



सत्यमेव जयते

GOVERNMENT OF MAHARASHTRA

ANNUAL REPORT
OF THE
HAFFKINE INSTITUTE
FOR THE YEAR
1958

BOMBAY
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THE HAFFKINE INSTITUTE, BOMBAY

MEMBERS OF THE STAFF

(As on 31st December 1958)

Director

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Assistant Directors

Dr. A. K. Hazra, M.B.B.S. (Bom.), D.T.M. (Cal.), Assistant Director in-charge, Department of Antitoxins and Sera.

Dr. N. K. Dutta, M.B. (Cal.), D. Phil. (Oxon.), Assistant Director in-charge, Department of Pharmacology.

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Dr. C. V. Deliwala, M.Sc. (Bom.), Ph.D. (Bom.), Assistant Director in-charge, Department of Chemotherapy.

Dr. A. N. D. Nanavati, M.D., Assistant Director in-charge, Department of Virus Diseases including Rabies (from 6th November 1958).

Assistant Director in-charge, Department of Vaccines (Post vacant)—charge held by Dr. H. I. Jhala, M.D. (Bom.), F.C.P.S. (Bom.), D.T.M. (Cal.), (from 6th November 1958).

Heads of Sections

Dr. (Smt.) Alamela Venkatraman, B.A. (Madras), M.Sc. (Madras), Ph.D. (Madras), Senior Biochemist, Biochemistry Section.

Dr. K. V. Kulkarni, M.B.B.S. (Bom.), Medical Officer, Blood Bank Section.

Dr. A. E. Kulkarni, G.B.V.C. (Bom.), Senior Veterinary Surgeon, Animal Laboratory.

Administrative and Auxilliary Sections

Shri P. K. Sholapurwalla, B.Sc. (Bom.), LL.B. (Bom.), Business Manager.

Shri B. O. Shah, B.Com. (Bom.), Cost Accounts Officer.

Shri S. C. Merh, B.Sc., Stores Officer.

Shri Shankar Rao, Personal Assistant to the Director.

Shri M. T. Jagtiani, B.A., Office Superintendent.

Shri T. V. Ranganathan, B.A. (Madras), Cost Accounts Officer (15-11-58 to 31-12-58).

Shri A. R. Dhavlikar, Accounts Superintendent.

Shri N. Lakshminarayana, L.M.E. (Mysore), L.E.E. (Mysore), Maintenance Engineer.

Library

Shri K. N. Pai, B.Sc. (Bom.), B.T. (Bom.), S.T.C. (Bom.), Dip. Lib. (Bom.), Librarian.

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REPORT OF THE HAFFKINE INSTITUTE. FOR THE YEAR 1958

I. GENERAL REVIEW

The year under review has been a period of considerable activity at the Institute. Early in the year Government decided to hold Diamond Jubilee Celebrations of the Institute on 10th January 1959. As a prelude to this occasion intense work of organization had to be undertaken throughout the last half of the year, so as to make the occasion a success.

Repairs to the buildings were overdue and P. W. D. undertook replastering, guniting, flooring, painting and other major works. This resulted in some dislocation of working but has ultimately yielded large dividends. The Institute building now stands completely renovated. Its laboratories have been properly placed in optimal working conditions. No new buildings were added during the year. The Hindustan Antibiotics Bottling Plant vacated their premises in June 1958 and the same was commissioned for make-shift arrangements during the building operations in the latter half of the year. A small depot has been leased for a period of 5 years to M/s. Hindustan Antibiotics in the Engineering-Carpentry Shed of the Institute on the premises. Special provision for an air-conditioned tissue culture laboratory was made and it started functioning this year.

There appears to be continued difficulty regarding obtaining qualified staff for manning senior posts. Dr. A. N. D. Nanavati joined as Assistant Director in the Department of Virus Diseases in November 1958. Shri S. C. Merh, B.Sc., joined as Stores Officer. Dr. (Smt.) Alamelu Venkataraman, Shri J. G. Bhatt, Shri H. K. Mhatre proceeded abroad for further training. Shri Mhatre returned to his original post of Junior Bacteriologist in the Toxin Laboratory of the Serum Department. Shri C. J. Mehta returned to his original post of Assistant Chemist (Inspector) in the Pharmacology Department after taking his M.S. Degree in U. S. A.

During the year Government of Bombay appointed a high-power Scientific Advisory Committee to advise Government on research and development of the Haffkine Institute. The members are : Lt. Col. Jaswant Singh, Director-General of Health Services, Government of India, New Delhi (Chairman); Maj. Gen. S. S. Sokhey, Ex-Director, Haffkine Institute; Dr. C. G. Pandit, Director, Indian Council of Medical Research; Dr. B. Mukerji, Director, Central Drug Research Institute, Lucknow; Dr. V. R. Khanolkar, Director, Indian Cancer Research Centre; Lt. Col. S. L. Kalra, Pathology Department, Armed Forces Medical College, Poona and Dr. Y. S. Narayana Rao, Director, Institute of Preventive Medicine, Hyderabad (Dn.) and the Director (Secretary). We welcome the members and look forward to their valuable guidance during the tenure of their office. Committee met in October and most of their suggestions have been adopted in principle by the Government. Government of Bombay appointed another Committee to look into the question of separation of large scale manufacture at the

Chemotherapy Department from the activities of the Institute. The Committee held its sittings at the Institute and have made certain recommendations which have also been accepted in principle by the Government.

Government of Bombay also appointed an Executive Committee of the Haffkine Institute Diamond Jubilee Celebrations of which H. E. the Governor of Bombay, Shri Sri Prakasa and the Chief Minister Shri Y. B. Chavan were Patrons. Dr. Jivraj N. Mehta, Minister for Finance was the Chairman of the Executive Committee and Shri M. S. Kannamwar, Minister for Health was Chairman of the Reception Committee. A number of prominent officials and non-officials were associated with the Committee.

Meetings of the Narcotic Committee and the Units of Indigenous Drug Research were held at the Institute under the auspices of the Indian Council of Medical Research during the year. Increasing assistance was available for research from various sources as report will indicate.

Institute supplied large amount of typhoid vaccine to Ceylon and Cholera vaccine to Thailand during epidemics, through World Health Organization. During the year there was an epidemic of Encephalitis in various parts of the country. The Institute offered assistance and participated in deliberations held under the auspices of the Indian Council of Medical Research. Influenza vaccine prepared at the Institute was released for distribution. Demands even now continue to be made on this Institute for this vaccine. The demand for cholera vaccine was unusually high ; the demand for plague vaccine has continued to be low. It has not been possible to fully comply with the indents of sera and antitoxins and dry plasma. Process for making triple vaccine in the Institute is finalised.

At Pimpri, 48 quarters for Class IV members of staff and 30 stalls for horses have been built for extending facilities for increased production of sera. Due to restriction of import, the Institute was faced with the problem of increased production. It is gratifying to note that there was no increase in the price-structure inspite of fluctuating market position.

A training programme was undertaken for training Technicians in medical laboratory technology. Sixteen candidates were admitted and they are undergoing training at the Institute.

It is gratifying to note that activity, publicity and facility for research have shown steady progress during the year, as some of the routine load has been taken off from certain departments. It has not yet been possible to eliminate all elementary work from the Institute as creation of alternate facilities elsewhere did not come up in time.

Director has been elected as Member on the Governing Body of the Indian Council of Medical Research and Executive Council of the Indian Institute of Biochemistry and Experimental Medicine, Calcutta. Dr. N. K. Dutta has become a Member of the Drug Technical Advisory Board. He also participated in the Symposium on "Chemotherapy of Viruses at Central Drug Research Institute, Lucknow".

Government of Bombay abolished routine diagnostic tests that were being performed for certain institutions and medical practitioners in Bombay from being carried out at this Institute of routine elementary type of investigations and permit concentration on investigations in specialised fields. The out-door department for antirabic treatment has also been closed down at the end of the year, as sufficient number of antirabic treatment centres are now in existence in the City. The Public Health Laboratory work of testing water supply, milk, ghee and other food samples has also been discontinued.

Animals continue to be in short supply. Demands have increased because of increased productive activity necessitating increased testing in animals. Owing to enforcement of strict drug control in the bigger Bombay State, the number of samples received for analysis have increased. In order to cope with this testing, specimens for analysis of drugs from private parties and from other States have been curtailed to a large extent. The Institute still continues to test samples needing special tests and entailing use of laboratory animals. The Institute also continues to give free diagnostic aid for communicable diseases as hitherto.

Training in productivity and cost accountancy was imparted to the staff of the Business Management Section by deputation to special courses.

The Institute participated in the INDIA 1958 Exhibition held at Delhi and the activities of the Institute as depicted in the cut-outs and other models were highlighted to acquaint the public with the activities of the Institute. The work was well appreciated from all quarters.

It is sad to record untimely demise of Lt. Col. J. R. Dogra (retired I.M.S.) who was associated with the Institute for a very long time as Assistant Director. Dr. R. G. Sathe, retired Senior Veterinary Surgeon also passed away during the year. We record also the untimely demise of the following members of the staff:—

- (1) J. Mavlankar, Laboratory Attendant.
- (2) Rajpat Rambharam Tiwari, Watchman.
- (3) Mahadu Tanu Mohite, Laboratory Assistant.
- (4) Sukhan Nohar, Syce.
- (5) Shri Pandu Tanu, Syce.

Sports Club was started in the year on an organised basis. Co-operative Society continued its good progress.

Director is thankful to all the members of the staff for their continuous wholehearted co-operation all the time. Several committees of the Institute, such as Staff Committee, Sports Committee, Canteen Committee, P. W. D. Committee, Workers' Committee, Chawl Committee, Animal House Committee, Library Committee, etc., have been very active in making consideration and in implementation of the policy. Valuable suggestions of economic importance were received from Shri R. G. Joshi, the clerk at the Institute.

II. DEPARTMENT OF ANTITOXINS AND SERA

GENERAL

Sera and antitoxins continued to be in short supply and the country has still not achieved self-sufficiency in these vital biologicals. Envisaged expansion of Pimpri is slowly taking place. Thirty-six Indian horses and 30 Australian horses were added during the year. Scientific and technical work for the production of Triple Vaccine are in final stage and as soon as new constructions by way of increased space and other facilities for large scale production are ready, Triple Vaccine for combined prophylaxis of Tetanus, Diphtheria and Whooping Cough will be possible to be released for public use.

Academic Activities.—Kumari L. S. Kadaba completed her work for M.Sc. in Biochemistry by research on "Biochemical Studies in Venoms of Poisonous Snakes of India". Kumari V. N. Wakis and Kumari S. L. Shah joined the Department for post-graduate studies in Biochemistry and have started working on "Studies in Anticoagulant Activity of Cobra Venom" and "Purification of Antitoxic Sera" respectively. Dr. R. W. P. Master worked on the Isolation of Biologically important Constituents of Venom in a C. S. I. R. Research Scheme up to 30th June 1958 and as Bombay Government Scholar on the same problem, thereafter.

Training of Workers.—The Department took part in the training of 16 students in the Technicians' Training Course as well as in imparting training to four students, who joined for elementary training in the Department. Dr. N. B. Kuppurajan, Assistant Director-designate, Department of Antisera, King Institute, Madras, received training for three months from 27th June 1958 to 25th September 1958 in the large scale preparation of toxins, toxoids and antitoxins. Shri H. K. Mhatre, Assistant Bacteriologist of this Institute was deputed by the Bombay Government to undergo a course of training in production of Diphtheria, Tetanus and Pertussis prophylactics at the Biogena Institute, Prague, Czechoslovakia.

RESEARCH ACTIVITIES

The anticoagulant action of cobra venom in human and horse blood is being investigated. Pure preparation of Fibrinogen and Prothrombin have been prepared from human and horse sera for these investigations. Preliminary results indicate that the venom has an Antithrombin-like action.

New chromogenic substrates have been prepared for detection and location of enzymes in venom after separation by starch electrophoresis. Cholinesterase was easily detectable by the use of indophenolacetate, aliesterases by 2:6 dichlorophenol-indophenol butyrate and lipases by 2:6 dichlorophenol-indophenol stearate.

The optimum pH of cobra venom aliestrerase using phenyl butyrate as substrate was found to be pH 9.0. The effect of various anions and cations on this enzyme was studied. The enzyme was completely destroyed when heated at 60°C for 30 minutes, and is very heat labile,

The venoms of cobra and Russell's viper when tested for various enzymes showed the presence of dopa oxidase and decarboxylase which have not been reported so far. The decarboxylase could produce histamine from histidine as found by paper chromatographic technique. This is being verified by pharmacological methods.

The work on purification of antitoxins by enzyme digestion methods has been continued. It has been observed that higher recovery and more regular results can be obtained if digestion with Pepsin is carried on with precipitate obtained by 50 per cent. ammonium sulphate saturation of plasma than by digesting the plasma directly. The optimum concentration of pepsin, temperature of digestion and time of digestion and thermocoagulation have been worked out. Diphtheria plasma in lots of 2-4 litres purified by this process have given recovery of 55 to 60 per cent. with higher purity than that obtained with the existing ammonium sulphate purification method. Large scale trial will be undertaken shortly. Further studies on use of different enzymes and a combination of enzymes are in progress.

The possibility of recovery of antitoxic globulin from the waste products by extraction and digestion with enzymes was investigated. For this the euglobulin fibrinogen precipitate obtained after 28 per cent. saturation of ammonium sulphate and precipitate of euglobulin obtained after Isoelectric precipitation were dissolved in distilled water and normal saline, respectively and antitoxin was recovered by Pepsin digestion at pH 3.2. The recovery of antitoxin from 28 per cent. precipitate was found to be 5 per cent. of the total of the total concentrated antitoxin recovered by the usual process and from Isoelectric precipitate only 2 per cent. was obtained. The total recovery was thus about 7 per cent. Experiments on large scale will be undertaken shortly to study whether such recoveries prove economical.

Experiments were carried out to study the bacterial flora of Russell's viper venom and to find out a suitable preservative for venom solutions. The presence of sporebearing organisms with terminal and subterminal spores was detected. The organisms have been isolated. Morphologically it is a thick rod giving terminal or subterminal spores. It was nonpathogenic to mice. The strain is under further study.

Venom solutions were preserved with 1 : 10,000 merthiolate and 1 : 10,000 chinocol buffer and were tested for sterility. It was observed that aerobic nonsporing organisms are eliminated by merthiolate while the chinocol does not kill the organisms. The anaerobic spore-bearing organisms are equally resistant to both the preservatives.

Studies on the venom of King Cobra were carried out. The M. L. D. of the King Cobra venom as supplied by Entomology Department for mice of 20 gm. weight was determined which was found to be only 0.05 mg. of dried venom, by intravenous route, which is not more lethal than that of Cobra.

Neutralization tests with polyvalent antsnake venom serum showed that 1 ml. of this serum can neutralise 0.5 mg. (20 mld.) of this venom as compared to that of 0.8 mg. (90 mlds.) of Indian Cobra (*Naja naja*). Gel diffusion technique also showed that there were four common antigens between Indian Cobra venom and King Cobra venom. The gel diffusion technique used with King snake serum, Cobra venom and Polyvalent antivenin indicated that snake serum and snake-venoms may have some antigenic relationship, so far as lethal factors are concerned.

In view of the reported susceptibility of tissue cultures to diphtheria toxins it is proposed to utilise the available facilities to study the phenomena and if possible to find out, if any, the possibility of utilising the findings for further studies of the properties of Diphtheria Toxin.

The cytopathogenic changes are being studied with a view to assess their comparative value such as in respect of reactions observed in cutaneous tissues by the method in vogue for M. R. D. tests.

Experiments are underway to ascertain the specificity of the reactions, by studying cytopathogenic effects with heated toxoids and with toxoids after neutralizing the formalin content. It is also proposed to study the role of specific antitoxins in neutralization of such cytopathogenic effects.

Studies on ear discharges made on material referred from clinical cases, revealed presence of toxogenic strains of *CI. tetani* as established by animal inoculation and specific neutralization with Antitoxin.

Studies on growth requirements for *H. pertussis* for purposes of preparation of combined antigen with Tetanus and Diphtheria toxoids were made using a modified Bordet Gengou medium with the incorporation of Yeast dialysate and cystin with suitable alterations in their proportions.

Studies on the use of Casein hydrolysate medium to obtain satisfactory growth are underway.

Methods for purification of Toxoids are being studied.

ROUTINE

The quantities of toxins and toxoids produced are given below :—

Type of Toxins and Toxoids.				Quantity in ml.
Tetanus Toxin	..	..	..	9,26,100
Diphtheria Toxin	..	..	..	3,14,275
Welchii Toxin	..	..	..	67,000
Oedematiens Toxin	..	..	..	23,500
Septique Toxin	..	..	..	23,000
Tetanus toxin converted to Toxoid	..	..	..	3,47,900
Diphtheria Toxin converted to Toxoid	..	..	..	69,175

The total volume of concentrated serum produced during the year was 18,23,600 ml. as against 17,17,600 ml. in 1956. The quantities of the various sera produced are given below :—

Type of Sera.	Quantity in ml.
1. Concentrated Sera—	
Tetanus Antitoxin	10,18,600
Diphtheria Antitoxin	2,46,800
Antivenene	3,26,800
Hyperimmune Rabies Serum	3,800
Gas Gangrene Antitoxin	2,27,800
Total ..	18,23,600
2. Normal Sera—	
Normal Horse Serum	39,600
Total ..	39,600

During the year, the department supplied 11,15,955 ml. of Tetanus Antitoxin, 2,38,179 ml. of Diphtheria Antitoxin, 3,52,060 ml. of Antivenene, 87,730 ml. of Gas gangrene antitoxin and 2,070 ml. of Normal Horse Serum. The volume of Toxoids issued was, 66,956 ml Tetanus Toxoid and 61,181 ml. Diphtheria Toxoid.

III. DEPARTMENT OF CHEMOTHERAPY

GENERAL

Academic Activities.—In addition to the previous two students registered for postgraduate degree of M.Sc. in Organic Chemistry, one additional student was enrolled during the year. Two Unichem Research Scholarships continued to be operative in the Department. Training in the Department was given to one Industrial trainee and eight private trainees. The Department participated in the Technicians' Training Course started for the first time during the year under review. In all, 12 lectures were delivered on the subjects related to the department. Suitable practical training was also given in the subjects.

RESEARCH ACTIVITIES

Patent application made in the previous year for the preparation of p-nitroacetophenone was accepted by the Patent Office during this year (Indian Pat. No. 62481). Further work on the analogues of chloramphenicol was continued and several new derivatives of thiazole, pyrazole and pyrimidine having the significant functional groups present in Chloramphenicol were synthesised. These compounds are being screened for their *in vitro* and *in vivo* activities.

During the study on oral antidiabetic sulphonylureas, a new and economical process for the desulphurisation was developed whereby tolbutamide can be prepared by the desulphurization of N^1 -p-methylbenzenesulphonyl- N^3 -n-butylthiourea, with the help of hydrogen peroxide in place of heavy metal oxides or salts normally used. A patent application to cover this process has been filed. Work on mesoxalic acid and its esters was continued to eventually study their effect as antidiabetic compounds.

New thiourea derivatives of the type $R \cdot SO_2 \cdot NH \cdot CS \cdot NH \cdot R'$ were synthesised to study their antitubercular properties. Various routes for the synthesis of 5-bromosalicylhydroxamic acid another compound reported to show antitubercular activity were also investigated. Preparation of various N^1 -aryl- N^4 -alkyl-thiosemi-carbazides was undertaken.

In the field of anticonvulsant compounds, various pyrazoles with substitution in 3 and 4 positions were synthesised.

A comparative study of sulphamethoxy-pyridazine with sulphadiazine in experimental plague in mice was carried out. It was shown that sulphadiazine treated mice survived for a longer time than those treated with sulphamethoxypyridazine.

A liquid medium containing the specific growth factor isolated from egg yolk was studied for use in the *in vitro* tubercular testing with virulent bacilli. A comparative study carried out between this medium and the one recently published by T. Ramkrishnan et al (Yousmans media with coconut water) showed that the media containing egg fraction is better of the two for *in-vitro* testing. Antitubercular testing on a very limited scale was begun by the end of the year and of the compounds tested, some isonicotinoyl hydrazones and other compounds indicated promising *in vitro* activities.

ROUTINE

The department continued to manufacture and supply Vitamin, Sulpha drugs and Quinine preparations to hospitals and dispensaries of Government and Municipalities and to the Employees State Insurance Scheme. All the demands were fully met. The table given below shows the products supplied during the year :—

Serial No.	Products	No. of Tablets issued.
1	Vitamin AD Tablets	68,39,200
2	Vitamin AD (Spl.) Tablets	1,32,000
3	Vitamin A Forte Tablets	52,500
4	Vitamin AD Forte Tablets	9,53,604

Serial No.	Products.			No. of Tablets issued.
5	Vitamin BC Tablets	..	..	1,07,39,880
6	Vitamin BC No. 3 Tablets	..	..	9,74,900
7	Vitamin B1 Tablets	..	..	9,99,040
8	Vitamin B2 Tablets	..	..	1,13,300
9	Vitamin C Tablets	..	..	14,02,458
10	Acid Nicotinic Tablets	..	..	3,33,360
11	Nicotinamide Tablets	..	..	30,000
12	Multivitamin Tablets	..	..	68,25,358
13	Vitamin K Tablets	..	..	22,850
Total				2,94,18,540
1	Sulphathiazole Tablets	..	..	33,81,775
2	Sulphadiazine Tablets	..	..	62,80,325
3	Sulphaguanidine Tablets	..	..	25,53,375
4	Quinine Sulphate Tablets	..	..	4,11,800
5	Magnesium Trisilicate Tablets	..	..	1,12,100
Total				1,27,39,375
1	Pemon	..	..	14,395 lbs.
2	Sulphanilamide Paste	..	..	272 lbs.
3	Solapsone Strong B. P. C. Solution	..	..	37,450 ccs.

A large stock of sub-standard Quinine Sulphate as disposal item from the Director-General Armed Forces Medical Stores, was obtained for purification and conversion into B. P. grade Quinine Sulphate. About 465 lbs. out of this material was purified and used in the manufacture of tablets. By this purification, the Department contributed towards prevention of loss of valuable material.

The Analytical Section of the Department carried out nearly 2,000 analysis during the year under review. This includes the testing of raw-materials intermediates and finished products. Micro-analysis (347) of compounds synthesised by the Department were also undertaken.

IV. DEPARTMENT OF CLINICAL PATHOLOGY AND DIAGNOSTIC REAGENTS

GENERAL

Staff.—Technicians Shri U. I. Shaikh, Shri A. V. Kutianawala and Kum. I. M. Ullal, left their posts during the year. Shri M. S. Sant and Kum. Yesodhara K. Nair joined the department as Technicians.

Academic Activities.—Kum. I. R. Ovalekar and Kum. M. C. Patel, continued their work for post-graduate degrees.

Training of Workers.—The Department participated in the new programme of Technicians Training Course started from 16th August 1958. All the batches of the Trainee-Technicians were given intensive training in both theory and practicals of the routine clinical diagnostic tests carried out in the department.

Among those who underwent training in the department were : Shri Prasan Rajendra Vachrajani, Shri K. Gopal of M/s. Raptakos Brett & Co., Bombay, Shri Gulam Nabi Mateen, a. W. H. O. Fellow from Kabul, Shri K. M. Cherian, Central Railway Hospital, Byculla, Shri M. M. Kothavle of M/s. Bombay Chemicals (Private) Ltd., Bombay, Kumari S. R. Chinoy, Kumari U. V. Rege of Central Railway, Bombay V. T., Mr. Mir Mohd. Hadi, another W. H. O. Fellow from Afghanistan. Dr. Dragsljub Sovrlich from Yugoslavia was here as an Observer specially for plague and cholera and other infectious diseases on Exchange of Scholarships (India-Yugoslavia Programme).

RESEARCH ACTIVITIES

Study on various epidemiological features of Salmonellosis is under progress. Problems under study are :—

(1) The phage-typing of all strains of *S. typhi* and *S. paratyphi A* routinely isolated, and by attempts to isolate phage types if any in these cultures.

(2) Examination of human stools, animal faeces, laboratory animal colonies and various articles of food which are likely to be vehicles of infection.

Continued attempts to prepare a stable antigen with *T. pallidum* for agglutination and skin tests did not prove successful.

A study has also been commenced to find out the types of *Escherichia* involved in infantile diarrhoea.

An investigation is in progress to find out the antigenic pattern of the different components of Cholera Vaccine, viz.,—the supernatant fluid, the leposit and Ammonium Sulphate precipitated extract in various solvents.

Under the Indian Council of Medical Research, a Survey on Industrial Workers for the incidence of Veneral Infection was started. From a local mill 392 blood samples were tested by Kahn and V. D. R. L. tests and showed 84 active sera. Out of 248 sera samples received from Ratnagiri (relations of workers in the City) 15 were reactive. This survey is still in progress.

With the reorientation of the policy of the Institute, in general, with special emphasis on more research and higher type of diagnostic work, tests for which facilities are available elsewhere, were discontinued gradually from 1st April 1958. With the discontinuance of such routine tests, special and higher types of tests can now be undertaken in the department.

ROUTINE

During the year, the department continued the routine activities viz. (i) conducting bacteriological, serological, microscopic and biological tests on all clinical materials received from Government hospitals and other institutions; (ii) preparing, stocking and supplying of various diagnostic reagents, stains, and snake venom solutions; (iii) carrying out the histopathological examinations of biopsy materials and pathological tissues; (iv) preparing autogenous vaccines; and (v) conducting special tests, such as Rideal Walker test, pregnancy test, Frie's test, Tuberculin test.

General Bacteriological Work.—As before, all the essential tests for the detection of infectious diseases like Diphtheria, Cerebrospinal fever, Enteric group of fevers, Typhus, Plague, Cholera, Tuberculosis (pulmonary) etc., were conducted free of charge.—

The number of routine examinations carried out during the year are as shown under :—

I. Serological Examinations—

(i) Wasserman Test	..	..	..	..	1,946
(ii) Kahn Test	..	..	..	..	1,058
(iii) Triple Widal Test	..	..	..	..	2,020
(iv) Agglutination Test for—					
(a) Typhus	..	..	..	..	2,020
(b) Brucellosis	..	..	..	..	2,020
(c) Leptospirosis	..	..	..	..	30
(d) Paul-Bunnell Test	..	..	..	..	4

II. Bacteriological and Biological Tests—

(i) Clot culture for enteric group	..	..	..	2,020
(ii) Urine culture for pathogenic organisms	..	..	..	55
(iii) Throat swabs for Diphtheria	..	..	..	399
(iv) Stools and rectal swabs for culture	..	..	..	40
(v) Sputum and body-fluids for AFB by smear culture and animal inoculation tests.				666
(vi) Blood culture routine	..	..	..	22
(vii) Preparation of autogenous vaccine	..	..	..	57

III. *General Microscopic Examinations—*

(i) Blood films	50
(ii) Blood cell counts—	
(a) RBC	611
(b) WBC	758
(c) Differential Count	810
(d) Haemoglobin	593
(iii) Bone Marrow	3
(iv) Semen	40
(v) Material for smear and examination (presence of pathogenic organisms like G. C., etc.)	16
(vi) Stool	461
(vii) Urine	375

IV. *Prothrombin Tissues Estimation.*

V. Pregnancy Test	908
VI. Rideal Walker Test	75

The Government of Bombay Typhoid Scheme.—The scheme was continued for the eleventh year. Four hundred and twenty-seven calls (427) from Private Practitioners were attended to. A significant diminution in the number of calls received was partially due to the false impression that was carried with the stoppage of routine tests. As before, the samples were collected for culture and triple widal test. All positive cases of typhoid group were reported to the Executive Health Officer, Bombay Municipality, to enable him to take the necessary preventive measures at the earliest opportunity. 36.6 per cent. of cases were positive. The largest number of calls were during January and March 1958.

The total number of samples examined for widal test and clot culture were 2,024. Of these, Widal test was positive in 632 and culture in 84 (*B. typhosus* in 75 and *B. paratyphi A* in 9).

Diagnostic Reagents Section.—The supply of various reagents to laboratories all over Bombay State and outside was continued. The demand for these reagents had been more. The issue for the year are under :—

	ml.
(i) Killed suspensions for Widal and Weil-Felix Tests ..	1,99,770
(ii) Blood Grouping Sera	15,167
(iii) High Titre Sera and Amboceptor	1,097
(iv) Kahn Antigen	10,500
(v) W. R. Antigen	400
(vi) Russell's viper and Cobra venom solutions ..	1,646
(vii) Biological stains	2,56,200

Histopathological Section.—During the year under review, 2,893 pathological specimens, received from different hospitals in the State of Bombay and a few from outside the State were examined and reported upon. These included brain tissues from suspected rabid animals, neoplasms, gynaecological conditions and some rare and interesting pathological specimens. The total number of blocks cut were 4,192.

The interesting specimens received during the year were as follows: —

- (i) A bone biopsy showed appearances of 'Multiple myelomatosis'.
- (ii) There were two specimens of growth from upper eye-lid showing characters of a 'Sweat Gland Carcinoma'.
- (iii) A specimen of breast biopsy showed evidence of Intraductal papillomatosis undergoing malignancy'.
- (iv) A specimen of an ovarian tumour showed the characters of a 'Malignant Teratoma'.
- (v) Sections of a mass from retroperitoneal tissue showed the features of an 'Adenocarcinoma of Pancreas' with metastatic deposits in the lymph node.
- (vi) Biopsy from the fimbrial end of the fallopian tube showed appearances of 'Papillary adenocarcinoma'.
- (vii) A specimen of tumour from breast showed the appearance of a 'Fibrosarcoma'.
- (viii) A biopsy of an excised growth from eyeball showed the features of a retinoblastoma.
- (ix) A tumour from lower thoracic region showed histological characters of a neurofibroma undergoing malignancy.
- (x) A lump from the left gluteal region showed the characters of a "Myogenic Sarcoma".

V. DEPARTMENT OF ENTOMOLOGY

GENERAL

The Assistant Director was deputed to conferences in India. He was sent to collect snakes in Madras, Mysore and Saurashtra. Shri G. Bhaskaran, M.Sc., joined the Department in June 1958 as a Research student.

Academic Activities.—Two post-graduate students completed their research work for M.Sc. degree and one for Ph.D. degree, is continuing his work.

Training of Workers.—Technical training course was inaugurated. Lectures were delivered to them on medical and industrial importance of Zoology and as well as the general portion of Entomology. Practicals also were conducted.

RESEARCH ACTIVITIES

Experiments were done and observations made to find out whether fleas have pool feeding or capillary feeding. A technique was developed to kill the fleas while they were feeding on mice. By this technique it was possible to observe the movement of the proboscis. The indication so far has been that there is a certain amount of elasticity at the tip of the proboscis which guides it to the blood vessels.

Body-louse experiments done on behalf of the WHO have shown that the lower concentration of DDT and BHC do not give 25 per cent. mortality to these insects. Pyrethrum gives even in lower concentration more than 75 per cent. knock-down.

House-flies were bred in large numbers after isolating the common house-fly *Musca domestica nebulosa*. The glands responsible for the pupation and for the emergence of the adult fly have been studied. The former gland has been isolated and experiments have been done to induce premature and late pupation. Further studies to find out explanation for diapause prothetly and metathetly are under progress. Similarly technique is being developed for the extirpation of these glands from the insect and study them biochemically.

The laboratory animals were screened for the external parasites and it was found possible to breed *D. muris* on white mice in the laboratory.

Rats

Ectoparasites.—The following points emerge out of the observations on the collections of rats:—

(i) There were extremely few *Rattus norvegicus* collected from Mahim area as compared to Kamathipura.

(ii) In the total collections more female rats were caught than males.

(iii) The sex-ratio and the percentage of fleas collected in these two wards were markedly different from each other.

(iv) For the first time in the last 7 years, three specimens of *X. brasiliensis* have been recovered. One was from *R. rattus* in Kamathipura and two from *B. bengalensis* from Mahim. All these were females.

The pattern of food habits of rats in Kamathipura is being studied along with similar habits in Mahim.

Rat Habits.—The burrowing habits of rats under laboratory conditions has shown that the pattern of the borrows is more or less the same in *R. rattus*, *R. norvegicus*, *B. bengalensis* and *M. dubius*. The average depth of the arms were 2 feet in *B. bengalensis*, 1½ Feet in *R. norvegicus*, 9 inches in *R. rattus* and 6 inches in *M. dubius*; *R. rattus* and *M. dubius* were more or less surface burrowers.

The food was often taken inside the rat-burrow and kept at the blind end of the arms, while the rats always defecated outside, keeping the burrows cleaner than the surroundings. Only two rats bred in captivity, i.e. *R. rattus* and *M. dubius*. The latter gives an average of 5 young ones per litter.

Biometrical records have been made of the weight and length of the young ones as they grow up to maturity. The young one of *M. dubius* at birth averaged 1.2 gm. and 3.3 cm. in length, while *R. rattus* was 3.3 gm. and 4.5 cms. respectively.

When outside rats are being brought near the animal house it was desired to see whether any ectoparasites from these rats affect laboratory animals. In these studies the following points were observed.

Only one flea, i.e. *X. astia* was so far recorded in the collections. Lice and mites have been recorded and these are listed below. The ectoparasites collected are being tested with outside rats and only in one case this change was possible. The mouth parts and gut contents of these ectoparasites are being studied with the idea of finding whether they are blood-suckers or mere "scrubbers".

List of ectoparasites collected from laboratory animals, i.e. Rabbit, Guinea pig, White mice, White rat and Fowl are :—

Lice.—*Polyplax spinulosa*, *Neumidilipeurus tropicalis*, *Menacanthus pallidulus* ; *Gyropus ovalis* and *Gliricola porcelli*.

Mites.—*Cheyletiella parasitivorax* ; *Listrophorus gibbus*, *Chrodiscoidea caviae* ; *Megninia* sp., and *Pterolichus obtusus*.

An experiment was designed for determining the infective potential of vector species of fleas. Instead of using a mouse which had developed septicaemia after the administration of an infective dose of *P. pestis*, for determining the infective potential, a mouse which had developed septicaemia after the administration of an infective dose of *V. cholerae* was used. This method made the work easy and quick and also yielded clear-cut results. A statistical analysis of the results showed that (1) females of both *X. cheopis* and *X. astia* gave significantly higher potentials than the males of the corresponding species ; (2) there was no significant difference in the infective potentials of the females of *X. cheopis* and *X. astia* ; (3) there was also no significant difference in the infective potentials of the males of *X. cheopis* and *X. astia*. Therefore, so far as this factor of vector efficiency is concerned, there is no difference between *X. cheopis* and *X. astia*.

The breeding of mosquitoes in the snake farm moat was under study. These studies have shown that the nymphs of Odonata destroy a large amount of mosquito larvae. During this study a record has been made of the different insects found in the moat during a period of six months. These insects and their stages are under identification.

Snakes.—(a) The morphological studies on *Echis carinatus* were completed.

(b) Records of snakes in Saurashtra were completed.

During the period under review the following amount of venom was collected from different snakes and supplied :—

Total venom produced for the year 1958 . . . 239.6473 gm.

Total venom supplied for the year 1958 . . . 63.4522 gm.

Forty-one cases of identification of snakes were attended. Twenty-five cases of enquiries pertaining to rat cages and insect identification were dealt with.

Water samples from Bombay Municipality and Bhavnagar Municipality as well as sewage water from Bombay Municipality were investigated.

Rat Control Committee meetings were organised during the year. An amount of data was collected to find out the rat damage and the probable method of controlling rats.

Site for the probable rat experimental station was examined and tentative proposals were put up to Municipality, Government and the Indian Council of Agricultural Research for rat control scheme.

BOMBAY MUNICIPAL RAT SECTION

Experiments on the susceptibility of Bombay City rats to plague infection by injecting a standard test infective dose showed results similar to last year.

During the year 313 dead rats, 66,997 live rats from the City and 7,914 live rats from the Bombay Port Trust area were examined for plague infection. No plague infection was detected.

VI. DEPARTMENT OF PHARMACOLOGY . .

GENERAL

Staff.—Shri K. P. Nayak, M. Pharm., joined the Indigenous Drug Research Unit established under the auspices of the Indian Council of Medical Research as Assistant Research Officer and Shri D. D. Gadgil, M.Sc., as Research Assistant. During the year, Dr. S. D. Vaidya, M.B.B.S., and Shri M. S. Sastri, M.Sc., Unichem Research Scholars, resigned ; their places were filled by Dr. D. R. Kulkarni, M.B.B.S. and Shri S. D. Kakade, M.Sc.

Dr. V. G. Kudalkar, B.Sc., B.Sc. (Tech.), Ph.D. (U. S. A.), who came here in July 1958 as Senior Organic Chemist, resigned in November to join the University Department of Chemical Technology, Bombay. Shri S. Sen, Shri G. R. Rane, Shri S. Kadamby and Shri J. A. Valu, who were working as Technicians, left the department in 1958. Shri V. S. Pradhan, and Kumari L. S. Kadaba are new entrants as Technicians.

Dr. N. K. Dutta was appointed as one of the members of the Drugs Technical Advisory Board and of the Study Group for Research on the Treatment of Narcotic Addicts under the Indian Council of Medical Research,

Dr. R. B. M. Colah, M.Sc., Ph.D., Senior Biochemist has gone to Switzerland to study at the laboratories of Hoffman la Roche, Basle. There he would receive special training in biological assays of vitamins and hormones. Shri J. G. Bhatt, B.Sc. (Hon.), B.Sc. (Tech.), Assistant Chemist (Inspector), joined the University of Manchester (England) to undergo higher training in pharmacology. Shri C. J. Mehta, B. Pharm. (Banaras), M.S. (California), Assistant Chemist (Inspector), returned from U. S. A. after taking his Master of Science degree in Biochemistry.

Training of Workers.—The training programme continued to be very popular. Quite a large number of applicants had to be refused due to shortage of space. The candidates were trained in the chemical, biochemical, microbiological and pharmacological methods of drug analysis. Besides, a few of them also took general pharmacological training. Each person was given training for a period varying from three to four months. Preference was given to the candidates who represented pharmaceutical firms. Private individuals were also entertained. Shri K. V. Panchapakesan was deputed by M/s. Fine Pharma, Kumbakonam. Shri K. N. Dhobi of M/s. Worli Chemical Works, Bombay, spent four months. Shri B. M. Chudgar had represented M/s. Therapeutics Pharmaceuticals, Bombay. Shri M. A. Chandavarkar came from M/s. Fairdeal Corporation to learn the special techniques of vitamin analysis. Shri V. N. Ramaniah of M/s. Essen & Co., Bombay, took training in microbiological testing of drugs. Shri G. P. Wagle was deputed by M/s. Hindusthan Antibiotics, Pimpri (Poona), to study pharmacological techniques. Kumari S. G. Kundaji and Kumari H. R. Chinoy came as private candidates. Besides these mentioned above, candidates for the Laboratory Technician Training Course were given lectures, demonstrations, and practical training.

RESEARCH ACTIVITIES

The Pharmacological actions of cholera endotoxin were studied with a view to finding out the pathogenicity of the disease. The endotoxin, when fed to a group of infant rabbits, produced profuse diarrhoea, loss of weight, dehydration and other signs and symptoms which are seen in clinical human cases of cholera. Biochemical and histopathological pictures of toxine-fed rabbits were observed to be similar to those of infant rabbits in which the disease was produced by infecting them with *V. cholera* (Dutta & Habbu, 1955). Thus, in the rabbit, the endotoxin was found to be responsible for the production of the signs and symptoms of cholera. This may be true for human cases too.

Total alkaloids have been obtained from the roots of *Withania Somnifera* by extraction with 60 per cent. alcohol. The presence of six different alkaloids has been confirmed by the application of chromatographic techniques.

The juice of the leaves of *Coleus aromaticus* and the volatile principles of the same were tested *in vitro* for vibriocidal properties and *in vivo* in infant rabbits suffering from experimental cholera. The beneficial effect of the plant in the treatment of cholera could not be confirmed either *in vitro* or *in vivo* experiments.

The basic fraction isolated from *Saussurea lappa* (clark) was tested pharmacologically. It was found to have spasmolytic activity when tested on guinea pig's ileum or on rabbit's duodenum. On the tracheal chain of guinea pigs it showed antagonism to histamine-induced contractions. The fraction did not alter the blood pressure and respiration in cats in a dose of 4.0 mg./kg. It was found to have a low toxicity. The report on the clinical studies showed its encouraging results in cases of chronic bronchitis and asthma. . .

A gravimetric method has been developed for the estimation of halogen derivatives of 8-hydroxyquinoline commonly used in medical practice. The optimum conditions for the formation of the Cadmium chelates of these compounds and their final weighing have been worked out. The results obtained with a number of samples both prepared in the laboratory and obtained from commercial firms warrant the adoption of the method for routine estimation of these drugs.

As the pharmacopoeial methods for differentiating between genuine and spurious tinctures have been found to be inadequate, a study for the development of additional tests for some of them has been undertaken. For two such tinctures containing haemolytic saponins, viz. Tincture Senega and Tincture Quillaia, the determination of the haemolytic index has been found to be a reliable criterion and is, therefore, recommended as an additional test for the establishment of the identity of these tinctures.

The optimum conditions for the development and measurement of colour by the coupling of the drug 'Luvistin' (1-2-N-benzylanilinoethyl) pyrrolidine hydrochloride with p-sulphophenyldiazonium chloride have been worked out. The method has been found to be sensitive and reliable for the estimation of the drug in pharmaceutical preparations.

The estimation of Vitamin C in complex multivitamin preparations has been a problem for quite a long time. The blue colour obtained by the reaction of Ascorbic Acid with Silico molybdic acid affords a colorimetric determination of the vitamin in the presence of many substances commonly incorporated in complex multivitamin preparations.

The available pharmacopoeial methods for assessing the limit of m-aminophenol in p-aminosalicylic acid and its sodium or calcium salts are not very satisfactory. A modification of the B. P. method has been proposed for a colorimetric assay of m-aminophenol to ensure greater reproducibility and accuracy.

The colorimetric assay of Folic Acid in complex pharmaceutical preparations has often been found to be unreliable. An investigation carried out led to the conclusion that Iron salts, Nitrates, Ascorbic Acid and Liver extract caused

interference and were responsible for the abnormal results. The optimum amounts of the interfering substances which would allow a dependable colorimetric assay were then determined. As these substances are very often incorporated in pharmaceutical preparations, colorimetric assay of Folic Acid in such complex products yields unreliable results. Attempts were, therefore, made to eliminate the interference caused by these ingredients. Simple modifications of the colorimetric method like selective precipitation or complex-formation did not prove very satisfactory so as to ensure precision and accuracy. Hence, isolation of Folic Acid by chromatographic methods was tried. Ion-exchange resins and more profitably an adsorbent like Florisil could be used for adsorption and selective elution of Folic Acid. The technique is now being applied to more complex experimental mixtures containing Folic Acid so that a modified colorimetric assay can be devised.

Stability of Folic Acid in different vehicles and at different pH levels was studied in order to arrive at the optimum conditions for assessing the effect of ingredients on the stability. The effect of different non-interfering ingredients on the stability was then determined under the optimum conditions. Riboflavin, Ascorbic Acid, Thiamine Hydrochloride and Calcium Hypophosphite were among those found to be responsible for loss of Folic Acid on Storage.

ROUTINE

During the year under report 4,428 samples were tested. Almost all the common varieties of drugs like galenicals, vitamins, hormones, chemo-therapeutic remedies, anti-biotics and complex non-pharmacopoeial preparations were represented by these samples examined and reported upon.

The number of samples declared as non-standard was 1019, which worked out to be about 23 per cent. of the total. This percentage of non-standard samples was almost the same as observed for the last year. The samples were mainly received from the Drug Inspectors and Prohibition and Excise Inspectors of the Bombay State. A large number of samples was also received from drugs Inspectors of States of Uttar Pradesh, Madhya Pradesh, Delhi, Bihar, Orissa and Himachal Pradesh.

Out of 3048 samples examined under the Drugs Act, 862 were found to be not of standard quality, so that the percentage of failing samples amounted to about 28. This figure was almost the same as that of the last year which was 31 and no significant improvement in quality could be noticed.

Samples of "Biological and special products" and "other special products" (as defined by the Drugs Act) tested number 1717. This category of products covered about 39 per cent. of the total number of samples analysed. The percentages of such samples declared as non-standard in 1958 and 1957 were 34 and 21 respectively.

Pharmacology Section.—There was no marked deviation noticeable from the report for the year 1957, both in respect of quantity and the variety of samples tested in this section.

One hundred and two samples of anti-biotics like Penicillin, Streptomycin, Dihydrostreptomycin and Chloramphenicol either individual or in admixture were tested for 'safety' or 'Undue toxicity'. The results of safety test were observed to depend to some extent upon the strain, age and weight of mice, when injections were given within the time-limit specified in U. S. P.

The number of parenteral preparations tested for the limit of pyrogens was 665, inclusive of 40 samples of Calcium Gluconate Injection.

Of the 24 samples of Adrenaline tested for potency, only one was not of standard quality. Sixteen samples of Digitalis, one of Tincture Strophanthus, two of Tincture Scillae, and one of Tincture Urginee were biologically tested for potency and only one sample each of Digitalis and Strophanthus could not conform to specified standards. Nine hundred and fifty samples of injectibles were tested for their sterility, out of which only 4 samples were declared as non-standard.

Other samples that were tested include Posterior Pituitary, Liver Extracts, Insulin, Vaccines, etc.

Chemistry Section.—A large number of galenicals was examined and about 40 per cent. of them were declared to be of non-standard quality. Some of them were sub-standard while some others were evidently spurious. The spurious drugs were nothing but consisted of colouring matter, alcohol and water. The recognised pharmacopoeias hardly give any specific tests for the identification of a large number of tinctures. Additional tests have been devised to identify the various constituents of different tinctures. These tests greatly helped us in differentiating between genuine and spurious drugs. Among the sub-standard samples, there were Tincture Belladonna, Tincture Hyoscyamus, Tincture Nux Vomica, Extract of Rauwolfia, Liquid Extract of Vasaka etc., containing either less or at times no alkaloids.

About half the number (32) of the samples of Tincture of Iodine failed as the quantities of Iodine or Potassium Iodide found in them were less than the pharmacopoeial standards, and in one case both these ingredients were absent.

It was pointed out before that Liquid Extract of Ergot becomes an unstable preparation if it is not stored very carefully. Except in cities or large towns there is hardly any provision for suitable cold storage, where such drugs could be preserved, with the result that most of the samples of Liquid Extract of Ergot deteriorate. In a tropical country like ours, it is essential that preparations of ergot should be dispensed in tablet form.

About 66 per cent. of the tested samples of Water for Injection were reported as non-standard, mostly because they contained suspended matter and in few cases they were non-sterile. The manufacturers should pay more attention to this aspect of the problem, as it is not difficult to get rid of foreign matter from solutions meant to be injected into the body. Many of these samples are used as a vehicle for preparing life-saving drugs which are meant to be injected even intravenously.

Gripe mixtures are very popular among the public. Out of 40 samples tested, 14 were found to be sub-standard preparations. Most of the samples contained Sodium Bicarbonate the amount of which did not comply with the claim made on the label. Five preparations contained Saccharin although the presence of it was not disclosed on the label.

Another class of preparations which are popularly known as "Balamrits" was tested here. Out of 16 samples, 8 were of non-standard quality. Most of them contained less amounts of calcium and/or hypophosphite.

It has been observed before that some of the samples of absorbent cotton wool do not pass the test for absorbency. This year too, out of the 16 samples that were examined, 7 failed to pass.

Several preparations dispensed in the form of complex powders containing anthelmintic or analgesic drugs were examined. In the case of packets, the individual weights of the contents were observed to differ widely. Four out of 6 samples of anthelmintic mixtures failed as the content of Santonin was found to be less. Several samples of analgesic mixtures dispensed as tablets or powders were tested and quite a large number of them was declared as non-standard either because one or more constituents like Aspirin, Phenacetin, Caffeine, etc., were less or absent.

Biochemical Section.—Multivitamin preparations formed a large portion of the total number of samples tested. Out of 1,431 samples tested, 469 were declared to be of non-standard quality which came out to be about 33 per cent.

As many as 122 out of 283 preparations containing Vitamin A did not contain the labelled amounts of the Vitamin. As large as 654 samples containing Vitamin B were examined, out of which 184 were found to be deficient in the content of the vitamin. The percentage of failure for samples containing Vitamin C was relatively less, only 74 out of 590 samples tested being found sub-standard.

Out of 244 samples tested for pantothenate activity, 115 failed to conform to claims made on their labels.

About half the number of samples tested for the content of Folic Acid were found to contain less amount of the vitamin. Riboflavin and Nicotinic Acid were found to be the most stable among the vitamins. All the samples tested for Riboflavin content were declared as standard. About 20 per cent. of the samples analysed for vitamin B12 activity were found to be non-standard.

A few samples containing Methionine were also analysed. In 5 out of 7 samples, the potency of Methionine was found to be less than that claimed by the manufacturers. Seventeen samples containing pepsin were tested for the proteolytic activity and out of these 7 were found to be devoid of the enzymic activity.

It appeared from the results of different estimations that vitamins are probably more stable in tablets and injectibles than in oral liquid preparations. About 53 per cent. of oral vitamin preparations (mostly complex mixtures) were found to be of non-standard quality, 38 per cent. which were dispensed as tablets and capsules and about 29 per cent. in injectable form.

A total number of 223 antibiotic preparations were examined. Penicillin, Streptomycin, Dihydrostreptomycin, Tetracyclines and Chloramphenicol were among the preparations analysed for potency and other tests. The microbiological methods for assaying Tetracyclines were introduced during the year under report. Injectables (163), ointments (44) and tablets and lozenges (16) could be mentioned as main categories of samples analysed. Of the several antibiotics tested, the percentage of non-standard ones was high among Penicillin preparations. Twenty-four out of 84 samples of Penicillin did not comply with the required potency. Out of these, 11 preparations claimed as Penicillin preparations were not only devoid of any antibiotic activity but contained inert substances like sugar, or Magnesium or Sodium Bicarbonate.

In all, 90 samples containing Streptomycin and Dihydrostreptomycin combined with Penicillin were tested and only 7 out of them proved to be non-standard. In four of these failing samples, as observed for Penicillin, the antibiotic was substituted by inert substances.

All the samples of Chloramphenicol (38) and Tetracyclines (12) were found to be of standard quality.

VII. DEPARTMENT OF VACCINE

GENERAL

Staff.—The Department has not yet been able to get the full quota of staff and even the Assistant Director for the Department could not be appointed. The charge of the Department held by Dr. A. K. Hazra as additional charge was taken over by Dr. H. I. Jhala, Director, Haffkine Institute, on his being relieved of the charge of the Department of Virus Diseases including Rabies from November 1958.

It is gratifying to note that the Department inspite of the depleted staff, with the help of experienced staff could fulfil demands made for the supply of various vaccines particularly Cholera vaccine during the epidemic in the country.

Training of Workers.—Shri Ghulam Nabi Mateen, World Health Organization Fellow of the Ministry of Public Health, Kabul and R. K. Sharma received training in Bacteriological and Chemical examinations of water.

Dr. S. Dragoljib from Yugoslavia, under Reciprocal Scholarship scheme and Dr. El Din El. Arnaonti, World Health Organization Fellow from Egypt were shown the different processes in the manufacture of Cholera vaccine.

Under the newly started Training course for Laboratory Technicians, 16 students were given practical training in the manufacture of vaccines.

Co-operation was given to Shri Panse, Pharmacology Department in seeding and harvesting Cholera cultures.

RESEARCH ACTIVITIES

(1) *Manufacture of Cholera Vaccine by Submerged Culture Method.*—At present, Cholera vaccine is manufactured in this Institute by stationary culture method. An attempt has been made for the manufacture of Cholera vaccine by the submerged culture method. It has been observed that it is possible to manufacture the Cholera vaccine by forced aeration method. It has also been seen that the growth of *vibrio cholerae* in aerated cultures is much more profuse than in the stationary ones and though the vaccine so prepared is more potent, it does not possess any abnormal toxicity.

(2) *Liquid medium for T. A. B. Vaccine.*—The typhoid bacilli are reported to require a number of essential and necessary growth factors which are lacking in acid hydrolysate of casein which is used in this Institute for the production of Plague and Cholera vaccines. It was however observed that all the three strains, viz. *salm typhi* Ty2, *salm-paratyphi A* and *salm-paratyphi B* can grow in plain casein hydrolysate without any supplementary growth factors, the optimum nitrogen concentration required for this purpose being 270 mg. N/100 ml. and the optimum incubation period at 37°C being 120 hours.

The effects of fortifying the medium with tryptophane, Glucose, sodium B glycerophosphate, yeast extract and yeast dialysate and their optimum concentrations in the medium for the different strains have been studied. Mineral salts such as Magnesium sulphate and Ferrous sulphate have also been tried.

The addition of yeast extract or yeast dialysate which are excellent source of the vitamins of B-complex group, is found to promote the growth to a high degree, individual vitamins of this group are being tried.

Physical factors such as surface area, forced aeration etc. are also being studied.

(3) It has been observed during examination of sterility test that some organisms do not grow properly in the test media and at the temperature (37°C) at which the media are incubated after inoculation. Few such strains have been isolated and tested in different batches of the media. It has been further observed that though some of these strains grow better at 25°C initially, they adapt themselves very rapidly to 37°C and show a better growth at this temperature.

It is proposed to study the role of these organisms in the usual sterility tests.

(4) *Susceptibility to Plague Infection of Rats.*—A study of the susceptibility of rats from the endemic zones carried out at the Institute has shown that except in Assam, which has not suffered from serious plague epidemics, *R. rattus* which has been the principal reservoir of plague infection is found resistant to plague infection in all the endemic zones. Perhaps, this is an indication that serious plague epidemics in these areas are not apprehended. However, in certain urban areas, due to extension of city limits another species

of rat *G. kol* which is highly susceptible to plague infection has invaded the human habitations, thus making these areas vulnerable to plague infection under favourable conditions.

(5) *Biological Assay*.—An active immunity test in which groups of mice are immunised with graded doses of the vaccine and later challenged with mucinised suspension of *S. typhosa* was developed. The method has been found to be fairly sensitive and the results obtained are fairly regular and repeatable. The method has been found very useful in checking up the immunising values of the different batches of vaccines produced in the laboratory.

ROUTINE

During the year under review, the demands for plague vaccine were low. However there was a very heavy demand for T.A.B. vaccine from Colombo in the month of January and 2, 15,047 ml. of this vaccine was supplied during this month. The demands for Cholera vaccine were also heavy and the production had to be put up to a very high level from May to October to meet the demands of nearly 14·5 million ml. during this period. It is gratifying that such a heavy demand within such a short space of time has been successfully met.

3,05,729 ml. of plague vaccine, 16,773,503 ml. of Cholera vaccine and 4,56,071 ml. of T.A.B. vaccine were supplied while 13,10,840 ml. of Plague vaccine, 17,394,415 ml. of Cholera vaccine and 4,56,168 ml. of T.A.B. vaccine were produced during the year.

The total quantity of vaccine issued during the year 1958 is 17,535,303 ml. The demands for Plague vaccine were received mostly from Assam, Madras, West Bengal, Bombay State and Burma; those for cholera vaccine from Bombay State, Bihar, West Bengal, Madhya Pradesh, Mysore and from foreign countries also such as Thailand, Ceylon and Nepal and those for T.A.B. vaccine were mostly from Bombay State and Ceylon.

Section of Public Health Chemistry and Bacteriology.—This section used to examine mainly samples of water for ascertaining their fitness for drinking purposes. Due to discontinuance of routine tests from the Institute, this section has stopped accepting samples of water for examination from 1st October 1958. Sixty-two samples of water were tested bacteriologically and chemically up to 30th September 1958. Most of the samples were received from Bombay State.

Media Section*

Training.—General training was given to Shri Hadi in the Media preparation.

Research Activities.—All the departments were given in general co-operation with the manufacture of special media and specially for the following: Much help was given to Shri Mhatre in the preparation of various media required for the production of Triple vaccine.

Dr. Amasur was also given substantial help in his endeavour to put the production of vaccine on the large scale with a new technique.

Shri Panse from the Pharmacology department was given co-operation in his work on Cholera toxins.

Mrs. Sundar and other colleagues from Virus department were also helped in carrying out their research work.

ROUTINE

During the year 24,878.5 litres of Casein hydrolysate medium for cholera vaccine and 475 litres of Casein hydrolysate medium for Plague vaccine were prepared.

For T.A.B. Vaccine, 2058 Roux Bottles of 200 ml. agar medium each were supplied. 77,651 Bottles of 80 ml. each "Sterility Test" medium (aerobic and anaerobic) were supplied.

Parenteral Solution Section.—The parenteral solution section has continued to produce more and more and the production for this year excelled that of previous ones. Below is the quantities of the Injectibles issued :—

Parenteral Solution.				Issued in litres.
Glucose Saline	..	..	..	37,573
5 per cent. Glucose Solution	..	..	..	22,809
25 per cent. Glucose Solution	..	..	..	1,361
50 per cent. Glucose Solution	..	..	..	150
Normal Saline	..	..	..	4,617
Hypertonic Saline	..	..	..	9,932
Protein Hydrolysate	..	..	..	808
Sodium Sulphate	..	..	..	153
Sodium Citrate	..	..	..	286
Anti-Coagulant Solution	..	..	..	1,101
Distilled Water	..	..	..	1,684
Total ..				80,274

VIII. DEPARTMENT OF VIRUS DISEASES

GENERAL

Staff.—The charge of the vacant post of Assistant Director in-charge, Department of Virus Diseases was taken over by Dr. A. N. D. Nanavati from Dr. H. I. Jhala, Director, from 6th November, 1958.

Kumari K. S. Sujan and Kumari V. K. Gokhale joined the department as Technicians.

Academic Activities.—The department participated in scientific session of the 11th Gujarat and Saurashtra Territorial Medical Conference at Ahmedabad and the Virus Advisory Committee meeting at the annual session of Indian Council of Medical Research at Indore. A paper on Immunology of Influenza Vaccine, was presented at the scientific session of the Saurashtra Medical Conference.

Two students, registered for Ph.D. degree, and five registered for M.Sc. degree in Microbiology, continued their work in the Department. One new student registered for Ph.D. degree in Microbiology.

Kumari M. Savitri continued to work under Research Training Scholarship Scheme of Government of India on problems of APC viruses, Kumari R. Mendes continued to work on influenza virus as Government of Bombay Research Scholar and Shri M. R. Darekar joined the Department under an I.C.M.R. Fellowship on Flury Vaccine.

Training of Workers.—During the period under review the Superintendent, Vaccine Institute, Namkum joined the Department for 3 months' training in the manufacture and testing of antirabic vaccine.

RESEARCH ACTIVITIES

During the year, the department continued the research inquiry of the I.C.M.R. on "Adaptation of street virus to developing chick embryos". This work was started in 1953 and is being continued. The method followed is one advocated by Komarov from Israel. Nine strains of rabies "street virus" were isolated in mice; the strains after being serially passaged in mice were inoculated in eggs. Two strains have taken to eggs and are being passaged serially. Pathogenicity tests are carried out on egg adapted strains at suitable intervals. The work is in progress.

Studies on salivary glands of rabid animals were continued. Eight specimens of salivary glands received along with brain specimens were tested. The virus was detected in three specimens only. In 5 specimens the salivary glands were negative although the brain was positive. Total number (salivary glands and brains) tested during the year was 47. Amongst the animals that have been reported to be rabid, there were 15 dogs, 2 buffaloes, 1 calf, 1 hyena and 1 cat.

The Flury strain received from W.H.O. in May 1958 was passaged in fertile hen's eggs immediately and has taken to the chick embryo well. Experimental batches of Flury vaccine have been prepared and await potency tests.

Hyperimmune antirabic serum was prepared at the Institute by hyper-immunizing horses and concentrating the plasma of these horses. At present, field trials of this serum are being carried out at 53 antirabic treatment centres. It is expected that these trials will throw some light on the superiority or otherwise of combined serum vaccine prophylactic therapy over the vaccine treatment alone in prevention of hydrophobia in persons severely bitten by rabid animals.

Antigenic studies on Semple's antirabic vaccine and normal sheep brain suspension and infected as well as normal brain suspensions of different species of animals using hyper-immune horse serum were carried out by the gel diffusion technique. Semple's vaccine gives 7 antigenic lines while normal brain processed identically gives 6; infected sheep brain suspension gives 10 lines, while the normal gives 7. This suggests that the addition of carbolic acid destroys some of the antigens present in brain. Antibody response of human patients to Semple's antirabic vaccine undergoing treatment of class IIA and class IIB was studied by serum virus neutralization tests. Sixty-three sera were taken at different time intervals. It was observed that antibody response of patients receiving class IIB treatment is consistently greater than of those receiving class IIA, at all time intervals studied. Antibodies in both classes persist in significant titre upto six months after the completion of treatment.

Electrophoretic Studies.—Electrophoretic studies on sheep brain suspensions infected with Paris strain using a discontinuous system of buffers, yields five fractions; whereas only two are seen using veronal buffer.

Attempts at purification of rabies fixed virus by differential centrifugation are being carried out.

Preparation of Influenza vaccine on an experimental scale is being carried out by using different methods of preparation—such as alcohol precipitation and cell absorption, and using various strains with a view to evolve a suitable polyvalent vaccine.

A comparative study was made of the potency of Influenza vaccine prepared at this Institute, and vaccine prepared by Messrs. Merck, Lederle, Lilly & L. Pozzi, using the HA test on fowl cells. No significant difference in potency of the various vaccines was detected. A higher potency in HA units, was noticed, in Lederle vaccine. Further, animal studies for immunogenic activity are contemplated. Deterioration effect, if any, of storage in the cold on potency of the Haffkine Institute vaccine has been studied. It was observed that the vaccine shows no loss of potency after storage at 4°–8° C. for 1 year.

The antibody response to the Influenza vaccine prepared at the Institute in 1957 was tested in human volunteers. No post-vaccinal reactions were observed except a very slight pain and slight erythema at the site of inoculation. The pre and post-vaccination sera were subjected to haemagglutination inhibition test; 95.2 per cent. of samples showed a rise in antibody titre. The antibody response observed with both the monovalent Asian 'flu vaccines and with two vaccines given in a bivalent form was the same. A study of the antigenic components of 9 of the Asian strains isolated in our Laboratory was made. All the strains were found to be of Asian type, antigenically closely related to each other but not to the old type A Strains.

Trials of Influenza vaccine in animals have led to the development of a biological test for the standardization of the potency of the vaccine. Studies carried out by 4 different methods *in vitro*, *in vivo* and *in ovo* have yielded very comparable results.

ROUTINE

Antirabic Outpatient Clinic.—During the year, 11,653 persons applied for antirabic treatment, while 3,965 of these completed the full course. Amongst these were 1,459 "advice cases". Nearly 6,239 cases discontinued treatment after starting it. There has been no report of hydrophobia amongst those treated at this Institute during the year. The clinic was closed down at the end of the year as sufficient number of Centres exist in the city.

Rabies Section.—Semple's vaccine for human and canine treatment continued to be made available for supplies. The total number of centres receiving the supplies have increased from 215 to 226 and of these 146 are in Bombay State. Canine vaccine was issued to the extent of 24,114 ml. for prophylactic use. The total production of the said vaccine was 23,828 ml. in the year. A total of 33,94,232 ml. of antirabic vaccine was issued for human prophylaxis while 32,65,778 ml. were produced during the year. The Department has felt the strain of meeting the increased demand, which was not anticipated.

The total number of human treatments for which supplies were made by the Institute during the year were 33,911. There were no cases of hydrophobia reported from any of the antirabic treatment centres during the year. The number of Veterinary treatments supplied during the year amounts to 996. Following the new classification, the human treatments are classified according to the class of treatment as follows :—Class I 2,206 ; Class II (a) child, 2,805 ; Class II (a) Adult and Class II (b) child 1,629 and Class II (b) adult 11,603. In addition to the 146 centres in Bombay State which have been regularly taking supplies, 18 railway centres, 16 military centres and 46 centres outside the State have been given the supplies during the year.

Influenza Section.—During the year, 23 throat-gargles were received from sporadic cases. All the above throat-gargles were passaged in eggs 2 to 3 times and 6 strains of Asian Influenza and one hitherto unconfirmed isolated. Influenza vaccine preparation was continued till February 1958. About 10,000 doses of vaccine were prepared in the months of January and February. During the year 1958, 29,754 doses of vaccine have been supplied.

Yellow Fever Section.—Under this programme Yellow Fever Vaccine was stored and tested for its potency from time to time. A total of 6,104 inoculations were made to outgoing passengers from this country ; no case of post-vaccinal reactions was reported. Supplies of potent vaccines were also made to 9 different centres in this country. Total number of potency tests performed were 35.

Virus Diseases other than Rabies, Influenza and Yellow Fever.—Attempts to grow the adeno-virus standard strains on Hela Cells were successful. All standard strains were passaged in Hela Cells. Fluids from different passages were pooled and used for preparing anti-sera in rabbits. Tonsils and adenoids collected from K. E. M. Hospital, Parel were grown on plasma clot with a view to isolate any virus they harbour. Throat-washings from patients with severe cold and fever reported as negative for influenza are also being passaged in Hela Cells.

Monkey kidney trypsinization is being done regularly every week. Rectal swabs from infantile diarrhoea cases are being collected and passaged in Monkey kidney monolayer cell-line with a view to isolate pathogenic agents. Samples from apparently normal children serve as controls. Six isolations of suspected pathogenic agents have been made. Work on identification of these agents is in progress.

IX. BIOCHEMISTRY SECTION

GENERAL

Staff.—Dr. (Smt.) Alamela Venkataraman, the Senior Biochemist and Officer-in-charge of the section has been awarded a post-doctoral Fellowship for study of Enzyme Chemistry at the Enzyme Research Laboratory, Wisconsin, and has been deputed abroad leaving the charge of the section to Shri R. N. Joshi.

Training of workers.—Ten persons were given training for various periods in the section. Amongst these were Shri K. M. Cherian of Central Railway, Kumari V. V. Rege of Central Railway, Kumari H. R. Chinoy, Shri Vazirani of Bombay, Shri Lal Kundnani of Bombay, Shri P. V. Khale, Shri U. V. Rao, Shri M. D. Kothare, Shri Masood A. K. A. and Shri Sharma of Saugar University.

RESEARCH ACTIVITIES

Serum amylase activity in the blood of normal donors and laboratory workers using a standardised method has been completed. Hundred normal cases have been studied. The normal range for serum amylase activity was found to be 30 to 93 units with a standard deviation of 15.72.

Estimations of Serum iron levels in normal pregnant women and anaemia cases, referred by Dr. V. G. Daftary and Dr. Parekh of Wadia Maternity Hospital, Bombay, were undertaken.

A preliminary study of the various methods given in the literature was made with a view to find out the suitable method for our purpose. Ramsay's method (Biochem. J., 53, 227, 1953 and Biochem. J., 57, XVIII, 1954) was tried, but was discarded due to turbidity in the final solution for colorimetry. Finally, the method of Bothwell and Mallett (Biochem. J., 59, 599, 1955) was used with some modifications. Forty cases of Women patients suffering from anaemia were studied for their serum iron levels before and after the treatment at regular interval of one week. The patients were treated with intravenous iron. The cases are still being continued.

Sixty-five cases of normal pregnant women were studied for serum iron levels (The average value works out to be 94 micrograms of iron per 100 c.c. of serum). A study of Serum iron levels in cord blood samples was also taken up.

Twenty-five pooled serum samples of selected normal male donors from Blood Bank were taken up for finding out the normal range of serum iron.

A study of serum iron levels in different species of animals, such as horses, rabbits, guinea-pigs, cats, fowls, etc., was also undertaken.

A study of total iron binding capacity of serum was started. Davis method (J. Clin. Path., 5, 312, 1952) with some modifications was used so that serum iron and total iron binding capacity can be simultaneously determined in a sample of serum. However, it was found that adding excess of reduced iron to the serum had no limit. More the quantity of reduced iron added, more was the value of total iron binding capacity of serum. Therefore the method was rejected and another method, namely that of Theodore Peters *et al* (J. Lab. & Clin. Med. 48, 274, 1956) using Amberlite IRA 410 resin is being tried.

Plasma Iron.—While carrying out the estimation of iron in oxalated plasma an interesting observation was made. In the case of serum samples the pink colour produced by 2, 2' dipyridyl, the colour developing reagent, was instantaneous, but in the case of oxalated plasma samples the full colour development was very much delayed, to the extent of two hours. It was found that citrated plasma also behaved in the same way. Therefore this problem was taken up for further study. The addition of acid phthalate, benzoate, tartrate radicals had no inhibitory effect on colour development.

About 400 workers and the other staff of this Institute were screened for glycosuria. About 10 per cent. of them were found to have mild glycosuria. Blood sugar was also determined in those cases.

ROUTINE

During the year under review, the section continued its activities of examination of clinical materials from hospitals and private clinics. Although work from private practitioners and clinics is discontinued from 1st October 1958, Government hospitals are sending a large number of samples with a variety of estimations. The total number of analysis carried out increased to 8,815 as against 6,957 in the previous year. It is observed that the emphasis was more and more on liver and kidney function tests. There were 6,881 samples of blood, 674 of urine and stools, 930 of cerebrospinal fluid and other body fluids and 77 milk samples. Two hundred and fifty-two special tests were carried out.

It is hoped that the section will in future be in a position to undertake more specialised type of work.

X. BLOOD BANK SECTION

GENERAL

It is becoming difficult to meet the increasing demand for dried human plasma and the blood grouping sera as fresh and heavy demands are being received from our National Projects and the Armed Forces and our sources of blood remain the same viz., the paid professional donor in the City (which source is over taxed) and the donors from the prisons. It is essential that

new sources of blood donors are developed and tapped to meet the demands of plasma. Hence, the urgent need of expansion of Blood Bank. A proposal to transfer the blood collecting unit at Red Cross to this Institute is made, so that it can be utilised more fully to augment our blood supply.

Staff.—Dr. J. N. Vazifdar, B.M.S., Class II, Medical Officer, in-charge Blood Collecting Centre at the Red Cross Centre resigned his post from 1st July 1958 and his post has remained vacant till the end of the year. There were many changes in other staff during the year. Three of the four laboratory assistants were promoted, two as Senior Laboratory Assistants and one as Clerk. The technician was promoted to work as Assistant Bacteriologist for 2 months in a leave vacancy.

Training of workers.—Apart from taking part in the general teaching programmes of the Institute, such as technician training programme, etc., the Department trained one Medical Officer and one Technician from the St. George's Hospital Voluntary Blood Transfusion Service.

Professor C. L. Vohra, Professor of Physiology, Punjab Veterinary College attended this department to study the blood grouping techniques and worked on Blood groups in horses, which work he is going to pursue in his laboratory.

RESEARCH ACTIVITIES

The work of preparation, blood grouping (Anti-A and -B) sera has progressed, well by immunizing human donors with group specific substances; however it is becoming difficult to meet the demand which has doubled itself in the course of one year. The production of Anti-Rh has been satisfactory by immunising the donors; but on repeated immunisation these donors are developing multiple anti-bodies and so further immunization amongst these donors has to be stopped. Sub-groups (Anti-C) sera has been produced from one of these donors.

Anti-human globulin serum was produced in rabbits by sodium alginate method. Attempt to produce it in sheep by following the method of Dr. I. Dunsford was not successful. (He had used goats).

Difficulties were encountered in adopting the iron exchange resin method of fractionating plasma. The original method of Dr. A. F. Reid was worked with serum and not plasma. When plasma is passed through resin columns the fibrin forms flakes and chokes the column and hinders further separation.

Homologous serum jaundice is a bugbear in the selection of blood donors. It is all the more important in plasma pooling process. In order to detect the carriers and sub-clinical cases, screening of blood donors has been undertaken by testing the sera of the blood donors by three (Hepatic function) tests:—

- (1) Thymol turbidity
- (2) Trichloroacetic acid test (Lancet dated 28th July 1956).
- (3) Icteric index and when the above tests were positive, the serum bilirubin was done.

Five hundred blood donors were screened in this way and 5 donors detected were having higher values, though they were clinically normal.

Equine serum albumin was prepared from the left-over fractions of horse plasma from the serum Department after separation of Antibodies for their purpose. It is being tried for use in place of Bovine albumin in blood grouping tests. It may also be useful in preparing media for growing T.B. organism (DuBois Media).

Dried plasma with Anti-haemophilic factor was prepared by lyophilising fresh plasma within 48 hours of collection. The further work is handicapped for want of a refrigerated centrifuge. Packed R.B.C.S. after separation of plasma were supplied to the medical units of Dr. M. J. Shah of the K. E. M. Hospital for trying on cases of hypoproteinemia in cirrhosis of liver and the results are encouraging the plasma proteins show an increase rapidly after transfusion of packed R. B. Cs.

Co-operation regarding research activities with other institutions.—(1) Packed erythrocytes were supplied to the medical unit of Dr. M. J. Shah at K. E. M. Hospital for trial of hypoproteinemia in cases of Cirrhosis of liver and the response was reported to be encouraging.

(2) Samples of fresh R.B.C. from our donors were supplied to Dr. Miss Braganza of I.C.R.C. for her studies on enzyme systems of the R.B.C.

(3) Samples of whole blood was lyophilised and supplied to Dr. Magar of Institute of Science for studies on lipoproteins of blood.

(4) Few samples of arterial grafts were lyophilised for Dr. P. K. Sen of the K. E. M. Hospital, Parel, for arterial grafts.

(5) Samples of human serum and plasma were supplied to Biochemistry, Serum and Nutrition Department for their studies.

ROUTINE

Efforts to step up the production of the plasma are being made. Four thousand eight hundred and seventy-six blood donors were bled during the year for preparation of dried plasma. Six hundred and forty-eight litres of lyophilised plasma were prepared from this. Hundred and six litres plasma were distributed free and 736.25 litres of plasma were sold making a total of 842.25 litres.

Two thousand four hundred kahn tests were performed. Out of these 19 per cent. were positive.

Three hundred and sixty-six samples were tested for Rh Test. Of them 22 were Rh. negative i.e. 6 per cent. Thirty six thousand four hundred and ninety-eight ampoules of Antivenine were dried.

Thirty-three thousand ml. of blood was supplied to diagnostic department for preparation of grouping sera.

XI. DEPARTMENT OF NUTRITION

RESEARCH ACTIVITIES

The Department of Nutrition is actively collaborating in research with the Haffkine Institute. The following researches were carried out :—

1. *Nutrition Evaluation of Food-stuffs commonly consumed in Bombay State.*—Further work on the nutritive value of foodstuffs has recently been commenced under the auspices of the Indian Council of Medical Research, New Delhi.

As far as possible, sampling of the foodstuffs was done according to the procedure suggested by the working party of the Nutrition Advisory Committee. Foodstuffs were purchased from four different markets in Bombay and pooled into one sample. Similarly, a few foodstuffs were obtained from Baroda and Sangli also.

Nineteen foodstuffs have been analysed for about 27 different constituents covering over 400 estimations in all. These determinations included—edible portion, moisture, protein, ether extractives, crude fibre, mineral matter, sodium, potassium, calcium, iron, total phosphorus, phytin phosphorus, magnesium, copper, oxalates, chlorides, sulphur, acidity, alkalinity, thiamine, riboflavin, niacin, carotene and vitamin C. Most of the estimations were carried out in quadruplicate. *Tur, papadi*, Jack fruit and seeds, *chavli* (both varieties), peas and Bengal grams are good sources of thiamine and riboflavin. Most of these foodstuffs are also high in sulphur content. Variation, and in some foodstuffs wide variation, in the value for the same variety of foodstuffs purchased from different districts, was observed.

2. *Studies in the Nutritive value of some leafy vegetables and their supplementary effects.*—Much remains to be done in respect of the overall nutritive value of mixtures of foodstuffs and their supplementary effects. Such information has wide practical significance in developing the dietary pattern of the population groups. In view of the above, two leafy vegetables namely *ambadi* (*Hibiscus cannabinus*) and *methi* (*Trigonella foenum graecum*), which are available almost throughout the year, were undertaken for detailed investigations. In certain parts of India *ambadi* is given particularly to the patients suffering from anaemia and oedema.

The analyses with respect to proximate principles, minerals, and vitamins were completed in these two vegetables.

In order to study the seasonal variations in the composition of various nutrients, a second lot of *ambadi* purchased from the local market was analysed for the same nutrients. Changes were observed particularly in the values for the mineral salts, thiamine and riboflavin. Similar study on the sample of *methi* is under progress.

The fractionation of the vegetable proteins (*ambadi*) in four protein extractants viz. water, 2 per cent. saline, 0.1 per cent. NaOH, and 70 per cent. alcohol was carried out. In each extract the amount of protein and non-protein

nitrogen was found out. In addition, two essential amino acids namely leucine and isoleucine were estimated microbiologically using *L. arabinosus* 17/5 as the test organism.

3. *Studies in Fermented Foods*.—As reported last year, the tests were repeated using original formula of *idli* namely four parts of coarsely ground black gram and one part of coarsely ground rice. The mixture was fermented as before at ordinary room temperature for about 20 hours. *Idli* and the corresponding unfermented preparation were incorporated into high fat low protein diet (30 percent fat, 10 per cent. protein) to replace 50 per cent. of its protein on dry weight basis. All the experimental details were the same as in the previous tests. The experimental results showed that *idli* helps in delaying the fat deposition in the livers of rats fed high fat low protein diet. In view of the above observations, it was considered interesting to study the nutritive value of *idli* and the corresponding unfermented preparation. The biological values were determined by following the conventional nitrogen balance method and they were found to be 63 and 76 respectively.

The growth promoting value of these two preparations at 10 per cent. protein level in the diet over a period of six weeks was also determined. The protein efficiency ratio was calculated from the increase in weight per gramme of protein consumed by the rates. The mean values are 2.55 and 2.27 for *idli* and the unfermented mixture.

Besides, regeneration of R.B.C. was studied in 24 adult rats (about 150 g.) made anaemic by a single intraperitoneal injection of 2 mg. of phenyl hydrazine (1 ml. of 0.2 per cent. aqueous solution of freshly distilled phenyl hydrazine). The peak of the anaemia was reached on the 4th day after the injection was given. Three groups, each of such 8 rats, were then transferred from the stock diet to the three experimental diets (18 per cent. casein protein, 18 per cent *idli* protein and 18 per cent. unfermented preparation protein on dry weight basis). R.B.C. were counted every 4th day till the normal value was reached. It was seen from the results that *idli* was found better than the other two diets.

Another experiment to study the regeneration of serum proteins and liver protein in adult rats kept on no-protein diet for three weeks was carried out. The experimental diets were as mentioned above. Protein estimations of liver and serum are under progress.

4. *Protein Metabolism and Vitamin B₁₂*.—There are divergent views regarding the growth promoting property of vitamin B₁₂. However, there are a few reports showing that the vitamin counteracts the growth inhibition caused by certain factors present in some foodstuffs. Very recently Wagle et al., (1958) have claimed to have produced the vitamin B₁₂ deficiency in rats fed full-fat soya bean diet (72 per cent.) as judged by differences in growth, R.B.C. count and haemoglobin values.

Soya bean is known to contain growth inhibitor and hence the observations made by the above authors are not free from doubt. Experiments are, therefore, devised in which young growing rats are fed raw and autoclaved soya bean meal (72 per cent.) diet with or without vitamin B₁₂.

From the results it is evident that Vitamin B₁₂ counteracts the effect of growth inhibitor present in raw soya bean meal, as there is significant difference in gain in weights in the two groups (group 1 and 2). On the other hand it is observed that when the growth inhibitor present in soyabean is inactivated by autoclaving, vitamin B₁₂ has no effect on the growth rate of the animals (groups 3 and 4). This confirms our earlier observations.

XII. CRITICS CLUB

Under the auspices of the Critics Club, thirty-eight meetings were held during the year. The Students, Scholars and Scientific staff of the Institute took active part in the meetings. Original work or reviews that were presented were critically discussed. There were five lectures by guest speakers. The following is the list of speakers and subjects:—

Speaker.	Subject.
1. Shri N. E. Vad	.. Some morphological observations on <i>Echis carinatus</i> .
2. Dr. H. I. Jhala	.. Sero-reactivity for syphilis in Bombay.
3. Kum. M. N. Guttikar	.. Studies on Neera.
4. Dr. (Mrs.) A. Venkataraman	Glycolysis in blood samples.
5. Prof. Otto Jirovac, University of Prague, Czechoslovakia.	Results and perspectives of human parasatology in Czechoslovakia.
6. Shri M. H. Shah	.. Oral treatment of diabetes with sulphonyl urea.
7. Prof. S. S. Nicolau, Prof. of Virology, University of Bucharest.	Mechanism of Immunity in Virus diseases.
8. Dr. K. V. Kulkarni	.. Studies on anti-human serum.
9. Dr. R. Milani, Director, Institute of Zoology, Pavia, Italy.	General behaviour in house flies and Insecticide resistance.
Dr. Winteringham, Pest Infestation Laboratory, Slough, England.	Biochemical Mechanism of insect resistance.
10. Kum. I. R. Ovalekar	.. Investigation of salmonella infection in laboratory mice.
11. Dr. P. J. Deoras	.. With a Naturalist in the Gir forest.
12. Dr. M. Gerundo, Visiting Professor, University of Travancore.	Immunity in Parasitoses.
13. Do.	.. Concept of Her.aglobinopathis.

Speaker.	Subject.
14. Shri M. G. Nerurkar	.. Natural agencies of disinfection and sterilization.
15. Shri M. S. Madiwale	.. Stability of folic acid in Pharmaceutical preparations.
16. Dr. R. W. P. Master	.. Biologically important constituents of snake venoms.
17. Kum. G. C. Kothari	.. Brucellosis in Bombay.
18. Kum. R. Mendes	.. Studies in Asian Flu virus carried out at the Institute.
19. Shri E. D. Bharucha	.. Study of Serum Lipoproteins.
20. Dr. K. V. Kulkarni	.. Preparation of Anti-Rh-Serum by immunizing human donors.
21. Dr. M. V. Bapat	.. Experimental study with <i>Treponema pallidum</i> , Nichol's pathogenic strain.
22. Shri B. N. Palande	.. Drug research and development.
23. Shri M. K. Habbu	.. Biological assay of Typhoid Vaccine.
24. Shri K. P. Nayak	.. Antipyretics.
25. Shri C. S. Swaminathan	.. Studies in the Production of diphtheria toxin.
26. Dr. S. D. Ambegaokar	.. Dietary protein and haemoglobin.
27. Dr. G. S. Fraenkel, Prof. of Entomology, University of Illinois, Chicago.	.. Physiology of Insect Nutrition.
28. Shri N. E. Vad	.. Some field studies in <i>Echis carinatus</i> .
29. Kum. B. Ver	.. Immunity response to Antirabic vaccine in human patients.
30. Shri R. N. Joshi	.. Determination of Amylase activity.
31. Kum. A. Bundeally	.. Comparative study of sulphomethoxyypyridiazine and Sulphadiazine in experimental plague in white mice.
32. Dr. S. S. Sabnis	.. Screening of blood donors for homologous serum jaundice.
33. Kum. M. C. Patel	.. Studies in the lysogenicity of <i>S. typhi</i> and <i>S. paratyphi A</i> cultures and Vi bacteriophage typing of <i>S. typhi</i> cultures.

Speaker.	Subject.
34. Shri R. S. Karbhari	.. Effect of accessory growth factors on growth of salmonella in casein hydrolysate.
35. Shri C. J. Mehta	.. Free amino acids in uremic plasma.
36. Shri H. K. Mhatre	.. My training tour to Czechoslovakia.
37. Shri A. P. Bhandarkar	.. Trypsin inhibitors in Indian foodstuffs.
38. Shri K. M. Khemani	.. Importance of Biological tests in the diagnosis of Rabies.

XIII. LIBRARY

GENERAL

Staff.—One clerk and one attendant were sanctioned and they joined duties from 1st May 1958.

The Library Committee constituted to suggest improvements to the Library, submitted its report on 8th February 1958. The report was discussed and approved at a staff meeting. The recommendations are being implemented. The revised rules for the users of the Library were brought into effect in August 1958.

The Library worked in co-operation with other Libraries in Bombay in the inter-library loan of books and periodicals.

The reprints of the papers published by the workers in the Institute were properly arranged for quick location and reference.

ROUTINE

The working hours of the Library were extended from 8-45 a.m. to 8-00 p.m. on all working days and from 8-45 a.m. to 5-00 p.m. on Saturdays. This extension of hours attracted more visitors to the Library both from inside the Institute as well as from outside.

The Library subscribed to 131 Journals and 45 Journals were received as gratis or by exchange.

There were 165 additions to the book section of the Library. Out of these, 54 were donations. Our thanks are due to the Ciba Foundation for donating 18 volumes of the Ciba Foundation symposia and to the Bombay University centenary fund for generously donating Rs. 5,000 for the purchase of books.

During the year, 1004 volumes were sent for binding, out of which 824 were received back, bound.

PUBLICATIONS

Twenty-two papers by the Research workers of this Institute were published in the year 1958 in different scientific and medical periodicals.

Eleven papers have been accepted for publication and they will be published in the year 1959.

XIV. ANIMAL LABORATORY

GENERAL

Training of Workers.—Shri B. C. Deole, Stockman from Veterinary Biological Products, Bombay, continued in the Animal House for training till 18th February 1958. Shri S. T. Mahajan, Stockman from Veterinary Biological Products, Bombay, joined Animal House for training in breeding, feeding and management of Laboratory Animals on 1st May 1958 for two months. Shri K. P. Pandya, S. J. Science Institute, M. S. University, Baroda, joined the Animal House for observing the working in breeding, feeding and management of Laboratory Animals on 9th May 1958 for a week.

In addition to these outside trainees, there were 20 Laboratory Technicians' Training Course trainees of the Haffkine Institute, who had been in this Department for training in breeding, feeding and management of Laboratory Animals.

The following table shows the number of animals bred, issued to the Institute, sold to other laboratories and purchased during the year 1958 :—

			Number of animals bred.	Number of animals issued to H. I.	Number of animals sold.	Number of animals purchased.
1. Rabbits	..	..	1,277	1,064	137	24
2. Guinea pigs	..	..	1,298	1,143	148	150
3. White mice HI	..	..	25,365	20,996	780	800
4. Swiss mice	..	..	3,441	2,243	6	
5. Albino Rats	..	..	2,684	1,459	718	148
6. Hamsters	..	..	54	30		
7. Cotton Rats	..	..	24			

Besides the animals mentioned in the above table, following animals were maintained in the animal house and issued for research purposes and production to the different departments of the Institute as and when required : Sheep 2,133 ; Dogs 47 ; Cats 192 ; Monkeys 353 (includes monkeys maintained for the Polio Research Unit of the I. C. M. R. for J. J. Hospital, Bombay) ; Fowls 401 ; Pigeons 48 and Horses 164 (average number maintained for production of different antitoxins and sera).

The breeding of White Mice was not to our expectation because of shifting of colonies from place to place for giving facilities for the repairs of buildings and non-availability of suitable food as per routine, from October 1958. The strength of the Colony and supply could be increased by using new type of mouse boxes and food, and arrangements are being made to obtain the requisite number of mouse boxes and other requirements. The increase in the strength of the colony and supply would depend on the early supply of the requirements and regular maintenance of the food supply.

XV. BUSINESS MANAGEMENT

Staff.—During the year under review, Shri S. C. Merh, B.Sc., joined as Stores Officer. Also, an independent section for physical verification of stocks and stores was sanctioned and started with certain staff under Supervisor (Physical Verification) Shri R. S. Thaney, B.A., M.Com.

Training.—Shri P. K. Sholapurwala, B.Sc., LL.B., Business Manager, attended a Residential Study Course in Productivity at the Indian Institute of Technology, Kharagpur. Similarly, Sarvashri B. O. Shah, B.Com., Cost Accounts Officer, and A. S. Samant, Assistant Accountant, were deputed for training in cost accounting at the Indian Institute of Cost and Works Accountants, Calcutta.

MANAGEMENT STUDIES

The Section in Business Management, Department of Economics, University of Bombay, is undertaking a research project in this Institute. The problem to be taken up would be "Relations between Purchase, Stores and Accounts Departments". The Business Manager would be associated with the working of this problem from the Institute's side.

ROUTINE

The productive activities of the Institute continued to maintain the same tempo. The overall business position is as follows:—

OUR POSITION AS ON 31st MARCH 1958

	1957-58.		1956-57.	
	Rs.	Rs.	Rs.	Rs.
<i>What we have—</i>				
1. Land and Buildings ..	39,66,201		39,56,675	
2. Equipments ..	18,28,377		17,69,795	
3. Library Books ..	5,00,000		5,00,000	
4. Live Stock (excluding gifts).	87,751		20,484	
5. Stocks and Stores ..	17,56,615		14,84,451	
6. Amount to be received.	16,01,957		12,39,954	
7. Cash and other balances.	1,93,604		1,72,823	
		<u>99,34,505</u>	<u>1,72,823</u>	<u>91,44,182</u>

	1957-58		1956-57	
	Rs.	Rs.	Rs.	Rs.
		B.F.—99,34,505	B.F.—91,44,182	
<i>What we owe—</i>				
1. Depreciation Fund ..	7,25,084		5,76,060	
2. Leave and Pension Reserve.	3,31,179		2,97,099	
3. Amounts to be paid ..	4,89,876		4,36,418	
4. Miscellaneous deposits ..	1,39,999		94,938	
		<u>16,86,138</u>	<u>14,04,515</u>	
		82,48,367	77,38,667	
<i>Surplus to be distributed between Government and the Institute—</i>				
1. Net Surplus (after providing for all expenses).		16,45,322	16,05,510	
		<u> </u>	<u> </u>	
<i>What remains—</i>				
1. Capital		<u>66,03,045</u>	<u>61,34,157</u>	

WHAT WE EARNED AND SPENT IN 1957-58

	1957-58		1956-57	
	Rs.	Rs.	Rs.	Rs.
<i>What we earned—</i>				
1. From selling biologicals and drugs.	47,39,370		40,04,914	
2. Value of free supplies ..	75,654		1,89,589	
3. From Analytical Tests ..	54,146		46,953	
4. Value of free analytical tests.	1,40,652		2,60,160	
5. Miscellaneous Sources ..	15,339		2,040	
6. Value of closing Stock ..	17,56,615		14,84,451	
		<u>67,81,776</u>	<u>59,88,107</u>	
<i>What we spent—</i>				
1. On our Employees ..	11,43,367		10,85,767	
2. On raw materials ..	15,86,787		11,88,617	
3. On other purchase and services.	4,65,322		2,71,081	
4. On provision for depreciation, etc.	4,56,527		4,30,726	
5. Value of opening stock.	14,84,451		14,06,406	
		<u>51,36,454</u>	<u>43,82,597</u>	

	1957-1958	1956-1957
	Rs.	Rs.
<i>Surplus to be distributed between Government and the Institute—</i>		
1. Net Surplus (after providing for all expenses).	16,45,322	16,05,510
<i>How the surplus will be distributed—</i>		
1. 50 per cent. to the Government.	8,22,661	16,05,510 (100 per cent.)
2. 50 per cent. to the Institute Development Fund.	8,22,661	Nil.

The nett profit has been arrived at, after accounting for all expenses like depreciation, interest, leave and pension reserve, etc. The productive activities of the Institute have reached an optimum level and further advance would be possible only with the help of new expansion schemes.

Acute shortage of staff continued, placing heavy strain on the existing staff. The necessary consolidated proposal is being prepared for submission to Government to organise the work on systematic and scientific lines.

For the period April to September 1958, the Institute succeeded in obtaining a foreign exchange of Rs. 5,64,305 for imports. The import licences were obtained and are under process.

A new section of independent physical verification has started functioning at the Institute.

Exports.—The Far East and Middle East countries continued to show interest in the Institute's biologicals. The European and American countries also showed interest in the snake venoms. The value of exports for 1957-58 came to Rs. 1,33,249. This is a field which requires further expansion.

Price.—During the year, the prices of our products remained the same except that of Sulphadiazine tablets, which was reduced to Rs. 50 per thousand tablets.

General.—

The number of items requisitioned by departments during the year.	761
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The number of customers served	 2,278
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The number of bills issued to customers	 16,066
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The number of parties supplying material	 411
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XVI. WORKSHOP SECTION

The Section comprises of two Units, viz., (1) Small maintenance workshop and (2) Carpentry Section, with their respective machinery.

The functions of the sections are of a multifarious nature and are as under :—

The sections are assisting the Blood Bank in operation, maintenance and management of Desivac Unit, in freeze drying, blood plasma, antivenene and antirabies sera etc. A comparative statement showing the number of charges taken out from the year 1954 to 1958 is given below :—

Year.		No. of charges.
1954	..	14
1955	..	20
1956	..	38
1957	..	57
1958	..	64

It is aiding in maintenance and management of electrical, mechanical, refrigeration and airconditioning, cold storage, incubator rooms and automobiles etc. of all the research production and service departments, including Department of Nutrition which is housed in this Institute.

The Carpentry Unit is fabricating about 18 varieties of crates needed for work and repairs to furniture, handcarts, construction of small cabins etc. In addition to the technical work of the above nature, the Section is assisting in the business side in scrutiny of technical quotations, purchase of machinery and equipment and raw material.

In the light of the increasing activities in the varied fields of expansion of the Institute, the Section has keenly felt the shortage of needed technical personnel and space.

XVII. GRANTS (1958)

1. *Indian Council of Medical Research, New Delhi—*

	Amount. Rs.
(i) Enquiry on "Adaptation of Rabies Street Virus collected Locally, to Chick Embryo".	6,380
(ii) Enquiry on "Nutritive Value of Foodstuff"	11,750
(iii) Drug Research Unit	13,000
(iv) Enquiry on the study of Rodent species and their susceptibility to Plague Infection.	1,650
(v) Enquiry into the liabilities to venereal infection	7,200
(vi) Enquiry on the location and isolation of the pupation hormone in the Indian Housefly.	800
(vii) Research Fellowship in Bacteriology (One Research Fellow).	4,000

2. *Council of Scientific and Industrial Research, New Delhi—*

	Staff. Rs.	Contingency. Rs.
(i) A post of Senior Research Assistant in the Enquiry on "Isolation and Study of the biologically important constituents of venoms of Cobra and Russell's Viper". (One Senior Research Assistant.)	1,463	300
(ii) Senior Research Fellowship for carrying out research work in Chemistry. Manufacture of Cholera Vaccine by submerged culture method. (One Senior Research Fellowship.)	2,941	900

3. *Government of India—*

(i) Research Training Scholarship for carrying out research in <i>Microbiology</i> ("Study of Adenoviruses in Tissue Culture") (One Scholar).	200 p. m.
(ii) Research Training Scholarship for carrying out Research in <i>Bacteriology</i> ("Study of <i>Vibrio Cholera</i> in relation to its Toxin") (One Scholar).	200 p. m.

4. *Government of Bombay—*

(i) Research Scholarship for "Study of Tissues Culture Techniques and its application in the cultivation of viruses". (One Scholar.)	150 p. m.
(ii) Research Scholarship for studying "Salmonella problem and the Phage work". (One Scholar.)	150 p. m.
(iii) Post Doctoral Research Fellowship to continue work on "Isolation of study of the biologically important constituents of venoms of Cobra and Russell's Viper". (One Research Fellow.)	300 p. m.

5. *University of Bombay, Bombay—*

(i) Research studentship for carrying out research on Rat fleas. (One Research student.)	100 p. m.
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6. *Unichem Laboratories, Bombay—*

	Staff. Rs.	Contingency per annum. Rs.
(i) Research Fellowship for research on "Indigenous Drugs". (One Research Fellow.)	250 p. m.	100
(ii) Research Fellowship for research on "Pharmacology". (One Research Fellow.)	250 p. m.	100
(iii) Research Fellowship for carrying out research in the Department of Chemotherapy. (One Research Fellow.)	250 p. m.	600
(iv) Research Fellowship for Research on Synthetic Drugs. (One Research Fellow.)	250 p. m.	1,200

XVIII. LIST OF DISTINGUISHED VISITORS DURING 1958

1. The Soviet Women's Delegation.
2. Dr. D. V. Ter-Avenseyar, Counsellor of the Embassy, U.S.S.R.
3. Dr. A. Tabibzadeh, Teheran, Iran.
4. Dr. L. Ross, Chairman, C.S.I.R.O., Australia.
5. Dr. P. F. Butler, Assistant Research Secretary, Biological Sciences, C.S.I.R.O. Australia.
6. Dr. Chamseddine M. H., Mofidi, Malaria Institute, Teheran, Iran.
7. Dr. L. J. Harris, Director, Dun Nutritional Laboratory, Cambridge, U. K.
8. Mr. Parry Jones, Fission Test Control Ltd., Cambridge, England.
9. Prof. I. I. Emanuiloff, Bulgarian Academie of Science.
10. Mr. Wilhelm Billig, Commisar for Atomic Energy, Poland.
11. H. E. Shri S. Fazl Ali, Governor of Assam.
12. Mr. Kilalchick, U.S.S.R., Moscow, }
13. Niskov, U.S.S.R., Moscow } Delegates.
14. Mr. J. Popov, U.S.S.R., Moscow }
15. Dr. F. G. Gakharow, M.D., Member of the Delegation, Ministry of Health, U.S.S.R.
16. Mr. N. I. Bruk, Protocol Section, Foreign Relations Department, Ministry of Health, U.S.S.R.
17. Dr. Alexander Barashov, Production Medical Equipment, U.S.S.R.
18. Shri W. A. Ayyangar, Speaker, Lok Sabha.
19. Col. Jaswant Singh, D.G.H.S., New Delhi.
20. Prof. G. S. Fraenkel, University of Illinois, U.S.A.
21. Shri Balvantray G. Mehta, Chairman, Estimates Committee of the Parliament of India.
22. Shrimati Sucheta Kripalani, M. P.
23. Shri Rajeshwar Patel, M.P.
24. Shri R. Ramanathan Chettiar, M.P.
25. Dr. Sushila Nayar, Member, Lok Sabha.
26. Shri Mathuradas Mathur, M.P.
27. Shri Sri Prakasa, Governor of Bombay.
28. L. A. Kenney, W.H.O.O., New Delhi.
29. Dr. G. N. Kaul, Professor of Physiology, University of Ceylon.

30. Dr. O. Ketusinh, Professor of Physiology, Siriraj Hospital, Bangalede, Thailand.
31. Dr. Mya Tn, Department of Physiology, Faculty of Medicine, University of Rangoon.
32. Dr. Vek Netravisesch, Department of Physiology, University of Medical Sciences, Bangkok, Thailand.
33. Shri V. P. Naik, Minister for Agriculture.
34. Shri T. Locuifer, Cultural Counsellor, French Embassy, New Delhi.
35. Shri H. Dumour, Consul General for France, Bombay.
36. Dr. Sef El. Din. El. Arnaouti, Deputy Director, Epidemic Control M.P.H., Cairo, Egypt.
37. Mr. A. Natradze, Head of the delegation, Chief of the Medical Drugs Department, Ministry of Health Service, U.S.S.R.
38. Mr. E. Valachek, Chemical Engineer of Pharmaceutical and Antibiotics Industry, Chief Engineer Planning Institute of Medical Industry, Ministry of Health Service, U.S.S.R.
39. Mr. P. Rassadnikov, Engineering Technologist on dyes and intermediate; Chief of Catalyst Laboratory of Research Institute of Dyes and Intermediates.
40. Mr. V. Dvoriakovskie, Advising Engineer on Medical equipment and Instruments.
41. Mr. D. Kolesnikov, Advising Engineer on manufacture of alkaloid and Vegetable compounds.
42. Mr. V. Mikhalov, Advising Chemical Engineer.
43. Mr. Y. Krol, Advising Engineer on endocrine preparations.
44. Mr. N. Pavlov, Senior Economist.

XIX. LIST OF THE PAPERS PUBLISHED IN THE YEAR 1958

1. Ball, B. G. (Mrs.) and Sheikh, U. A. Survey of leptospirosis in Bombay. American Journal of Hygiene. 67; 66, 1958.
2. Bharadwaj, T. P.; Suitaria, P. B. and Jhala, H. I. 17-Hydroxysteroid in the Plasma and Urine of patients with tropical Eosinophilia Indian Journal of Pathology and Bacteriology 1; 226. 1958.
3. Bharucha, E. D. and Venkatraman, A. Studies on estimation of serum protein. Part II-Comparison of Howe's albumin with "True Albumin" in cases of Hypoalbuminaemia Indian Journal of Medical Sciences. 12, 1031, 1958.

4. Deoras, P. J. and Gokhale, M. S. Some biometrical observations on the common Bombay Rats. *Journal of Bombay Natural History Society* 55 ; 450, 1958.
5. Dutta, N. K. Pharmacological action of *Aristolochia bracteata* Retz, on the Uterus. *Indian Journal of Pharmacy*. 20; 302, 1958.
6. Dutta, N. K. and Colah, R.B.M. Novobiocin in experimental Cholera. *Journal of Post-graduate Medicine*. 4 ; 13, 1958.
7. Gharpure, P. V. and Jhala, H. I. Normal Standards for bodyweight and organ weights in India. *Indian Journal of Medical Sciences*. 12, 445, 1958.
8. Habbu, M. K. Biological assay of typhoid vaccine. *Indian Journal of Medical Research* 46 ; 535, 1958.
9. Jhala, H. I. Immunology of Influenza Vaccine. *Journal of J. J. Group of Hospitals and G.M.C.* 3 ; 66, 1958.
10. Jhala, H. I. Mycotic Diseases in India. *Journal of J. J. Group of Hospitals and G.M.C.* 3 ; 45, 1958 (Edit).
11. Kulkarni, K. V. Incidence of Rh. iso-immunization. *Journal of J. J. Group of Hospital and G.M.C.* 3 ; 165, 1958.
12. Kulkarni, K. D. A process for preparation of para-nitroacetophenone and other substituted Acetophenones. *Journal of Scientific and Industrial Research*. 17A ; 89, 1958.
13. Kulkarni, K. V. and Pradan, M. G. A case of anti-p-agglutinin. *Indian Journal of Medical Sciences* 12 ; 624, 1958.
14. Mungale, M. D.; Jhala, H. I. and Welinkar, W. N. Seroreactivity for Syphilis in Bombay. *British Journal of Venereal Diseases*. 34 ; 113, 1958.
15. Parekh, J. G.; Dixit, C.M.; Jhala H. I.; Mody, B. M. and Ramasarma, C. B. Serum Vitamin B-12 concentration in patients with anaemias and other diseases. *Journal of Association of physicians in India*. 6; 173, 1958.
16. Patel, B. D.; Sharma, R. S.; Jhala, H. I.; Parekh, J. G. and (Kumari) Kothari, G. C. Note on Serum Vitamin B-12 Concentration in Normal pregnant Women. *Journal of J. J. Group of Hospitals and G.M.C.* 3 ; 102, 1958.
17. Sabnis, S.S.; Kulkarni, K. D. and Deliwala, C. V. Preparation of Acetophenone and substituted acetophenone. *Journal of Scientific and Industrial Research*. 17A ; 421, 1958.
18. Sabnis, S. S. and Shirsat M. V. Studies in the synthesis of B-Aminosalicylic acid. *Journal of Scientific & Industrial Research* 17B; 451, 1958.
19. Sethna, Y. I. and Soman, D. W. On the value of complement fixation test in the diagnosis of Rabies. *Indian Journal of Public Health*. 2; 258, 1958.
20. Sharma, R. S.; Parekh, J. G.; Jhala, H. I.; Saraiya, C. G., (Kumari) Kothari, G. C. and Patel, B. D. A note on serum iron concentration in normal pregnant women. *Journal of J. J. Group of Hospitals and G.M.C.* 3 ; 189, 1958.

21. Soman, D. W. and (Kumari) Patel, M. C. Comparison of toxigenicity tests of *C. diptheria* by three different methods. *Indian Journal of Medical Science.* 12; 235, 1958.
22. Venkatraman, A. (Mrs.) Studies on the estimation of serum proteins Part I-Chemical determination of true Albumin and globulins by Microkjeldahl-Nesslerisation technique. *Indian Journal of Medical Sciences.* 12; 1021, 1958.

XX. LIST OF PAPERS SUBMITTED FROM HAFFKINE
INSTITUTE DURING JANUARY TO DECEMBER 1958
AND WAITING FOR PUBLICATION

1. Bharadwaj, T. P.; Gaitonde, B. B.; and Jhala, H. I. Histamine and tropical Eosinophilia. *Indian Journal of Medical Research.* (In press.)
2. Bharadwaj, T. P. and Jhala, H. I. Adrenocortical function tests in Normal Indians and in patients of Tropical Eosinophilia. *Indian Journal of Pathology and Bacteriology.* (In press.)
3. Bharadwaj, T. P. and Jhala, H. I. Studies in the metabolism of infused hydrocortisone in Normal individuals, and in patients in tropical Eosinophilia. *Annals of Biochemistry and Experimental Medicine, Calcutta.* (In press.)
4. Bharadwaj, T. P. and Jhala, H. I. Steroidogenic assay of endogenous ACTH in normals and patients with tropical Eosinophilia. *Annals of Biochemistry and Experimental Medicine.* (In press.)
5. Bharadwaj, T. P.; Sutaria, P. B. and Jhala, H. I. 17-Hydroxysteroids in urine and plasma of Normal Indian Adults. *Indian Journal of Medical Research.* (In press.)
6. Bundealli, Amina; Habbu, M. K. and Deliwala, C. V. Curative value of sulphamethoxy-pyridazine in experimental plague infection in mice. *Indian Journal of Medical Research.* (In press.)
7. Deoras, P. J. and Gokhale, M. S. Studies on Bombay Rats.. Part III. Some observations on the flea parasites of Bombay Rats. *Journal of University of Bombay.* (In press.)
8. Deoras, P. J. and Joshee, A. K. Proventricular teeth in some rat fleas. *Indian Journal of Medical Research.* (In press.)
9. Khemani, K. M. Importance of Biological tests in the diagnosis of Rabies. *Indian Journal of Medical Science.* (In press.)
10. Khemani, K. M. Study of Rabies Virus Tropism for salivary glands. *Indian Journal of Medical Sciences.* (In press.)
11. Master, R. W. P. and Rao, S. S. Identification of Cholineesterase in Cobra Venoms after electrophoretic separation on starch gel. *Current Science.* (In press.)

XXI. ACADEMIC COURSES

The Institute is affiliated to the University of Bombay for post-graduate training courses in the following degrees :—

M.Sc. and Ph.D. in Microbiology, Bacteriology, Biochemistry (including Nutrition), Zoology and Organic Chemistry.

M.Sc. & Ph.D. (Med.) in Pathology, Bacteriology, Parasitology and Pharmacology.

The following are post-graduate teachers recognized by the University of Bombay :—

1. Dr. H. I. Jhala.
2. Dr. N. K. Dutta.
3. Dr. P. J. Deoras.
4. Dr. C. V. Deliwala.
5. Dr. A. N. D. Nanavati.
6. Dr. S. S. Rao.
7. Dr. M. V. R. Rao.
8. Dr. S. M. Patel.
9. Dr. M. V. Sant.
10. Shri K. G. Anantanarayanan.

The Institute is also recognized by the College of Physicians and Surgeons of Bombay for training candidates (a) for F. C. P. S. Examination in Pathology and Pharmacology and (b) for D. P. B. Examination of the College.

The following Officers of the Institute are recognized as teachers of the College :—

1. Dr. H. I. Jhala.
2. Dr. N. K. Dutta.
3. Dr. M. V. Sant.

Facilities were offered to Science Graduates to prosecute their studies for post-graduate studies. During the period under review following students registered their names at this Institute for the post-graduate courses :—

1. Smt. Susy Cherian.
2. Kumari I. R. Ovalekar.
3. Kumari P. K. Khandwala.
4. Kumari M. S. Sawant.
5. Kumari K. K. Patel.
6. Shri S. A. Vengsarkar.
7. Kumari L. S. Kadaba.
8. Shri S. E. Mhasalkar.
9. Kumari R. Mendez.
10. Kumari C. Ved Prakash.
11. Shri D. V. Mehta.
12. Shri R. T. Talvalkar.
13. Shri K. M. Khemani.
14. Kumari B. A. Ver.

15. Kumari M. C. Patel.
16. Dr. M. V. Bapat.
17. Smt. Sunder Kantha (Sethi).
18. Kumari Savitri Choyi.
19. Shri M. L. Chainani.
20. Shri A. K. Joshee.
21. Kumari G. C. Kothari.
22. Shri A. B. Martins.
23. Shri G. Bhaskaran.
24. Shri M. G. Nerurkar.
25. Kumari V. N. Wankar.
26. Shri M. R. Shirsat.
27. Kumari S. H. Aswani.
28. Kumari M. N. Guttikar.
29. Kumari D. H. Shah.
30. Shri M. S. Madiwale.
31. Shri E. D. Bharucha.
32. Shri A. P. Bhandarkar.
33. Kumari S. L. Shah.
34. Shri M. V. Panse.
35. Shri C. J. Mehta.

Kumari M. C. Patel, B.Sc., obtained her M.Sc. (Microbiology) degree by thesis entitled "Comparative Study of Different Methods for Recognizing the Toxigenicity of *Corynebacterium Diphtheriae* Strains Isolated in Bombay".

There are several research fellowships awarded at this Institute by national agencies, such as the Indian Council of Medical Research, Council of Scientific and Industrial Research, State and Central Governments. The Institute also takes up research fellows who may be recipients of fellowships of the National Institute of Sciences of India or any other endowment. These fellowships are open to science and medical graduates. The Institute takes the advantage of sponsoring research schemes through the Indian Council of Medical Research on specific projects. The laboratories of the Institute are exceptionally well-equipped with laboratory apparatus and attract international visitors and trainees from organisations like the World Health Organisation, UNICEF, Colombo Plan and Rockefeller and other International Foundations. The Institute has contributed substantially in several fields of medical research.

The following Research Fellowships and Scholarships were attached to the Institute during the period under review :—

Serial No.	Sponsors.	Subject of Fellowship/ Scholarship.	Name of Candidate.
1	Unichem Laboratories, Bombay.	Indigenous Drugs ..	Shri S. D. Kakde, M.Sc., from 11th September 1958.
2	Do.	.. Pharmacology ..	Dr. D. R. Kulkarni, M.B.B.S., from 12th May 1958.
3	Do.	.. Research work in the Department of Chemotherapy.	Shri C. B. Thanawalla, M.Sc., from 15th January 1958.
4	Do.	.. Synthetic Drugs ..	Miss Zainab Muljiani, M.Sc., from 15th January 1958.
5	Council of Scientific and Industrial Research, New Delhi.	Isolation and Study of the biologically important constituents of venoms of Cobra and Russell's Viper.	Dr. R. W. P. Master, M.Sc., Ph.D. (up to 30th June 1958).
6	Do.	.. Chemistry ..	Dr. B. R. Amesur, B.Sc. (Hons.), M.A., Ph.D. (Calif.), from 21st July 1958.
7	Government of Bombay Post Doctoral Research Fellowship.	Isolation and Study of the biologically important constituents of venoms of Cobra and Russell's Viper.	Dr. R. W. P. Master, M.Sc., Ph.D., from 1st July 1958.
8	Government of India Research Training Scholarship.	Microbiology ..	Kumari M. Savitri, M.Sc., from 28th August 1956.
9	Do.	.. Bacteriology ..	Shri M. V. Panse, M.Sc., from 6th June 1958.
10	Government of Bombay Research Scholarship.	Study of Tissue Culture Techniques and its application in the cultivation of Viruses.	Kumari R. A. Mendez, B.Sc., from 30th April 1956.
11	Do.	.. Salmonella Problem and the phage work.	Kumari M. C. Patel, B.Sc., from 30th August 1956.
12	Indian Council of Medical Research, New Delhi.	Higher Training in Bacteriology.	Dr. M. V. Bapat, B.Sc., M.B.B.S., from 12th November 1956 to 6th November 1958.
13	Bombay University, Bombay.	Research on Rat fleas.	Shri A. K. Joshee, M.Sc., from 2nd February 1958.

XXII. TRAINING OF HEALTH PERSONNEL

The Institute plays an important role in the dissemination of scientific knowledge by affording facilities to persons desirous of learning different types of techniques, either for the prosecution of research problems or for routine working in their different spheres of activities. In addition, short courses of training of a preliminary nature are given to Public Health Personnel with a view to enable them to carry on their disease control work efficiently. Following is the list of persons to whom training was given in various departments during the period 1958 :—

Serial No.	Name.	Designation and address.	Department allotted.	Duration of training.
1	Shri K. Panchapakesan.	Chemist, Fine Pharmaceuticals, Kumbakonam.	Pharmacology ..	2nd January 1958 to 30th June 1958.
2	Shri P. R. Vachhrajani.	Jetpur, Saurashtra.	Clinical Pathology..	21st January 1958 to 30th April 1958.
3	Shri K. Gopal B. Pharm.	Messrs. Raptakos Brett Co. Private Ltd., Bombay.	Do. ..	14th January 1958 to 15th March 1958.
4	Shri C. B. Thanawalla.	Chemist, Messrs. Unichem Laboratories, Bombay.	Chemotherapy ..	1st February 1958 to 30th September 1958.
5	Shri K. N. Dodhi, B.Sc.	Chemist, Messrs. Worli Chemicals Ltd., Bombay.	Pharmacology ..	1st April 1958 to 31st July 1958.
6	Shri S. S. Nerurkar, 2nd B. Pharm. Student.	Bandra, Bombay ..	Chemotherapy ..	1st May 1958 to 3rd June 1958.
7	Shri A. P. Vyas ..	Senior Attendant, Public Health Laboratory, Ahmedabad Municipal Corporation.	Media ..	1st April 1958 to 31st May 1958.
8	Shri M. N. Kothavale.	Chemist, Bombay Chemicals Private Ltd., Bombay.	Clinical Pathology..	1st May 1958 to 31st May 1958.
9	Shri R. K. Sharma, B. Pharm. Student.	University of Saugar.	Chemotherapy ..	7th May 1958 to 6th July 1958.
10	Shri A. Griffiths ..	St. George's Hospital, Blood Bank Bombay.	..	27th January 1958 to 1st March 1958.
11	Shri Pandya K. P. (as Observer).	M. S. University, Baroda.	Animal House ..	9th March 1958 to 17th March 1958.

Serial No.	Name.	Designation and address.	Department allotted.	Duration of training.
12	Dr. N. K. Prasad, M.B.B.S., D.P.H.	Supdt., Vaccine Institute, Nam- kum, Ranchi.	Antirabic Depart- ment.	15th June 1958 to 23rd August 1958.
13	Dr. N. B. Kuppurajan, M.D.	Assistant Surgeon, King Institute, Guindy.	Serum Department.	27th June 1958 to 23rd August 1958.
14	Shri S. T. Mahajan ..	Stockman, Biological Products, Bombay.	Animal House ..	1st May 1958 to 30th June 1958.
15	Shri Ghulam Nabi Mateen Rustami.	W. H. O. Fellow, from Afghanistan.	Clinical Pathology..	14th January 1958 to 12th May 1958.
16	Shri G. L. Kundnani, B.Sc.	Bombay ..	Chemotherapy ..	11th April 1958 to 10th July 1958.
17	Shri H. N. Vazirani, M.Sc.	Do. ..	Do. ..	17th March 1958 to 16th June 1958.
18	Prof. Dr. C. L. Vohra, L.V.P., B.V.Sc., P.V.S.I.	Punjab College Veterinary Science and Animal Husbandry, Hissar.	Blood Bank, Ento- mology, Antitoxin and sera.	7th July 1958 to 19th August 1958.
19	Shri B. M. Chudgar, B.Pharm.	Analytical Chemist Therapeutic Pharmaceuticals, Bombay 2.	Pharmacology ..	15th July 1958 to 14th October 1958.
20	Miss H. R. Chinoy, B.Sc.	Bombay ..	Clinical Pathology and Pharmacology.	2nd August 1958 up-to-date.
21	Shri M. A. Chandavar- kar, B.Sc. (Hons.).	Chemist, The Fair- deal Corporation (Pvt.) Ltd., Bom- bay 1.	Pharmacology ..	2nd August 1958 to 1st Novem- ber 1958.
22	Shri U. V. Rao, B.Sc.	Bombay ..	All Department ..	2nd September 1958 up-to-date.
23	Shri P. V. Khale, B.Sc.	Do. ..	Do. ..	2nd September 1958 up-to-date
24	Shri M. D. Kothare, B.Sc.	Do. ..	Do. ..	2nd September 1958 up-to- date.
25	Shri M. K. Nakhwa, M.Sc.	Do. ..	Do. ..	3rd September 1958 up-to- date.
26	Kumari U. V. Rege ..	Laboratory Assistant D. M. O. (H.), Central Railway, V. T., Bombay.	Clinical Pathology..	8th September 1958 to 6th December 1958.

Serial No.	Name.	Designation and address.	Department allotted.	Duration of training.
27	Shri J. C. Chimanani, M.Sc.	Bombay	Chemotherapy	14th October 1958 to 13th January 1959.
28	Shri G. T. Wagle (as Observer).	Laboratory Assistant Hindustan Antibiotics (Pr.) Ltd., Pimpri, Poona.	Pharmacology	3rd November 1958 to 15th November 1958.
29	Shri Ramaniah, M.Pharm.	Chemist, Essen and Co., Bangalore 3.	Pharmacology	15th October 1958 to 14th January 1958.
30	Shri A. K. A. Masood, B.Sc.	Bombay	Biochemistry Clinical Pathology, Pharmacology, etc.	24th November 1958 up-to-date.
31	Dr. S. Dragoljib	From Yugoslavia under Reciprocal Scholarship Scheme.	Virus, including Anti-Rabies Vaccine, etc.	19th December 1958 to 20th January 1959.
32	Shri C. Sivasankaran, B.Sc.	Bombay	Chemotherapy	15th November 1958 up-to-date.
33	Shri M. M. Hadi	W. H. O. Fellow from Afghanistan.	Clinical Pathology	13th October 1958 up-to-date.
34	Dr. Sef El Din El Arnaouti (as Observer).	W. H. O. Fellow from Egypt.	Vaccine, Pharmacology, etc.	One week from 10th December 1958.
35	Dr. A. H. Trivedi	Unichem Laboratories, Bombay 26.	Chemotherapy	1st November 1958 up-to-date.

Laboratory Technician's Training Course.—With the inauguration of the Laboratory Technicians Training Course from 11th August this year, the Institute has gone one step further in the dissemination of the Scientific knowledge, which is one of the premier functions of this Institute. In a country which has pledged its economy to a planned development there is always an unprecedented demand for scientific and technical personnel. Any scientific or technical graduate with mere academic qualification cannot fit in properly in the structure of the planned development unless he has undergone a specialized training suitable for the plan.

The duration of the course is of 9 months only. After the candidate has successfully completed the Elementary Course lasting 6 months, he has the option to select any one of the specialised subject for training, viz. Pathology and Bacteriology, Clinical Biochemistry, Drug Analysis, Production and Standardization of some Biologicals, Organic and Biochemical Analysis and Zoology.

There will be an examination at the end of the advanced course, and the successful candidates will be given a certificate in this connection.

Sixteen science graduates were admitted to this training course as given below :—

1. Kumari J. S. Vatandar,
2. Kumari V. V. Karia,
3. Shri J. K. Oza,
4. Shri N. I. Shaikh,
5. Kumari N. J. Shah,
6. Shrimati K. B. Madekar,
7. Shri S. W. Parchure,
8. Shri P. K. Deshpabhu,
9. Shrimati M. M. Pandit
10. Shri G. T. Kamat,
11. Kumari U. K. Naik,
12. Shri B. D. Sohoni,
13. Shri K. Madhukar,
14. Shri R. G. Bhatwadekar,
15. Shri N. K. Maladkar,
16. Kumari S. S. Sawant.

XXIII. MISCELLANEOUS

(a) *India 1958 Exhibition.*—Haffkine Institute participated in the INDIA 1958 Exhibition held in New Delhi from 8th September 1958 to 31st January 1959. Nearly 800 sq. feet of floor space was occupied by the Institute in the Government of Bombay Pavilion.

In order to make the exhibition intelligible to all the sections of the population and to show the activities of the Institute in a pictorial form, life-size colourful cutouts, big photographs and actual samples of the life-saving biologicals manufactured by the Institute were put up. Emphasis was laid on the importance and uses of vaccines, toxoids, sera (including Antivenene) freeze-dried blood plasma and the research activities carried out in the Institute.

From the visitor's Remark book, it was observed that very few people, even in the medical profession, knew about the life-saving biologicals prepared by the Institute, which stresses the need for participating in such exhibitions to make the public conscious about taking vaccines and toxoids as preventive medicines and antitoxines and sera as curatives.

(b) *Haffkine Institute Co-operative Credit Society Ltd.*—The Society has made satisfactory progress during 23rd year :—

1. The total strength of the members of society is 444 (as it stood on 30th June 1958) as against 432 of the last year.
2. The subscribed capital of the Society as on 30th June 1958 is Rs. 1,73,071.57 showing an increase of Rs. 13,917.27 over that of the previous year.

3. The Society is carrying the business of advancing loans to members of the Society—the loans advanced to members during the current year amounts to Rs. 1,72,120.06 which is less than that of the previous year Rs. 15,254.43. It is worth mentioning here that on the whole there appears to be a fall in borrowings as compared to the previous year.

4. The society has also utilised the funds in the purchase of Government Securities, B.M.D. and National Savings Certificates which amount to Rs. 27,056.57.

5. The society is registered as an agent under the existing rules of the following agencies and also is doing this agency business:—

- (i) Janata Policy of Life Insurance Corporation of India ;
- (ii) Small Savings Scheme such as National Savings Certificates.

Due to these agencies, the Society has created opportunities to its members to encourage thrift and help the Small Saving Drive of the Government.

6. The Society is also running a grain shop for the benefits of its members as well as the residents of the Institute and has transacted a business of Rs. 55,220.09 in sale of grains ; it is an authorised shop dealing in rationed foodgrains.

The appropriation of profits for this year is as follows :—

			Rs.
Reserve Fund 25 per cent.	..	..	2,191.23
Dividend Equi. Fund	..	..	165.00
Charity Fund	..	..	50.00
Dividend	..	..	5,808.70
Bonus to staff	..	..	320.00
Balance	..	..	268.20
			8,803.13

(c) *Welfare Activities—Dispensary.*—Institute Dispensary continued to cater to the needs of the workers of the Institute as usual. It is necessary that a suitable place be provided for housing dispensary and a suitable clinical examination room.

Tuberculosis Survey.—With the kind co-operation of the Bombay State Anti-tuberculosis Association, a survey of the incidence of the tuberculosis was undertaken. Four hundred and fifty workers were covered by this survey. They were x-rayed ; and in doubtful cases, examination of blood for E.S.R. and differential counts were carried out and physical examinations also were carried out. The cases detected were referred to the J. J. Hospital for further treatment. The advised treatment was followed up here. The Government has been pleased to sanction that in future such cases can be treated at this Institute and the medicines supplied by this Institute,

Ophthalmic Examination.—All the persons engaged in sealing the ampoules (i.e. working against bright light) were referred to the C. J. Ophthalmic Hospital for examination of their eyes, and in some cases refractive errors due to age were detected and the glasses prescribed.

First Aid Facilities.—First aid centres are fitted up in different centres. Necessity is felt about fitting up an ambulance room and steps are being taken in this direction. Minor injuries are attended to locally and serious ones are directed to the neighbouring hospital.

General.—UNICEF aided milk distribution centre for ill-nourished young children in staff colony is opened on premises with the help of Nutrition Department. Nearly 70 children take advantage every day on the premise.

A Welfare Centre for workers, a Library for workers, social education classes for workers, health and family planning propaganda among the workers and cultural and sports programme were arranged.

The Haffkine Institute Sports Club was put on a sound footing this year. The sports club has its constitution set with definite aims and objects. The members of staff can take part in many of the activities of the Sports Club on payment of nominal fees. In addition to the regular games played every year the Haffkine Institute Sports Club this year has introduced additional facilities for (i) indoor games, (ii) athletics and (iii) cultural activities.

The Cricket Club too participated in the E. Merck Tournaments for Pharmaceuticals Laboratories. The Cricket Team was successful in reaching up to the semi-finals of the tournament but unfortunately lost to the last year's winners. The increasing popularity of the Table-tennis, necessitates the demand for an additional table to accommodate all the enthusiastic members. The Tennis and Badminton Committees could not arrange the regular practice and tournaments as the ground were under repairs.

