	..	..	..
17 Gudalur (P)	..	..	2	..	..	..	..	..	1	1	..	..	..	..
Total	22	3	243	42	52	6	2	..	39	17	51	9	21	4

VI. Malabar district—

1 Kozhikode	1	..	9	1	85	7	..	..	3	7	25	17	1	..
2 Palghat (M)	..	..	7	..	12	..	..	..	..	..	..	..	..	..
3 Cannanore (M)	..	..	..	..	6	..	..	..	..	..	..	..	..	..

4 Cochin (M)	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5 Tellicherry (M)	..	..	1	1	14	2	..	..	..	..	..	..	..	..
6 Badagara (P)	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	1	..	17	4	87	12	..	..	15	15	25	17	1	..

VII. Nilgiris district—

1 Ootacamund (M)	..	..	15	4	7	1	..	..	4	1	29	25	..	..
2 Coonoor (M)	2	..	11	1	5	..	..	..	1	4	23	20	..	..
3 Kotagiri (P)	..	..	2	..	1	..	..	..	..	..	..	..	..	..
Total	2	..	28	5	13	1	..	..	15	5	42	35	..	..

VIII. Ramanathapuram district—

1 Virudhunagar (M)	7	4	14	1	5	..	..	..	..	..	..	..	..	..
2 Karaikudi (M)	2	1	2	1	1	..	..	..	..	..	..	..	..	..
3 Devakottai (M)	..	..	8	..	..	..	..	..	..	..	..	..	..	..
4 Rajapalayam (M)	..	..	4	..	1	..	..	..	..	..	..	..	..	..
5 Srivillipattur (M)	1	..	..	..	1	..	..	..	..	..	..	..	..	..
6 Aruppukottai (M)	..	..	4	2	..	..	..	..	..	..	..	..	..	..
7 Sivakasi (M)	1	..	1	..	2	..	..	..	..	..	..	..	..	..
8 Mudukulathur (P)	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9 Kilakarai (P)	..	..	1	..	1	..	..	..	..	..	..	..	..	..
10 Kandanoor (P)	..	..	1	..	..	..	..	..	7	4	10	..	..	..
11 Pallattur (P)	..	..	2	..	..	..	..	..	..	..	..	..	..	..
12 Paramakudi (P)	3	1	11	2	..	..	..	..	..	..	..	..	..	..
13 Ramanathapuram (P)	..	..	3	..	..	..	..	..	..	..	..	..	..	..
14 Rameswaram (P)	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15 Sattur (P)	..	..	9	3	1	1	..	..	..	..	..	..	..	..
16 Sivaganga (P)	..	..	2	1	1	..	..	..	..	..	..	..	..	..
17 Tirupattur (P)	..	..	2	1	..	..	..	..	..	..	..	..	..	..
18 Venkateswarapuram (P)	2	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	16	6	65	13	19	1	3	2	13	7	21	25	11	..

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Number of samples received and found adulterated from Municipalities and Panchayat Boards working the Prevention of Adulteration Act in the Madras State during the period from 1st April 1954 to 31st March 1955—cont.

Serial number and places.	Samples.				Milk.		Ghee.		Butter.		Gingelly oil.	
	Annual quota.	Total received.	Number adulterated.	Percentage of adulteration.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
IX. Salem district—												
1 Salem (M)	288	387	186	48.1	318	174	24	7	1	..	17	1
2 Rasipuram (M)	48	49	29	59.2	41	27	..	..	1	..	1	..
3 Dharmapuri (P)	48	39	14	35.9	12	11	1	1	..	..	10	..
4 Harur (P)	..	48	25	52.1	30	21	..	..	..	..	5	..
5 Idappadi (P)	48	48	28	58.2	43	23	..	..	..	..	..	..
6 Namakkal (P)	48	48	31	64.6	36	23	1	1	..	..	1	..
7 Shevaroy (P)	48	48	9	18.8	44	9	..	..	..	..	1	..
8 Tiruchengode (P)	48	49	36	73.5	49	36	..	..	..	..	..	..
9 Attur (P)	48	47	34	72.3	45	33	..	..	..	..	1	..
10 Mecheri (P)	..	2	..	..	..	..	..	..	..	..	..	..
Total	..	765	392	51.2	618	357	26	9	2	..	36	1
X. South Kanara district—												
1 Mangalore (M)	216	216	75	34.7	132	65	14	2	5	1	9	..
2 Udipi (M)	48	47	29	61.7	44	29	1	..	1	..	..	..
3 Kasaragode (P)	48	48	33	68.7	36	31	1	1	1	..	..	..
Total	..	311	137	44.0	212	125	16	3	7	1	9	..

XI. Tanjore district—

1 Tajore (M)	216	215	107	49.8	131	76	18	9	16	8	19	6
2 Kumbakonam (M)	144	190	114	60.0	187	113	..	..	2	..	..	..
3 Nagapattinam (M)	144	156	59	37.8	102	46	3	..	12	8	25	..
4 Mayuram (M)	96	108	41	38.0	71	28	8	3	2	2	14	..
5 Mannargudi (M)	48	52	33	65.5	41	32	2	1	..	..	6	..
6 Tiruvarur (M)	48	48	27	56.3	34	22	2	..	..	..	2	..
7 Ayyampet (P)	48	49	23	46.9	38	23	..	..	..	..	5	..
8 Arantungi (P)	48	49	28	57.1	28	21	2	1	..	..	13	..
9 Nannilam (P)	48	48	18	37.5	46	17	..	..	1	1	1	..
10 Papanasam (P)	48	48	13	28.3	27	11	..	..	..	..	7	..
11 Pattukottai (P)	48	47	24	51.1	31	17	3	3	..	..	11	..
12 Sirkali (P)	48	50	20	40.0	25	14	2	1	3	3	11	..
13 Tiruvaiyaru (P)	48	46	23	50.0	29	17	1	..	..	..	3	..
14 Tiruturaipundi (P)	48	49	32	65.3	41	29	2	2	..	..	2	..
15 Tiruvidamarudur (P)	48	48	13	27.1	26	8	..	..	..	..	19	..
Total	..	1,201	575	47.8	847	474	43	19	36	23	138	23

XII. Tiruchirappalli district—

1 Tiruchirappalli (M)	360	323	121	37.5	203	88	30	4	6	3	19	2
2 Karur (M)	96	93	47	50.5	83	43	7	4	..	..	..	..
3 Pudukottai (M)	96	97	52	53.6	75	47	3	3	..	..	9	1
4 Srirangam (M)	48	48	25	52.1	25	16	15	7	2	..	..	..
5 Gunaseelam (P)	..	..	..	..	3	..	..	..	..	..	..	..
6 Ariyalur (P)	48	49	12	24.5	31	11	1	..	1	..	7	1
7 Kulitalai (P)	48	47	20	42.6	33	16	5	1	6	2	1	..
8 Lalgudi (P)	48	48	21	43.8	36	18	2	1	..	..	1	..
9 Jayankondam (P)	48	52	36	69.2	47	36	..	..	..	..	5	..
10 Musiri (P)	43	51	17	33.3	36	16	..	..	..	..	2	..
11 Manaparai (P)	48	50	28	56.0	38	27	..	..	..	..	9	..
12 Turaiyur (P)	48	48	17	35.4	22	9	..	..	..	..	7	1
Total	..	910	396	43.5	632	327	63	20	14	5	71	6

REPORT OF THE GOVERNMENT ANALYST, MADRAS

Number of samples received and found adulterated from Municipalities and Panchayat Boards working the Prevention of Adulteration Act in the Madras State during the period from 1st April 1954 to 31st March 1955—cont.

	Coconut oil		Groundnut oil		Coffee		Tea		Sweets		Turmeric		Bhall and flour		Miscellaneous	
	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.
IX. Salem district—																
1 Salem (M)	6	6	2	2	4	4	2	2	10	10	2	2	2	2	2	2
2 Rasiyuram (M)	2	2	1	1	1	1	1	1	4	4	2	2	2	2	2	2
3 Dharmapuri (P)	7	7	1	1	3	3	1	1	1	1	1	1	1	1	1	1
4 Harur (P)	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5 Idappadi (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Namakkal (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Shevaroya (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Tiruchengode (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Attur (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Mecheri (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total ..	21	21	7	7	13	13	3	3	23	23	11	11	5	5	3	3
X. South Kanara district—																
1 Mangalore (M)	7	7	1	1	21	21	1	1	1	1	1	1	1	1	1	1
2 Udipi (M)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 Kasaragod (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total ..	9	9	3	3	23	23	3	3	3	3	3	3	3	3	3	3

REPORT OF THE GOVERNMENT ANALYST, MADRAS

	Coconut oil		Groundnut oil		Coffee		Tea		Sweets		Turmeric		Bhall and flour		Miscellaneous	
	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.
XI. Tanjore district—																
1 Tanjore (M)	8	8	1	1	7	7	2	2	1	1	1	1	1	1	1	1
2 Kumbakonam (M)	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 Nagapattinam (M)	1	1	1	1	4	4	1	1	1	1	1	1	1	1	1	1
4 Mayasam (M)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5 Mannargudi (M)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Tiruvarur (M)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Ayyampet (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Arantangi (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Masulim (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Papanasam (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Pudukkottai (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12 Sirkali (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13 Tiruvallur (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14 Tirukodupundi (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15 Tiruvannamalai (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total ..	31	31	4	4	43	43	3	3	1	1	7	7	10	10	19	19
XII. Tiruchirappalli district—																
1 Tiruchirappalli (M)	7	7	1	1	43	43	1	1	3	3	9	9	2	2	1	1
2 Karur (M)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 Pudukkottai (M)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4 Srirangam (M)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5 Gunaseelam (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Ariyalur (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Kallakurichi (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Lalgudi (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Jayankondam (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Mudali (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Manapal (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12 Tiruvarur (P)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total ..	20	20	1	1	70	70	4	4	5	5	13	13	5	5	4	4

REPORT OF THE GOVERNMENT ANALYST, MADRAS

Number of samples received and found adulterated from Municipalities and Panchayat Boards working the Prevent on of Adulteration Act in the Madras State during the period from 1st April 1954 to 31st March 1955—cont.

Serial number and place.	Samples.			Milk.		Ghee.		Butter.		Gingelly 'oil.		Coconut oil.	
	Annual quota.	Total received.	Number adulterated.	Percentage adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
XIII. Tirunelveli district—													
1 Tirunelveli (M)	216	247	138	55.9	217	124	16	8	3	3	2	1	5
2 Tuticorin (M)	144	225	88	39.1	101	44	5	3	3	1	11	2	6
3 Palayamkottai (M)	96	97	41	42.3	77	33	6	6	3	1	5	2	5
4 Ambasamudram (P)	48	48	18	37.5	17	6	..	..	2	2	3	..	..
5 Melapalayam (M)	48	50	20	40.0	17	6	4	1	..	..	10	4	1
6 Courtallam (P)	48	49	21	42.9	40	21	2	1	..	..	1	1	5
7 Ettayapuram (P)	48	49	10	20.4	15	2	3	1	..	..	4	..	..
8 Kallidaikurichi (P)	48	49	30	61.2	39	23	6	5	2	1	2	..	2
9 Kedayanallur (P)	48	48	27	56.3	30	19	1	..	..	..	..	..	..
10 Kovilpatti (P)	48	48	25	52.1	28	16	..	..	..	..	1	..	..
11 Puliyaugudi (P)	48	49	21	42.9	29	16	..	..	..	..	3	2	..
12 Sankarancoil (P)	48	48	20	41.7	28	14	..	..	..	..	3	1	..
13 Srivaikuntam (P)	48	47	22	46.8	36	17	3	3	..	..	2	1	1
14 Tenkasi (P)	48	48	29	60.4	40	28	1	1	..	..	3	1	..
15 Tiruchendur (P)	48	51	24	47.1	26	15	9	1	..	..	4	1	..
16 Vikramasingapuram (P)	48	50	31	62.0	45	31	..	..	..	..	1	..	..
17 Viravanallur (P)	48	50	24	48.0	44	23	..	..	..	..	4	..	..
Total ..		1,253	689	47.0	839	438	59	31	10	7	61	14	14

Serial number and place.

Serial number and place.	Groundnut oil.		Coffee.		Tea.		Sweets.		Turmeric.		Mustard oil.	
	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.	Total.	Adulterated.
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
XIII. Tirunelveli district—												
1 Tirunelveli (M)	..	..	2	..	4	..	6	..	..	..	1	..
2 Tuticorin (M)	..	..	23	..	19	..	3	..	..	..	38	..
3 Palayamkottai (M)	..	..	7	..	2	..	1	..	..	..	14	..
4 Ambasamudram (P)	..	..	6	..	3	..	1	..	..	..	2	..
5 Melapalayam (M)	..	..	10	..	3	..	..	..	..	..	1	..
6 Courtallam (P)	..	..	4	..	1	..	..	..	..	..	1	..
7 Ettayapuram (P)	..	..	4	..	1	..	..	..	..	..	3	..
8 Kallidaikurichi (P)	..	..	4	..	3	..	3	..	..	..	1	..
9 Kedayanallur (P)	..	..	2	..	7	..	..	..	..	..	4	..
10 Kovilpatti (P)	..	..	10	..	3	..	..	..	..	..	2	..
11 Puliyaugudi (P)	..	..	6	..	2	..	..	..	..	..	1	..
12 Sankarancoil (P)	..	..	4	..	..	..	..	..	..	..	..	..
13 Srivaikuntam (P)	..	..	4	..	1	..	..	..	..	..	..	..
14 Tenkasi (P)	..	..	4	..	..	..	..	..	..	..	..	..
15 Tiruchendur (P)	..	..	1	..	..	..	..	..	..	..	..	..
16 Vikramasingapuram (P)	..	..	1	..	..	..	..	..	..	..	..	..
17 Viravanallur (P)	1	1	1	..	..	..	..	..	..	..	..	..
Total ..	6	1	118	38	48	7	18	3	4	74	23	17

APPENDIX C.

Statement showing the total amount of fines levied, number of convictions, average fine, etc., from 1st April 1954 to 31st March 1955.

(Madras State).

Names of municipalities.	Number of pending cases.	Number of convictions.	Fines in analysis case.	Fines in non-analysis case.	Total fines.	Maximum fine.	Minimum fine.	Average fine.	Average fine 1954-55.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Class A Municipalities.									
1 Madurai	62	272	8,568	77	8,645	100	10	31	32
2 Tiruchirappalli	45	70	3,648	..	3,648	100	5	48	38
3 Coimbatore	52	152	9,108	53	9,161	165	15	60	65
4 Kozhikode	5	92	4,090	..	4,090	100	15	44	44
5 Salem	30	147	3,797	..	3,797	80	10	38	38
6 Mangalore	6	69	3,018	..	3,018	100	20	43	37
7 Ootacamund	9	95	2,200	..	2,200	40	10	29	30
8 Tanjore	3	104	5,058	..	5,058	200	15	45	45
9 Tirunelveli	6	122	4,370	..	4,370	100	5	33	33
10 Coonoor	2	67	2,925	60	2,985	200	10	44	44
11 Oudaloro	..	33	875	..	875	80	1	23	21
12 Kanchipuram	2	71	2,380	..	2,380	70	30	33	33
13 Kumbakonam	9	105	3,512	..	3,512	150	12	23	23
14 Narsipattinam	4	85	1,860	108	1,968	100	10	24	24
15 Palghat	8	76	2,714	..	2,714	120	10	26	26
16 Pollachi	1	64	1,422	..	1,422	100	10	24	24
17 Tuticorin	2	86	5,304	616	5,920	108	10	32	32
18 Vellore	7	57	1,945	..	1,945	75	15	24	24
Class B Municipalities.									
19 Cannanore	..	37	1,036	..	1,036	50	10	22	22
20 Chidambaram	..	30	1,045	..	1,045	100	5	35	35
21 Dindigul	1	33	1,226	..	1,226	80	10	33	33
22 Erode	2	52	2,365	..	2,365	70	5	45	45
23 Karaikudi	..	38	640	..	640	50	10	17	17
24 Karur	30	17	770	..	770	75	25	45	45
25 Mayuram	7	34	1,202	..	1,202	125	10	35	35
26 Palni	26	23	1,000	10	1,010	60	15	36	36
27 Palayamkottai	..	41	1,334	..	1,334	75	30	33	33
28 Pudukottai	1	51	1,940	..	1,940	150	10	33	33
29 Tiruppur	2	58	2,530	..	2,530	100	15	45	45
30 Udumalpet	6	34	1,040	..	1,040	75	10	30	30
31 Villupuram	2	35	965	35	1,000	100	5	33	33
32 Virudhunagar	3	30	1,170	..	1,170	125	10	35	35
Class C Municipalities.									
33 Bodinayakanur	5	16	430	10	430	75	14	27	25
34 Devakottai	..	33	850	..	850	60	5	26	26
35 Rajapalayam	..	19	586	..	586	60	15	31	31
36 Srivilliputhur	15	14	234	..	234	40	12	20	20
37 Tellicherry	3	27	580	..	580	70	5	21	21
38 Tiruvannamalai	1	44	1,608	..	1,608	100	5	36	36
39 Ambur	11	12	350	..	350	50	15	20	20
40 Arni	7	16	296	..	296	40	10	19	19
41 Aruppukottai	..	23	647	119	766	75	9	23	23
42 Chingleput	2	17	905	..	905	100	10	33	33
43 Cochin	3	16	507	..	507	100	15	23	23
44 Dharmapuri	2	30	1,166	..	1,166	100	10	30	30
45 Gobichettipalayam	8	34	2,145	..	2,145	100	20	33	33
46 Gudiyattam	1	7	235	..	235	60	20	23	23
47 Kodalkanal	1	18	365	..	365	100	25	34	34
48 Mannargudi	..	33	1,340	..	1,340	100	30	45	45
49 Melapalayam	2	18	512	10	522	80	30	34	34
50 Mettupalayam	1	43	2,346	18	2,364	115	20	37	37
51 Perakulam	..	22	825	30	855	100	10	31	31
52 Rasipuram	1	28	845	..	845	50	20	21	21
53 Sivakasi	7	12	475	..	475	70	15	39	39
54 Srirangam	2	23	1,010	..	1,010	75	25	45	45
55 Thindivanam	1	22	555	..	555	60	5	25	25
56 Tirupattur	11	7	188	..	188	50	5	27	27
57 Tiruvannamalai	1	26	900	..	900	100	15	34	34
58 Tiruvallur	8	17	920	..	920	160	25	34	34
59 Udipi	5	24	575	..	575	51	10	24	24
60 Vaniambari	7	22	730	..	730	75	10	26	26
61 Walajpet	..	4	62	..	62	30	10	15	15

Statement showing the total amount of fines levied, number of convictions, average fine, etc., from 1st April 1954 to 31st March 1955—cont.

(Madras State).

Names of panchayats.	Number of pending cases.	Number of convictions.	Fines in analysis case.	Fines in non-analysis case.	Total fines.	Maximum fine.	Minimum fine.	Average fine.	Average fine 1954-55.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PANCHAYATS.									
I. South Arcot District—									
1 Arani	..	12	223	..	223	40	10	18	25
2 Arakonam	..	21	1,075	..	1,075	100	30	51	37
3 Arani	..	12	234	..	234	25	14	19	21
4 Ponnur	..	27	1,015	..	1,015	90	30	27	27
II. South Arcot District—									
5 Bhuvanagiri	..	1	405	..	405	40	20	20	23
6 Kalakurichi	..	14	350	..	350	45	10	25	..
7 Nellikuppam	..	17	345	..	345	50	5	21	21
8 Panruti	..	12	441	..	441	50	16	24	29
9 Tirukolur	..	12	535	40	575	90	20	44	28
10 Vriddachalam	..	20	735	..	735	50	15	25	25
III. Chingleput District—									
11 Alandur	..	1	940	..	940	100	15	41	33
12 Maduravakam	..	7	550	..	550	60	20	43	40
13 Poonamallee	..	1	450	..	450	60	15	30	33
14 Panruti	..	27	997	..	997	100	25	37	38
15 Tiruvottiyur	..	12	425	..	425	70	15	25	20
16 Sriperumbudur	..	8	200	..	200	40	20	25	30
17 Avadi	..	2	330	..	330	50	15	26	..
IV. Coimbatore District—									
18 Avanashi	..	12	418	..	418	62	5	23	28
19 Bhavani	..	22	787	25	812	70	20	36	33
20 Kollegal	..	33	1,360	45	1,405	75	25	38	34
21 Kurichi	..	12	595	..	595	100	20	49	33
22 Sathyamangalam	..	29	1,236	80	1,316	70	20	42	41
V. Madurai District—									
23 Alinnagaram	..	1	500	..	500	125	10	29	25
24 Arakkudi	..	11	380	..	380	50	15	34	38
25 Battagundu	..	13	495	..	495	75	15	38	25
26 Chinnamanur	..	13	280	..	280	35	15	21	26
27 Cumbam	..	7	185	..	185	45	15	26	26
28 Melur	..	2	685	35	720	100	10	34	54
29 Nilakottai	..	3	85	..	85	20	15	17	17
30 Sholavandan	..	19	435	5	440	45	15	23	..
31 Tirumangalam	..	15	487	15	502	50	15	31	16
32 Uthirapatti	..	10	125	..	125	50	35	41	32
33 Gudalur	..	1	70	..	70	40	15	23	..
VI. Malabar District—									
34 Badagara	..	2	1,025	..	1,025	35	20	25	25
VII. Nilgiris District—									
35 Kottagiri	..	3	315	..	315	65	25	36	30
VIII. Ramanathapuram District—									
36 Kandamur	..	4	162	..	162	15	12	14	15
37 Kilakarai	..	7	469	..	469	65	25	42	28
38 Pallattur	..	12	240	..	240	35	15	20	20
39 Paravankudi	..	1	415	..	415	110	15	41	25
40 Ramanathapuram	..	12	57	..	57	17	10	14	31
41 Rameswaram	..	5	200	..	200	50	25	43	23
42 Sattur	..	12	660	180	840	100	20	55	30
43 Sivaganga	..	6	232	..	232	40	5	17	28
44 Tirupattur	..	18	781	..	781	90	15	43	34
45 Mudukulattur	..	3	..	..	..	..	..	..	..

Statement showing the total amount of fines levied, number of convictions, average fine, etc., from 1st April 1954 to 31st March 1955—cont.

(Madras State.)									
Name of panchayats.	Number of pending cases.	Number of convictions.	Fines in analysis cases.	Fines in non-analysis cases.	Total fines.	Maximum fine.	Minimum fine.	Average fine.	Average fine 1954-55.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
PANCHAYATS—cont.									
IX. Salem district—									
46 Dharmapuri	9	5	285	..	285	100	35	57	61
47 Idappadi	..	23	715	..	715	80	16	25	18
48 Attur	23	11	350	..	350	50	20	24	25
49 Namakkal	8	23	725	10	735	50	15	23	23
50 Shevaroyas	..	9	225	..	225	40	15	23	23
51 Tiruchengode	7	29	1,795	40	1,835	105	40	23	29
52 Harur	1	24	805	104	909	75	15	23	23
X. South Kanara district—									
53 Kasaragod	3	30	855	..	855	75	5	23	31
XI. Tanjore district—									
54 Arantangi	13	13	470	..	470	60	30	26	29
55 Ayvampet	..	23	751	..	751	60	5	22	25
56 Nannam	..	18	375	..	375	30	10	21	22
57 Papanasam	4	9	250	..	250	50	10	23	23
58 Pattukottai	4	16	660	50	710	75	30	41	50
59 Sirkali	8	16	420	..	420	60	10	26	40
60 Tiruturai	..	32	955	..	955	70	20	30	31
61 Tiruvialmarudur	..	13	455	..	455	100	15	35	54
62 Thuvaiyaru	1	22	1,045	..	1,045	100	20	47	30
XII. Tiruchirappalli district—									
63 Ariyalur	..	12	560	..	560	77	32	47	25
64 Kullitalai	11	9	305	..	305	100	10	24	24
65 Jayankondan	6	30	830	..	830	60	14	28	23
66 Lagudi	1	20	805	..	805	85	20	40	23
67 Manapalai	..	23	1,431	50	1,481	80	30	51	32
68 Musiri	3	14	283	..	283	30	17	20	17
69 Turaiyur	..	17	425	15	510	50	15	29	23
XIII. Tirunelveli district—									
70 Ambasamudram	..	18	560	..	560	80	10	31	31
71 Courtallam	1	20	498	..	498	40	16	25	26
72 Ettayapuram	3	7	150	..	150	25	15	21	15
73 Kadayanallur	4	23	721	70	791	60	15	31	25
74 Kallidai	8	22	885	30	915	100	30	40	25
75 Kovilpatti	4	21	465	..	465	40	10	23	29
76 Pullangudi	..	21	820	..	820	50	5	39	23
77 Sankarankoll	1	19	840	..	840	75	30	44	23
78 Srivalkuntam	..	10	292	75	367	65	10	29	23
79 Tenkad	12	29	1,135	..	1,135	80	16	39	23
80 Tiruchendur	3	21	570	25	595	60	15	27	31
81 Vickramasingapuram	9	22	795	..	795	80	25	36	30
82 Viravanallur	2	22	695	..	695	70	15	31	30



DEPARTMENT OF HEALTH, EDUCATION AND LOCAL ADMINISTRATION

(Health)

G.O. No. 1924, 12th June 1956

Administration Report—King Institute, Guindy—1954-55—Reviewed

READ—the following papers :—

From the Director of Medical Services, dated 21st February 1956,
Ref. No. P. 45-N/56.

From the Director of Medical Services, dated 14th May 1956,
Ref. No. P. 45-M/56.

Order—No. 1924, Health, dated 12th June 1956.

Recorded.

2. *Vaccine lymph section.*—During the year under report, 1,35,906 millions of Glycerinated vaccine lymph was manufactured as against 210,462 millions for the year 1953-54 and a total quantity of 5,617,140 doses (as against 5,180,450 doses for the year 1953-54) of Glycerinated vaccine was issued to the field after the usual test of purity etc. The production of vaccine was suspended during February, 1955 due to the diseases of the calves.

3. *Serological (Diagnostic) Section.*—There was a slight fall in the total number of specimens tested during the year 1954-55 as specimens of the Government Stanley Hospital and Government General Hospital, Madras, were sent to the Venereal Diseases Department of Government General Hospital, Madras, for V.D.H.L. slide flocculation tests. This section participated in the Inter Laboratory Evaluation of Serological tests of the Indian Council of Medical Research under Dr. R. V. Rajam, Officer-in-Charge of Inter Laboratory, Evaluation of Procedure for Serological test for syphilis for 1954-55.

4. *Clinical Section.*—15,438 specimens were received for Microscopical, cultural and Agglutination tests as against 15,955 specimens received during 1953-54. This decrease is due to low incidence of cholera in Madras and Andhra States during the year.

5. *Department of Antitoxin.*—2,255 litres of plasma were processed for serum production. Further preliminary experiments were conducted by paper chromatography for the analysis of serum proteins and for examination of the essential Amino Acids in the cultural media for Tetanus Toxin.

6. *Blood Bank.*—The Blood Bank department took part in the exhibitions held during the year at Mayuram, Kumbakonam, Salem and Madras. A Mobile Blood Bank from the King Institute, Guindy collects blood from the inmates of the Central Jail at Ouddalore and Penitentiary, Madras for utilising the same for plasma processing. Seventeen Medical Officers underwent the Blood Bank Training during the year.

7. *Water Analysis section.*—Samples of water received from water-supply schemes under investigation were tested for determining their suitability for use for drinking and domestic purposes. A sum of Rs. 7,742-7-9 was received as charges for the analytical work undertaken from private bodies.

8. *Food analysis and drug analysis section.*—The total number of food samples and drugs analysed in the Government Analyst's Laboratory during the year was 19,734 and 531 respectively as against 10,203 and 152 respectively in the previous year.

Adulteration of foods and drugs has not shown any sign of decrease. General.—The work of the Institute continued to be satisfactory.

(By Order of the Governor)

K. GHULAM MAHMOOD,

Additional Secretary to Government.

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To the Director of Medical Services.

.. the Director of Public Health.

.. the Sanitary Engineer (through Chief Engineer, P.W.D. (General).)

.. the Director of King Institute, Guindy (through the Director of Medical Services).

.. all Presidents of District Boards.

.. all Commissioners, of Municipalities (through the Chairmen).

.. the Commissioner, Corporation of Madras (through the Mayor).

.. the Accountant-General.

.. the Inspector of Municipal Councils and Local Boards.

.. the Inspector-General of Prisons (through the Home Department).

.. the Principal, College of Engineering, Guindy.

.. the General Manager, Southern Railway (with covering letter).

.. the Librarian, Legislature Assembly Secretariat.

.. the Librarian, Secretariat Library.

.. the Home Department.

.. the Public (General) Department.

.. the Director, Pasteur Institute, Coonoor.

.. the High Commissioner for India (with copies for India Office, Ministry of Health, British Museum).

.. the Madras Medical Association.

.. the Madras University.

.. the Annamalai University.

.. the Connemara Public Library, Madras.

.. the Madras Chamber of Commerce, Madras.

.. the Southern India Chamber of Commerce.

.. the Government Analyst, Madras (Analyst's report only).

.. the Secretary to the Government of Andhra, Health and Local Administration Department, Kurnool (with covering letter).

.. the Government of Mysore, Health and Local Administration Department, Bangalore (with covering letter).