BULLETIN OF THE

MEDICAL RESEARCH INSTITUTE

OF SRI LANKA

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BULLETIN OF
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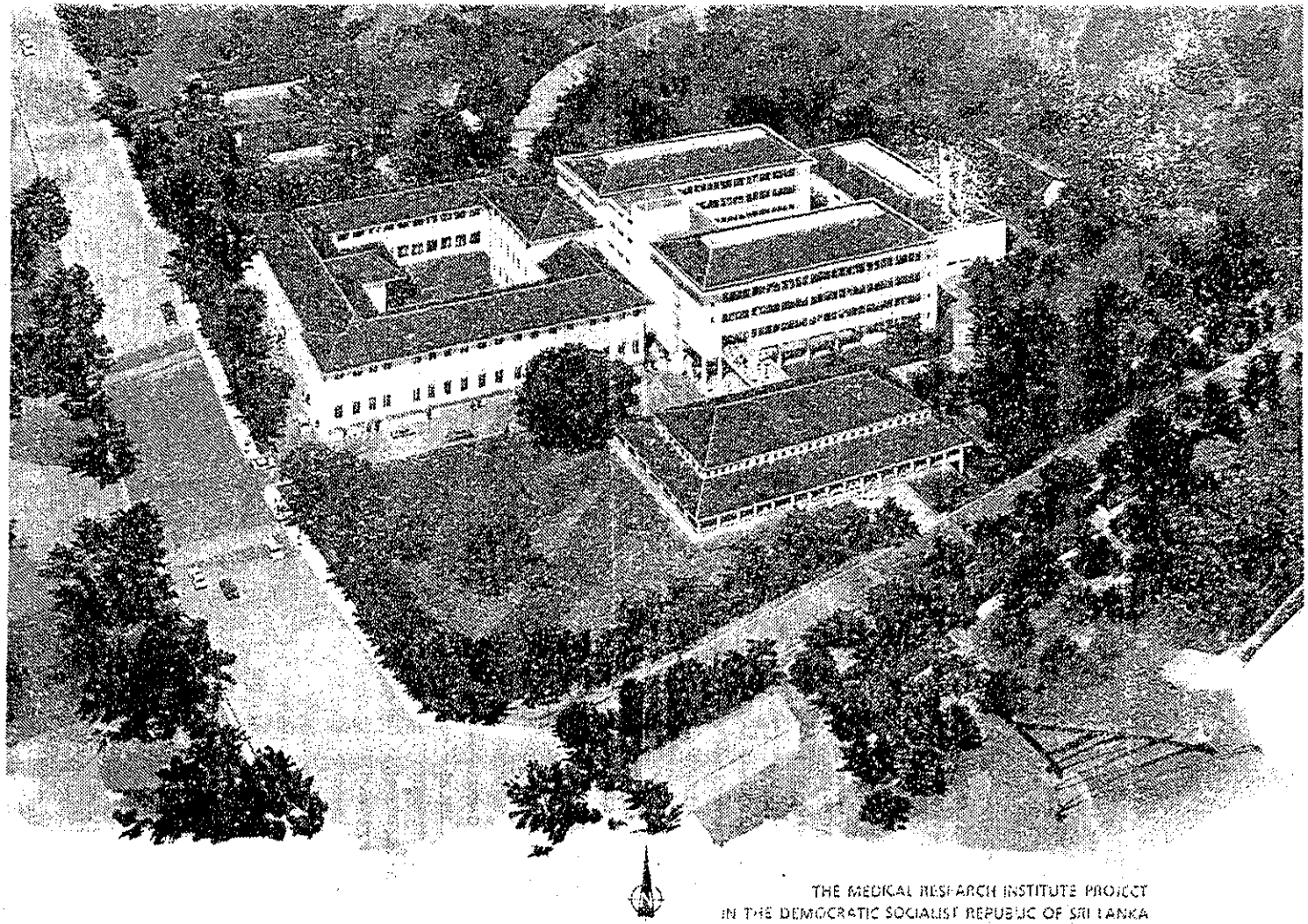

THE MEDICAL RESEARCH INSTITUTE PROJECT
IN THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

EDITORIAL

THE NEW MEDICAL RESEARCH INSTITUTE

The Medical Research Institute – M. R. I. (Formerly the De Soysa Bacteriological Institute) was established in 1899. From its inception, the M.R.I. was recognised as the premier medical research and reference institute in the country. Under the able guidance of many distinguished medical scientists, the institute gradually expanded its role and was called upon to undertake varied functions such as, *inter alia*, vaccine production, health education and much routine diagnostic testing.

It has been evident for some time that the facilities available at the M.R.I. were inadequate to fulfil its manifold functions. Consequently the Japanese Government acting on a request from the Sri Lanka Government instructed the Japan International Co-operation Agency (JICA) to supervise the construction of a new Medical Research Institute.

The aims of the expansion and improvement scheme for the M. R. I. were defined as follows :

(1) Rehabilitate and improve the existing M. R. I. which is functionally limited by constructing modern research facilities that will enable it to play the role of a National Reference Laboratory.

(2) Amplify the educational facilities for the training of medical laboratory technologists and other grades which have been deficient in order to be able to cope with the growing demand for microbiologists, technologists, etc.

(3) Upgrade the level of research activities and teaching techniques by realising the despatch of trainees to Japan and despatch of experts from Japan under the JICA Technical Co-operation Scheme.

The task of construction was entrusted to Kume Architects and Engineers Ltd. The original plan envisaged the demolition of the old group of buildings and construction of the new complex on the same site but it was later decided to build the new complex to the east and south of the existing main building and to utilise the latter for subsidiary functions.

The New Laboratory Complex, Animal and Biological Production Centre and Medical Laboratory Technologists (M.L.TT.) Training Centre will be situated to the east and south of the existing buildings and will consist of the following components :

	Square Metres
1. Laboratory Building	6,849
2. Animal Centre and Department of Biological (Vaccine) Production	1,584
3. M.L.TT. School Building	1,359
4. Animal Quarantine shed	99
5. Supplementary facilities incinerator, oil tank, sewage treatment works, etc.	
Total	9,891

The Laboratory Complex will consist of a 4 storey structure and M.L.TT. School and Animal House of 2 floors each. The Laboratory Complex and Vaccine Unit/Animal House will be closely inter-linked.

In the Laboratory Complex itself the, distribution of departments will be as follows :

GROUND FLOOR

Department of Nutrition with laboratories and instrument room,
Director's and Deputy Director's rooms,
Branch Library,
Reception,
Subsidiary telephone exchange,
Deptartment of Vaccines and Biological Products,
Conference Room.

1ST FLOOR

NORTH WING

Department of Parasitology and Entomology.

SOUTH WING

Department of Biochemistry including the Radio Immunoassay Section and Quality Control.

2ND FLOOR

NORTH WING

Department of Microbiology (Aerobic, Anaerobic and Entero-Bacteriology, Mycology, Food and Water, Leptospira and Media preparation).

SOUTH WING

Haematology,
Histopathology,
Immunology and Allergy (New Department),
Quality Control (New Department).

3RD FLOOR

NORTH WING

Virology :

Rabies and Neurological Viruses,
Arbo Virus,
Respiratory Virus,
Entero Viruses,
Chlamydia and Rickatsiae (New Department
High Risk Laboratory for processing potentially hazardous pathogens,
2 Electron microscopes.

SOUTH WING

Medicinal plants (natural products),
Pharmacology.

Each floor will also include seminar rooms, walk-in incubators, cold rooms, specimen reception rooms, washing and changing rooms, stores, consultants' rooms and toilets. Micro computers will be installed on every floor to serve the departments on that floor. There will also be a maintenance workshop, instrument room, glass blowing section and department of photomicrography housed on the 1st floor.

The Department of Biological Production and the Animal House will be situated to the east of the laboratory complex. The ground floor will be devoted to production of bacterial, viral vaccines and antisera and snake antivenin production and breeding of mice, hamsters, rats, pigs and rabbits. The first floor will have the animal experimental room, operating theatre and post-mortem room, and animal quarantine shed will be situated at some distance north of this building.

The Training Centre for Medical Laboratory Technologists and other grades will be situated to the south of existing building and new laboratory complex. It will contain M.L.TT. Training Laboratories on the ground floor and lecture theatre (Audio-Visual Hall), extending up from the first floor. The Audio-Visual Hall will also be utilised by the M.R.I. for lectures, seminars workshop, etc. This Complex will also contain preparation rooms, canteens, Toilets, etc., for the M.R.I.

The current M.R.I. Laboratory Complex will be modified to serve different functions. The existing office space will be expanded to occupy almost the entirety of the western portion of the ground floor (area abutting on Danister De Silva Mawatha). The telephone exchange will also be housed here. The northern wing (adjacent to Serpentine Road) will be taken over by the Nutrition Department. The ground floor south wing (next to Magazine Road) will be adapted to provide a series of consultation rooms where patients referred by medical specialists will be seen by M.R.I. consultants by appointment. The eastern wing will provide a common room for the minor staff.

1st Floor (Old MRI)

A portion of the western wing will be occupied by the expanded library. The balance west wing and the entire northern section will be taken up by the M.L.TT. School and will be utilized as lecture

theaters, laboratories, seminar rooms and library for trainee technologists. The southern wing will be reserved as laboratories for inter-country and intra-country workshops and the eastern section will be modified to provide a common room for the middle grade staff.

The existing Entomology Department. (The original Bacteriological institute) will be retained as a Medical Museum.

The total projected cost of the New complex (Borne by the Japanese Government) is estimated at Rs. 780 million and the local costs (demolition, levelling of site, provision of utilities, etc.) at Rs.19 million.

Work at the site was initiated on 8.8.1988. Construction work and installation of equipment is estimated at 19 months. The laboratory will be ready for use by March 1990.

Noteworthy features of the New Institute are –

(1) New Departments of Immunology, allergy and quality control.
(2) High risk laboratory for processing hazardous pathogenas,
(3) Separate section for Chlamydia and Ricketsiae,
(4) Production of snake antivenin and expanded facilities for production of bac terial, viral vaccines and antiserum,
(5) Audio - visual Hall,
(6) Computers,
(7) Expanded Animal House with provision of a Veterinary Surgeon,
(8) Two electron microscopes,
(9) Separate maintenance section for the institute,
(10) Medical Museum,
(11) Clinics for investigating referred patients,
(12) Provision of a Deputy Director,
(13) Integrated School for Medical Laboratory Technologists,
(14) Special laboratory for Inter-country and Intra-country workshops,
(15) Air conditioning for departments where necessary.

The new laboratory will be fully equipped by the Japanese Government, according to the requests made by each department. The equip ment supplied would vary from electron microscopes, inverted microscopes, and lyophillising machines to water baths and sonicators. The Centre for Medical Instrumentation (Maintenance section) will be staffed by 2 engineers, 6 technicians and assorted carpenters, electricians and orderlies. The total annual cost for 1990 (Staff, equipment maintenance and repair costs, etc.) is estimated at Rs. 19,807 Million.

Staff and Training

It is estimated that with the expanded functions of the M.R.I. the Staff requirement would increase as follows :

	Medical Consultant Medical Officers Research Officers	*Medical Laboratory Technologists*	*Laboratory Orderlies*
1987	34	71	61
1990	57	109	93
1995	73	137	117

MRI – PLAN

The New (and some of the old) staff will receive specialised training in Japan under the Technical Corporation Scheme. Among those to be trained in specialised fields (for periods ranging from 6 months - 1 year) are Virologists, Microbiologist, Mycologists, Parasitologists M.L.T. Tutors, Veterinary Surgeons, Technologists and Laboratory Equipment Maintenance Officers. The Japanese authorities too will send appropriate experts to train staff and maintain equipment at the M.R.I.

The generous assistance of the Japanese Government has offered an unique opportunity for the Medical Research Institute to fulfil its role as the premier medical research, referral, training and Vaccine Production Centre in Sri Lanka. With this impetus there is no doubt that the M.R.I. would maintain its reputation for excellence in laboratory medicine in the country in the future as it has in the past.

REPORT OF THE DIRECTOR M. R. I.

THE M.R.I. continues to play its key role in the Health Services as the National Reference Laboratory and as the largest laboratory servicing both the curative and preventive services. Its activities in 1987 may be categorised as follows :

1. **Routine Diagnosis**

The M.R.I. continued to receive a large volume of specimens for routine laboratory tests from hospitals throughout the country. With the present shortage of laboratory consultants and technologists in the country the output of routine laboratory tests in the hospitals continue to fall and this has placed a greater load on the M.R.I. In the fields like Virology, Mycology, Serology and Leptospirosis the M.R.I. continues to provide the main routine diagnostic service for the entire country. The M.R.I. has been trying out commercial kits and comparing their performance with the standard methods with a view to overcome the problem posed by the shortage of technologists. Action has been taken through WHO to obtain such kits and also set up an Immunology Unit which will assemble kits here. A start has already been made to prepare kits for markers of Viral Hepatitis and a Medical Officer and a Biochemist have been recruited and sent to C.D.C., Atlanta, U.S.A. for training. The work load had also increased with the introduction of new routine tests.

2. **National Reference Laboratory**

The M.R.I. continues to fulfill its role as the National Reference Laboratory doing the more complex and specialised tests, producing and supplying antigens and antisera to other laboratories and promoting a quality control programme. The quality control programme in clinical chemistry has been implemented and extended to the sixteen laboratories that participated in the 1984 workshop. The M.R.I. continued to participate in the International External Quality Assessment Scheme for Clinical Chemistry which began in February, 1985. Action was taken to introduce WHO recommended methods for the testing of SGOT, SGPT, Albumin, Calcium and Alkaline Phosphatase. While the WHO methods are satisfactory for glucose, bilirubin and calcium they are not satisfactory for cholesterol under our conditions. The quality control workshop in Microbiology that was scheduled to be held in 1986 was put off due to lack of funds and the inadequacy of Microbiology services outside Colombo. Instead this money will be pooled with that already voted to have a workshop in Haematology in 1988. The M.R.I. assisted the Health Ministry in the Drug Quality Control Programme as well, by testing for potency and sterility. The Immuno-fluorescence test for HFRS diagnosis was also started.

3. **Research**

Despite the shortage of consultant staff over 30 research projects and activities were carried out at the M.R.I. in 1987. Several of these projects received funding from WHO and NARESA. The lack of any research fund continues to interfere with the work of the Institute.

The revival of the Nutrition Department has continued and four research projects were done in 1987. The detection of Hantavirus infection in rats, isolation of the virus and the demonstration of human disease for the first time in South Asia is a note-worthy achievement. Another was the detection of the first case of Loasis in Sri Lanka.

4. **Disease Surveillance and Other Public Health Activities**

The M.R.I. staff is engaged in surveillance programmes that are essential to the Public Health Service of the country, e.g. Nutritional Surveys, Entomological and Virological Surveillance and Surveys, examination of dog brains to monitor the Rabies Control Programme and tests of food and water samples for contamination.

Serveral members of the staff served in committees of the Health Department, e.g. Communicable Disease Advisory Committee, Diarrhoea Control and other organizations like the Institute of Standards. The MRI staff assists the Epidemiologist in the investigation of epidemics and outbreaks and in the expanded programme of immunization.

As expected there was an increase of Japanese Encephalitis in the last two months of 1987. Besides Anuradhapura and Chilaw, there was an increase of cases in Polonnaruwa, Kurunegala, Batticaloa and Vavuniya and it did build up into an epidemic. There were also minor outbreaks of diarrhoea that were investigated by the M.R.I.

5. **Production**

The M.R.I. continued the production of anti-rabies vaccine, typhoid and paratyphoid vaccine and cholera vaccine for human use. This includes potency and safety testing and their subsequent distribution. Towards the end of 1986 a decision was taken by the Health Ministry to introduce imported tissue culture (Vero) anti-rabies vaccine and the M.R.I. continued the distribution to Provincial, Base and some District Hospitals. The M.R.I. also produced sterile distilled water, saline, bicarbonate, citrate and glucose for use by hospital laboratories. A variety of antigens and antisera e.g., Salmonella typing sera were also produced and distributed.

6. **Teaching and Training**

(*a*) *Medical Laboratory Technologists' School.*–The M.R.I. continued to be responsible for the teaching and training of the students of the Medical Laboratory Technologists' School. One batch of 47 students passed out during 1987. Two batches of 45 students were taken in. Despite handicaps such as the shortage of tutors and inadequate facilities, the tutorial staff and the Advisory Committee put in a tremendous amount of work so that the training programme could go on uninterrupted. The curriculum has been modified to cope with the increased intake but without significant lowering of standards. To make up for the shortage of tutorial staff four M.L.T.T. from the M.R.I. had to spend a major part of their time as part-time tutors.

(*b*) *Other Para-medical Staff.*–The staff of the M.R.I. was involved in the training of nurses, P.H.I.I. and family health workers.

(*c*) *Medical Undergraduate Training.*–Undergraduates continued to visit the M.R.I. for practical demonstrations and M.R.I. staff assisted in university teaching and examinations.

(*d*) *Postgraduate Training.*–The staff of the M.R.I. participated in the training programmes in Microbiology, Pathology and Community Medicine organized by the Postgraduate Institute of Medicine. Several research students continued their training at the M.R.I.

7. **Other Services**

The M.R.I. continued to play its key role in obtaining the laboratory equipment and reagents for the entire Health Service. Despite the depleted staff the collection of requisitions, indenting and distribution continued. An effort was initiated to streamline the process and reduce delays by handing over imports to the State Pharmaceutical Corporation.

The M.R.I. continued its microscope servicing function. It also provided relief M.L.T.T. for the Western Province. The glass blowing service has come to a stop due to the retirement of the trained M.L.T.

8. **M.R.I. Development Project**

With the support of the Minister of Health and the other Health Ministry staff a project was prepared for Japanese Government Aid. This M.R.I. Development Project envisages–

(*a*) Construction of new buildings – a Laboratory Complex, Production Unit, Animal House, Audio-visual Hall and Training Centre ;

(*b*) Supply of modern equipment to these buildings ;

(*c*) Technical cooperation with centres of excellence in Japan including exchange of scientific personnel, training programmes and the supply of essential reagents.

Good progress has been made with the assistance of the Department of External Resources and Personnel from Japan International Co-operation Agency (JICA), Niigata University and NIH, Tokyo and the Japanese Embassy. It is hoped that work on the project will commence in July, 1988.

Tissa Vitarana
Director
Medical Research Institute.

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ADMINISTRATION

The Medical Research Institute which is a decentralised unit in the Ministry of Health, Sri Lanka provides a 24 hour service in laboratory investigations for the entire country.

The main components of the Medical Research Institute are :

1. Medical Research Institute ;
2. The Quality Control Laboratory ;
3. The School of Medical Laboratory Technology.

The Director, Medical Research Institute is the technical as well as the administrative head of the Institute. He is assisted by the office staff, under the General supervision of the Administrative Officer Mr. D. W. Ratnayake who is also functioning as the Accountant with the Chief Clerk, Mr. M. D. Kularatna working as a Senior financial Clerk. The total staff strength of the Institute is about 300. In addition there are abote 150 students undergoing training in the School of Medical Laboratory Technology.

The preliminary discussion with regard to the Japanese Grant Aid for construction of the new building was conducted during the year with the participation of the Director, Medical Research Institute.

The staff in the institute during the year was as follows :

1. Virologists	04
2. Pathologists	01
3. Mycologists	01
4. Bacteriologists	02
5. Biochemists	03
6. Medical Officers	19
7. Research Officers	09
8. Medical Laboratory Technologists	69
9. Nutrition Assistants	01
10. Entomological Assistants	06
11. Public Health Inspectors	05
12. Pharmacists	05
13. Photo Micrographer	01
14. Superintendent MLT i/c of M.R.I. Drug Stores	01
15. Animal Supervisors	03
16. Clerks (Health Clerical Service)	15
17. English Typists	02
18. Sinhala typists	02
19. Store Keepers	04
20. Librarians	02
21. Telephone Operator	01
22. Binder/Roneo Operator	01
23. Minor grades (Labourers, orderlies, Peons, Sanitary Labourers,etc.)	113
	270

56 M.L.TT. completed training at the school of Medical Laboratory Technology during the year 1987.

The financial allocation and expenditure in respect of the above three component projects of the Medical Research Institute was as follows :

	Amount Allocated *Rs.*	*Expenditure* *Rs.*
Medical Research Institute	13,013,500	8,839,160
Quality Control Laboratory	725,000	295,160
School of M.L.TT.	1,743,500	1,238,810

The average monthly cash dealings in the institute during the year under review was about Rs. 1,000,000

The Medical Research Institute had to supply the needs of various Medical Institutions/Hospitals of the Ministry of Health as well as the Ministry of Teaching Hospitals throughout the island, in regard to their laboratory chemicals and equipment.

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Designed and equipped for the production of microbiological kits, this suite comprises a number of key areas: two media laboratories and three further rooms for filling, pouching and packaging respectively.

DEPARTMENT OF BACTERIOLOGY I

1. Introduction

The staff consists of Consultant Dr. R. S. B. Wickremasinghe M. B. B. S., Dip. Bact., M.Sc., M.D.,D.M., One Medical Officer Dr. I. P. M. Pathirage M.B.B.S., (from December 1987) ; one Research Officer Miss K. A. K. C. Kulatunge B. Sc. (Special) (from October 1987) ; four Medical Laboratory Technologists Mr. B. P. S. Dias (Senior M. L. T.), Mr. W. M. M. Weeraratne Part-time tutor at the School of Medical Laboratory Technology, Mr. S. A. L. P. Suraweera, Mr. J. M. A. N. Jayasuriya and three Laboratory Orderlies.

This Department continued to perform its service function by the microbiological processing of a variety of specimens from Government and Private Institutions. Among the specimens processed were urine, blood, cerebro-spinal fluid, sputum, pus, and throat swabs. Antibiotic susceptibility testing was performed when required.

We continued to prepare antibiotic discs and perform specialised examinations such as testing of potency of disinfectants, identification of "difficult" microbes, culture for pertussis, participate in WHO Quality Control Programme, teaching of Post-graduate doctors and M.L.TT. and serve as a reference centre for diagnosis of opportunistic infection in AIDS patients.

2. Work Output–1987

Specimens Examined	*Culture*	*Antibiotic Susceptibility testing*
	No.	*No.*
Urine	1,642	868
Blood	111	42
Cerebro spinal fluid	165	61
Sputum/Bronchial swabs	427	239
Pus	893	635
TS/NS	291	98
Total	3,529	1,942

Antibiotic susceptibility discs prepared	*99,800*
Disinfectants tested	15
Quality control specimens examined	11
Per-nasal swabs examined for *B. pertussis*	12

The number of specimens examined this year showed a slight increase over the previous year. The bulk of specimens received were from Government Hospitals and Institutes that had no bacteriological facilities viz., Avissawella, Gampaha, Maharagama, Matale, Polonnaruwa and Army Hospital. A certain number are received from General Practitioners. Antibiotic discs prepared showed a reduction due to the fact that some institutes now make their requisitions directly from local agents and the delay in our receiving antibiotic powders from the State Pharmaceutical Corporation.

The majority of specimens are received after much delay from outstations. As a consequence, isolation of significant pathogens is low. Rapid transport of specimens by courier service and introduction of rapid diagnostic techniques would significantly increase the detection rate.

3. Research Activities

The ongoing research activities are–

(i) Survey of incidence of Cryptosporidium in diarrhoea patients from Colombo and its suburbs,

(ii) Current incidence and serotyping of *Bordetella pertussis* and *B. Para pertussis* and its relevance to the expanded programme of immunisation,

(iii) Haemolytic streptococci and staphylococci in cases of pyoderma in the Children's Hospital.

A very significant finding was the detection and identification of male Loa loa worm in the conjunctiva of a returned 14 year Sri Lankan girl from Nigeria. *This is the first recorded case of Loasis in Sri Lanka.* The patient gave a typical

history of calabar swelling had a significant Eosinophilia and responded well to diethyl carbanazine. The African vectors of Loasis viz., *Chrysops dimidiata* and *C. siliaceae* are not found in Sri Lanka, but other species of the same genus are. Their competence for transmission of Loasis is not known. Hence, it behoves the public health authorities to be vigilant as to the possibility of Loa loa transmission in Sri Lanka.

4. Training Provided

1. Lectures and practical training of Post-graduate Medical Officers reading for the Diploma in Microbiology.

2. Lectures and practical work for Medical Laboratory Technologists.

5. Services to Other Organizations and Institutions

The Bacteriologist is called upon to render services to many organizations as–

(1) Secretary, Board of Study in Microbiology,

(2) Member of various committees at National Institute of Standards,

(3) Curriculum Revision Course for Medical Laboratory Technologists,

(4) Advisory Committee to School of Medical Laboratory Technologists and conducting of its examinations,

(5) Member of National Consultative Committee for the development of a National T.B. Control Plan,

(6) National AIDS Task Force.

6. Teaching

(1) Teaching of Post-graduate Doctors reading for the Diploma in Microbiology.

(2) Teaching and conducting examination for Medical Laboratory Technologists.

(3) External Examiner for Microbiology, Faculty of Medicine, University of Ruhuna.

7. Workshops

W.H.O. sponsored all island refresher course for Medical Laboratory Technologists.

8. Publications

(1) WICKREMESINGHE, R.S.B. (1987) Opportunistic Infections in the Acquired Immunodeficiency Syndrome (AIDS). Journal of the Ceylon College of Physicians 19 – 20, 17 – 26.

(2) WICKREMESINGHE, R.S.B., GOONESINGHE, S.K., SAMARASINGHE, S. (1987) Loa loa in a Sri Lankan Expatriate from Nigeria. Ceylon Medical Journal – accepted for publication.

9. Papers

SIRI WICKREMESINGHE (1987), Cryptosporidium A "New" enteric Pathogen. Sri Lanka Medical Association Centennial sessions.

DEPARTMENT OF BACTERIOLOGY II

1. Introduction

Dr. T. J. P. Ratnayake M.B.B.S.(Ceylon), Dip. Bact. (Toronto) Bacteriologist is in charge of this Department assisted by one Senior Medical Laboratory Technologist, Mr. D. S. Wijesekara and one Laboratory Orderly. The services of Medical Laboratory Technologist, Mrs. M. S. Beachump was lost from 1986 as she was appointed lecturer in the School of Medical Laboratory Technology. This vacancy has not been filled. She had been trained in Quality Control of Vaccine in the United Kingdom. Mr. Wijesekara has been trained in Anaerobic Bacteriology in the 1979 - 1980 in England on a Colombo Plan Fellowship.

The laboratory serves as a Routine Diagnostic Laboratory and a Reference Laboratory for the whole island. No Anaerobic Laboratory facilities are available in the other Government Institutions.

Investigations of hospital cross infections both in the Private Sector and in Government Health Institutions are undertaken by this Department with the concurrence of the Epidemiologist.

2. Work Output – 1987

Determination of the presence of aerobic and anaerobic organisms. Specimens have been sent from the following units :

(*a*) Operating Theatres,
(*b*) Baby Rooms,
(*c*) Premature Baby Rooms,
(*d*) Labour Rooms.

The following Institutions submitted specimens from those sections mentioned above to determine the presence of pathogenic aerobic and anaerobic organisms :

(*a*) De Soysa Maternity Hospital, Colombo	22
(*b*) Badulla General Hospital	22
(*c*) Negombo General Hospital	06
(*d*) Office of Regional Director of Health Services, Kandy (specimens from an institution in his region)	06
(*e*) General Hospital, Matale	03
(*f*) General Hospital, Awissawella	04
(*g*) Macarthy Private Hospital, Colombo	03
Total	66

Specimens were also received from the following Institutions to determine the presence of anaerobic organisms :

(*a*) Sri Lanka Bureau of Standards	04
(*b*) General Hospital, Ratnapura	01
(*c*) General Hospital, Badulla	01
(*d*) National Zoological Gardens, Dehiwela	02
(*e*) Dental Clinic, Base Hospital, Kuliyapitiya	02
(*f*) General Hospital, Kurunegala	01
Total	11

High pressure sterilizers from the following Institutions were tested :

(*a*) District Hospital	04
(*b*) Base Hospital, Gampaha	02
(*c*) Base Hospital, Polonnaruwa	02
(*d*) Navy Hospital, Trincomalee	02
(*e*) General Hospital, Ragama	02
(*f*) General Hospital, Galle	02
(*g*) General Hospital, Colombo South	06
(*h*) Grandpass Maternity and Nursing Home (Private)	04
Total	26

Note.–High pressure Sterilizers are tested at the request of the Engineer, Bio–medical Engineering Services, De Saram Place, Colombo 10. Therefore requests for this service by the medical Research Institute should be made to the Engineer, bio-medical Engineering Services.

Investigation of Hospital Cross Infections

(1) Weligama–Private Eye Hospital–Operating Theatre,

(2) Colombo South for Tetanus organisms,

(3) Polpitigama–Staphylococcus pyogenes,

(4) Homagama–New Theatre (state of sterility),

(5) Eye Donation Society Laboratory–Donor eye infection, Colombo.

3. Comments on Routine Work

Lack of regular, constant supply of water and gas has caused delays in processing specimens and supplying reports, within the minimum period normally taken for issuing reports. Lack of modern equipment has hindered the proper functioning of this laboratory. Supply of media from the Media Department gets delayed due to the above constraint in supply of water and gas. It is very important that specimens for anaerobic culture should be collected in proper containers. Suitable specimens should also be submitted to enable the laboratory to identify anaerobic organisms. Specimens should be collected and transported in such a way that full anaerobic conditions are maintained in the container holding the specimen. Very frequently this procedure is not observed, thus proper results are not obtained.

Research Activities and Summary for Past Years

The following studies have been done in this Department :

(1) Campylobacter Enteritis in Sri Lanka by C. Palasuntheram and D. S. Wijesekara. *(The Ceylon Medical Journal. volume 27–June 1982).*

(2) A Study of *Campylobacter foetus Subspecies Jejuni* strains isolated from the stools of children in Sri Lanka suffering from Diarrhoea by C. Palasuntheram and D. S. Wijesekara. (Transactions of the Royal Society of Tropical Medicine and Hygiene (1984)).

4. Teaching and Training Provided

(1) Post-graduate students reading for the Diploma in Bacteriology Course conducted by the Post-graduate Institute of Medicine of the University of Colombo.

(2) Medical Officers appointed to the Medical Research Institute after their internship.

(3) Medical Laboratory Technologists in service.

(4) Students of the School of Medical Laboratory Technology.

5. Services to Other Organizations and Institutions

(1) Specimens from private laboratories, Sri Jayawardenapura hospital, private medical institutions are received for Bacteriological examination and report.

(2) Bacteriologist is a member of the committee on Standardization of food directed by the Sri Lanka Standards Institution.

(3) Requests are made to determine the suitability of operating theatres and labour rooms in the private sector. They are visited and tested bacteriologically, reports submitted and advice given to correct any existing defects.

DEPARTMENT OF BIOCHEMISTRY I

1. Introduction

The staff consists of Dr. (Mrs.) Piyaseeli Premachandra, B.Sc.Hon.(Cey.), Ph.D.(Manchester), M.I.Chem.C., C.Chem., Head of Section; two Research Officers Mrs. P. Uluwita, B.Sc. (Cey.), M. Phil. (Essex), M.I.Chem.C., C. Chem. and Mr. D. Dharmadasa, B.Sc. (Cey.), M.Phil.(Cey.), M.I.Chem.C., C. Chemist. Dr. Senthi Shanmuganathan who was the Head of the Department retired in March 1987 after thirty six years of dedicated service in the Department of Biochemistry.

The M.L.T. staff consists of Mr. S. Rajasooriyar (Senior M.L.T.) Miss Charlotte Nagahawatta, Mr. K.S.T. Karunapala and Miss Badra Gamage. There are two Laboratory Orderlies.

2. Work Output for Past Year

During the year 1987 the Department received 16,384 samples of which 1,802 samples were reported unsuitable for analysis.

Routine and quality control work carried out for 1987

Investigations	*No. of tests done*
Alkaline Phosphatase	1,540
Acid Phosphatase	189
Amylase	388
Sodium	837
Potassium	837
Lithium	307
Calcium	196
Phosphorus	162
Bilirubin	5,276
Protein	3,287
Albumin	1,803
Globulin	1,372
SGOT (AST)	2,488
SGPT (AST)	5,150
Choline Esterase	36
Electrophoresis Protein	60
Cholesterol	2,294
HDL Cholesterol	328
LDL Cholesterol	328
G⁶ PD	96
S. Iron	36
Total	27,010

3. Comments on Routine Work

3.1. The number of tests performed is higher than the number of specimens received for the following reasons :

3.1.1. For certain investigations sample blanks have to be performed to correct for non-specific reactions and turbidity.

3.1.2. Quality control samples, standards and reagent blanks are analysed along with each batch of patients specimens to ensure the reliability of the analytical results.

3.1.3. Introduction of WHO methods.–This involves the establishment of new reference ranges and evaluation of these methods.

4. Research activities and Summary for Past Year

4.1 Introduction of WHO recommended methods for SGOT, SGPT, Albumin, Calcium and Alkaline Phosphatase.

4.1.1. The reference range for SGOT and SGPT. In many older colorimetric SGOT and SGPT procedures the reference values were related to UV (340 nm) methods at 25°C and were upto about 20 I.U. and 15 I.U. respectively. The most widely used colorimetric method of Reitman and Frankel is carried out at 37°C. Therefore the enzyme activity should be expressed at 37°C. WHO manual Lab/86.3 recommends a temperature conversion factor of 2.08 for SGOT. The temperature conversion factor for SGPT is 1.82. A new table has been worked out using these two factors for calculating the enzyme activities of SGOT and SGPT at 37°C. This table with the new reference values has been circulated to all laboratories. (K.S.T. Karunapala). The new reference ranges for SGOT and SGPT at 37°C are as follows :

3–

SGOT	4 - 42	I.U. at 37°C.
SGPT	2 - 27	I.U. at 37°C.

4.1.2. *The Estimation of Albumin.*–The albumin is measured using succinic Acid buffered bromocresol green. The absorbance is measured within 30 seconds of mixing the serum and BCG, this eliminates the nonspecific binding of BCG with globulin (B. Gamage).

4.1.3. *The Estimation of Calcium.*–Serum calcium is measured with O-cresolphthalein complexone reagent containing ethanediol which maintains a clear solution in the presence of proteins. In this method the inter-ference by magnesium is eliminated by the inclusion of 8 - hydroxy quinoline. The method is simple, sensitive specific and reliable than the Titrimetric Method. This method requires very small amount of serum and this has been introduced into routine service (C. Nagahawatte).

4.1.4. The estimation of Alkaline Phosphatase by the WHO recommended method has been introduced into routine service. The substrate 4 - nitrophenyl phosphatase is hydrolysed by alkaline phosphatase and nitrophenol is liberated. Alkali is added to stop the enzyme activity at the end of 15 minutes incubation period, and the increase in absorbance, due to the 4 - nitrophenol released is measured. The only disadvantage here is that the substrate 4-nitrophenyl phosphate has to be prepared fresh.

4.2. *The Estimation of HDL Cholesterol.*– The estimation of HDL and LDL cholesterol had been revised and modified. The reaction is carried out at low temperatures using 1ml of serum. Calculation of results are done using a standard of low strength. Efforts have been made to establish the reference values for Sri Lankan subjects (S. Rajasooriyar).

4.3. Research activities for the year 1987- Mrs. P. Uluwita Established the clinical norm for serum Iron for Sri Lankan men (Age group 20-40 yrs). This paper is in the process of publication.

5. **Training Provided**

5.1. One biochemist was trained for six months in General Biochemical Estimations and Quality Control Procedures.

5.2. One M.L.T. from Wathupitiwala Hospital was trained in reagent preparation and estimation of serum proteins for two weeks.

5.3. Training of M.L.TT. interns in Quality Control Procedures (D.K.D. Silva).

6. **Services to Other Organizations and Institutions.**

6.1. Measurement of Cholinesterase activity on workers exposed to Organophosphorus Insecticides.

6.2. Training of Hospital Biochemists in General Biochemistry and Quality Control Procedures.

6.3. Training of M.L.TT. from other hospitals in biochemical techniques as and when requested by them.

6.4. Serves as the Reference Laboratory for Clinical Chemistry.

6.5. The Department provides a Quality Assessment Scheme in General Biochemistry for eighteen laboratories in the island.

6.6. Dr. (Mrs.) P. Premachandra serves on the Advisory Committee on Quality Control in Clinical Chemistry.

6.7. Served as the Editor for the Annual Bulletin of the M.R.I. 1987.

6.8. Serves as a member in the drafting Committee for the drowing up of Sri Lankan Standards for the following items :

6.8.1. Biscuits,
6.8.2. Sugar,
6.8.3. Tomato sauce.

6.9. Mrs. P. Uluwita serves as a part-time Biochemist at Ayurvedic Institute, Nawinna from October 1987.

7. Workshops

Refresher course sponsored by the WHO/ Ministry of Health for S.M.L.TT. in Clinical Biochemistry was conducted for six days. Mrs. P. Uluwita, Mr. Dharmadasa and the M.L.TT. staff assisted in this programme.

8. Publications and Papers for the Past Year

S. SENTHI SHANMUGANATHAN and D. DHARMADASA. Serum copper levels in normal Sri Lankan subjects and in various pathological states. Cey. J. Med. Science 29, 1986 75–80.

DEPARTMENT OF BIOCHEMISTRY II

1. Introduction

The staff consists of Dr. Piyaseeli Premachandra B.Sc., Hons. (Cey.) Ph.D. (Manchester), M.I.Chem C., C.Chemist, Head of Section and is in charge of the Quality Control Programme in Clinical Chemistry.

The M.L.T. staff consists of Miss D. K. Daya Silva (Senior M.L.T.), Miss Irangani Karunaratne and Miss Sujeewa Fernando. There is one Orderly.

The Department is involved in introducing W.H.O. recommended methods, implementing Internal Quality Control procedures and organizing and operating the External Quality Assessment Scheme in Clinical Chemistry. The section also prepares standard solutions and quality control sera for use at the M.R.I. and in interlaboratory surveys. Routine biochemical investigations are also performed here.

2. Work Output for Past Year

During the year 1987, the section has received 2,700 specimens of which 626 samples were found unsuitable for analysis.

Routine and quality control samples analysed during the year 1987

Investigations	*No. of tests done*
Plasma glucose	2615
Urea	1482
Uric acid	372
Creatinine	450
Urine creatinine	66
Creatinine clearance	45
Urine uric acid	08
S. Creatine phosphokinase	76
S. Aldolase	60
S. Ceruloplasmin	15
Total	5,187

3. Comments on Routine Work

Specimens received from outstation hospitals for Biochemical Investigations are very often unsuitable for analysis. This is due to a number of factors such as improper collection, contamination, delay in the post and the temperature at which they are transported. Ideally the blood should be collected into dry and sterile containers and sent to M.R.I. as soon as possible preferably under refrigerated conditions. The quality of the sample is important in producing reliable laboratory data.

4. Research Activities

4.1 Method improvement and investigation of new techniques.

The estimation of glucose, urea, cholesterol and creatine phosphokinase have been improved.

4.1.1 The glucose oxidase method for the estimation of glucose in plasma has been introduced into routine practise. All the performance characteristics for this method have been worked out by Miss D. K. Daya Silva and Miss Iranganie Karunaratne.

4.1.2 The estimation of urea by diacetyl monooxime method is under evaluation. The method of assay is simple, reliable and less expensive. Another advantage is that the use of mercury which is hazardous can be avoided. The performance characteristics of the method are being determined before introducing into routine practise. (Miss Iranganie Karunaratne)

4.1.3 The W.H.O. method for the estimation of cholesterol has been modified and performed under controlled temperature. When the assay is carried out at 20°C the results are satisfactory and is under evaluation before introducing into routine practise. The method is simple and eliminates the use of expensive solvents. The performance characteristics are being established. (D. K. Daya Silva)

4.1.4 Evaluation of Reagent Kits. The estimation of creatine phosphokinase using a commercial reagent kit has been evaluated.

4.2 The Department continues to participate in the International External Quality Assessment Scheme in Clinical Chemistry organised by the W.H.O. collaborating centre for Research and Reference Services. U.K.

4.3 National External Quality Assessment Scheme Clinical Chemistry.

This scheme was initiated in January 1987, as a follow up of the quality control Workshop held in 1984 at the M.R.I. The main objective of the scheme is to help the laboratories to improve the quality of clinical chemistry results on patients specimens. There are 18 laboratories in the scheme and the performance of the following analytes are assessed monthly: Blood Sugar, Urea, Sodium, Potassium, Bilirubin, Protein, Albumin, Cholesterol, Aspartate transaninase (AST), Alkaline Phosphatase (ALP), Uric Acid, Creatinine and Calcium. Quality Control samples, report forms and instruction sheets are distributed once in three months to the participant laboratories. Laboratory codes are assigned for each participating laboratory. After the analysis the results are returned to M.R.I. for statistical analysis of the data. The department prepares a result sheet including all the results and the target value for each analyte, and a copy is posted to each participant laboratory with relevant comments. The individual laboratories can assess the accuracy of their results and also compare the performance with the other laboratories. The scheme is used to assess the precision and the accuracy of the analytical results at normal and abnormal concentrations. Out of the 18 laboratories, 13 have continued to participate upto December 1987 and the other five have failed to return the results, due to various factors. (D. K. Daya Silva and Sujeewa Fernando).

4.4 Evaluation of WPA C0700D colorimeter for WHO recommended methods in Clinical Chemistry. All the WHO methods were compared using this colorimeter and the spectronic 21 spectrophotometer. A report on the evaluation of this colorimeter was sent to W.H.O.

4.5 Preparation of Ethylene glycol stabilised quality control sera at high and medium concentrations. Quality control sera was prepared using blood collected from an abbatior at Ekela. This control sera is used to monitor the precision of the analytical results on patients samples. About 100 vials of medium concentration and 100 vials of high concentration were prepared. This serum was stable upto one year for most analytes.

5. **Training**

Training of M.L.TT. interns in Quality Control Procedures.

6. **Services to Other Organizations and Institutions**

6.1 Training of M.L.TT. from other hospitals in Biochemical Techniques as and when requested by them.

6.2 Serves as the reference laboratory for clinical chemistry.

6.3 The department provides a quality Assessment scheme in general Biochemistry for 17 major hospitals in the Island.

6.4 Dr. (Mrs.) P. Premachandra serves on the Advisory Committee on Quality Control in clinical Chemistry.

DEPARTMENT OF DRUG QUALITY CONTROL

1. Introduction

Consultant and Head of Department, Dr. (Mrs.) Maya C. Attapattu, M.B.B.S., Dip. Bact., Ph.D. The Department is staffed by one medical Laboratory Technologist, Mr. M. K. S. Sampasivam who was trained in M.R.C., WHO International Laboratory, London and National Institute of Health, Tokyo, Japan under WHO Fellowship. The Department serves mainly State pharmaceuticals Corporation and private Sectors in carrying out Potency Testing of Antibiotic (Microbiological Assay) and Sterility Testing of Antibiotics and Pharmaceutical Products.

2. Work Carried out in 1987

A total of 14 samples of Tetracycline received for potency testing, out of which one was found to be lelow the potency level. A sample is reported satisfactory if the potency level is between 85–125%.

The following 6 samples were received for sterility testing and all were found to be sterile :

Dried Aluminium Hydroxide	3
Procaine Penicillin	1
Compound Sodium Lactate Infusion	1
Benzathine Penicillin Injection	1

3. Training Provided

Demonstration to Food health Inspectors and Divisional pharmacist.

DEPARTMENT OF ENTOMOLOGY

Staff.–Mrs. N. Jayasekara, B.Sc. (Hons.) Cey., M.Sc. (Lond.), M. I. Biol., Entomologist and Head of Department. Dr. (Mrs.) S. Satharasinghe, Medical Officer/Entomology. Two Medical Laboratory Technologists, Mr. C. G. Jansen, (Senior M.L.T.) and Mrs. H. H. K. K.Jinapala and two Laboratory Orderlies.

Field staff.–Six Entomological Assistants, Mr. N. W. Premaratne (Senior E.A.) Mr. T. A. Piyadasa (E.A./Ports), Mr. G. H. Gamini, Mr. D. A. T.Bopearachchi, Mr. D. Sunil Shantha, Mr. P. Ranasinghe and five field Attendants.

The Department is actively engaged in research on insect vectors of disease with special emphasis on mosquito vectors of Arbo-viral diseases. Special surveillance programmes are carried out in the airports and seaport of Colombo in order to monitor the densities of Dengue and Dengue Hemorrhagic Fever vectors. The department also carries out special studies on mosquito vectors of Japanese Encephalitis (JE), including surveillance programmes in different parts of the country, which provides vital information to the Ministry of Health for prevention of major outbreaks of the disease. Teaching and training programmes are conducted for public health personnel laboratory staff of the Health Department and University students in Entomology.

2. Work Output

Aedes Surveillance

	No. of larvae examined
Colombo International Airport (Katunayake)	408
Colombo Airport (Ratmalana)	263
Seaport (Colombo)	821
Colombo City	5,561
Sri Jayawardhanepura (Kotte)	3.299

JE Vector Surveillances

	No. of adults examined	*No. of larvae examined*
Panadura	4,602	2,590
Thalawathugoda	4,610	940
Thalapathpitiya	800	304

3. Research Activities and Summary

3.1 Zoogeorgraphical studies on Dipterous flies of Sri Lanka (Nuwara Eliya and Ratnapura Districts) as a collaborative research project with Japanese scientists from several Institutions of Japan, including National Institute of Health, Tokyo and Toyama Medical and pharmaceutical University. Extensive field studies were carried out in the process of collecting field material. Several species of Dipterous flies were collected of which two were new species. This study was funded by the ministry of Education, Science and Culture, Government of Japan.

3.2 *Dengue Haemorrhagic Study.*–The entomological aspects of this study was continued in selected areas of Colombo city. The Breteau indices of *Ae. aegypti* and *Ae. albopictus* remained low, although breeding was detected mainly in outdoor containers. This study was carried out in collaboration with the Department of Virology/M.R.I. and was funded by W.H.O.

3.3 Establishment of mosquito banks for studies on molecular biology of the urban filariasis vector *Cx.quinquefasiatus.* from different areas were made and samples of these were dissected in the laboratory for *W. bancrofti* infections, while representative samples were stored under suitable conditions for molecular biology studies. This formed a preliminary part of the studies leading to the development of a *W. bancrofti* specific DNA probe for the identification of filarial larvae in mosquitoes, carried out in collaboration with the Department of Biochemistry, Faculty of Medicine, Peradeniya and

the Department of Biochemistry, Faculty of Medicine, Colombo.

4. **Training Provided**

Training was provided to Entomological Assistant Trainees in laboratory and field aspects of Medical Entomology.

5. **Services to Other Organizations and Institutions**

5.1. The Entomologist served on the following committees :

5.1.1. Member, Advisory Committee on Communicable Diseases, Ministry of Health.

5.1.2. Member, Interagency Committee for Mosquito Control – Central Environmental Authority, Ministry of Local Goernment, Housing and Construction.

5.1.3. Member Drafting Committee for Specification for testing of Mosquito Coils, Institute of Sri Lanka Standards.

6. **Teaching**

6.1 Lectures in Medical Entomology were conducted for B.Sc. (Hons.) students of the Department of Zoology, Ruhunu Campus, University of Matara.

6.1 A course of Medical Entomology was conducted at the School of Medical Laboratory Technology for the Medical Laboratory Technologist trainees.

7. **Publications and Papers**

KURAHASHI H. and JAYASEKERA NALINI.- Two New Species of the genus *Onesia* from Sri Lanka (Diptera: Calliphoridea) Journal of Entomological Society of Japan. (submitted for publication)

JAYASEKERA NALINI-Mosquito Vectors of Japanese Encephalitis in Sri Lanka; Paper presented at the Sessions of the Sri Lanka Medical Association, March 1987.

DEPARTMENT OF ENTERIC BACTERIOLOGY

1. Introduction

Consultant and Head of Department, Dr. (Mrs.) Maya C. Attapattu Dip. Bact., Ph.D. The other staff consists of : one Medical Officer, Dr. K. J. Cooray, two Medical Laboratory Technologists, Mr. S. Tennekoon (Senior M.L.T.), Miss K. C. R. Perera and two Laboratory Orderlies.

This Department is engaged in–

(1) Isolation of Enteric pathogens from stools. (The Department receives stool samples from all over the country.)

(2) Isolation of Salmonella typhi and S. paratyphi from clot cultures.

(3) Serotyping of cultures of Salmonella and Shigella. Enteropathogenic E. coli and Cholera organisms.

(4) Assists Epidemiologist during outbreaks of diarrhoeal diseases.

(5) Maintenance of stock cultures of Enteric Pathogens.

2. Work Output for 1987

Total No. of stool samples	1,006	
Total No. +ve pathogens	174	(17.4%)
(*a*) No. +ve for Salmonella	23	(2.9%)
Salmonella typhimurium	10	
Salmonella group A	01	
Salmonella group C	05	
Salmonella group E	01	
Salmonella group E_2	01	
Salmonella group E_4	05	
(*b*) No. +ve for Shigella	133	(13.2%)
Shigella Dysenteriae I	14	
Shigella Dysenteriae II	01	
Shigella Flexneri I	11	
Shigella Flexneri II	103	
Shigella Flexneri III	03	
Shigella Sonnei	01	
(*c*) No. +ve for Enteropathogenic E. coli	18	(8.5%)
(*d*) No. +ve Vibrio Cholera	Nil	
(*e*) Total No. of clot cultures done	2,400	
No. of Salmonella	34	(1.4%)
Salmonella typhi	32	
Salmonella paratyphi	01	
Other Salmonella	01	

3. Comments on Routine Work

During the year 1987 the Department received samples from Government Hospitals all over the country, two M.O.H. divisions, Coconut Mills around Colombo, one Garment Factory and Farm. The samples received from M.O.H. Divisions, Coconut Mills, Garment Factory and Farm were from healthy individuals.

Out of 178 healthy individuals one sample was positive for *Shigella Flex. I* and one was positive for Sal. Gr. E_1.

Year	*Salmonella*		*Shigella*		*E. coli*	*Vibrio*
	Percentage		*Percentage*		*Percentage*	*Percentage*
1984	1.0		1.4		0.7	0
1985	1.55		2.2		1.6	0
1986	3.5		0.7		4	0
1987	2.9		13.2		8.5	0

There is a marked rise in isolation rate of Shigella and E. coli. Isolation rate of Salmonella has come down. The more frequently isolated strains of Shigella is Shi. Flex. II. and more frequently isolated strain of Salmonella is S. typhymurium. The isolation rate of Salmonella from clot cultures has come down in 1987 (1986–1.8%, 1987 – 1.4%).

The antibiotic sensitivity pattern of Shi. Flex. II implies that it is sensitive to Gentamicin, Kanamycin. Selexid and moderately sensitive to Nalidixic acid. The next frequently isolated strain of shigella is S. Dysenteriae I. The ABS pattern of this organism implies that it is sensitive to Gentamicin, Kanamycin and Selexid and moderately sensitive to Furazolidone and resistant to Ampicillin and Nalidixic acid. The

ABS pattern of *S. typhimurium* shows that it is resistant to Tetracycline and sensitive to most commonly used antibiotics. The ABS pattern of Enteropathogenic *E. coli* implies that it is sensitive to Gentamicin, Kanamycin, Nalidixic, Furazolidone and Selexid.

4. **Teaching and Training**

(1) Provides training for M.L.TT. Trainees from the M.L.T. School.

(2) Training of post-graduate Students for Diploma in Microbiology.

(3) Demonstrations to Pupil Nurses.

DEPARTMENT OF FOOD AND WATER BACTERIOLOGY

1. Introduction

Consultant and Head of Department Dr. Maya C. Attapattu M.B.B.S., Dip. bacteriology, Ph.D. The staff consists of one Medical Officer Dr. Mrs. P. Chandrasiri; two Medical Laboratory Technologists Mrs. V. Sockalingam (Senior M.L.T.) and Mr. S. Selvarasah. Two water collecting Orderlies and one Laboratory Orderly.

Examination of food and water samples for evidence of Bacteriological contamination is done at this Department. It receives samples from all over the island as this is the only Government Institution which carried out these tests.

This Department receives specimens from following sources :

(i) Food and water samples from various M.O.H. areas referred by the Medical Officers of Health. This include routine tests and investigations during epidemics of diarrhoeal diseases and outbreak of food poisoning.

(2) Water samples from various water supply schemes, mainly from the water supply schemes funded by UNICEF.

(3) Food and water samples from Security Forces.

(4) Water samples from Private individuals.

(5) Examination of Thriposha for evidence of bacteriological contamination before distibution.

(6) Microbiological Analysis of foods like shrimps, cuttle-fish, lobsters, etc., that are exported to various countries from Sri Lanka.

In addition to examination of food and water samples this department is also engaged in the preparation of diagnostic antisera for Shigella and Salmonella organisms. These antisera is utilized by M.R.I. and other laboratories all over the island.

2. Work Done in 1987

Water Samples :	
Total No. done	474
No. satisfactory	262
No. suspicious	29
No. unsatisfactory	183
Well :	
Total No. done	54
No. satisfactory	13
No. suspicious	02
No. unsatisfactory	39
Swimming Pools :	
Total No. done	42
No. satisfactory	41
No. unsatisfactory	01
Food Samples :	
Total No. done	64
No. satisfactory	48
No. unsatisfactory	16

Antisera–Production

Salmonella Preparation :

		ml.
Salmonella O-4, 5, 12		35
Salmonella O-9, 12		28
Salmonella H-b		30
Salmonella H-i		25
	Total	118

Issues

		ml.
Salmonella Polyvalent A		73
Salmonella Polyvalent B		68
Salmonella 0-9, 12		30
Salmonella 0-1, 2, 12		15
Salmonella 0-4, 5, 12		20
Salmonella Vi		20
Salmonella H-d		10
Salmonella H-b		10
Salmonella H-i		10
	Total	256

Shigella Preparation:

	ml.
Shigella Polyvalent A	30
Shigella Polyvalent B	25
Shigella Polyvalent D	25
Shigella Dysenteriae I	25
Shigella Dysenteriae II	30
Shigella Flexneri II	30
Shigella Flexneri I	30
Total	195

Issues

	ml.
Shigella Polyvalent A	75
Shigella Polyvalent B	54
Shigella Polyvalent D	35
Shigella Dysenteriae I	30
Shigella Dysenteriae II	25
Shigella Flexneri I	24
Shigella Flexneri II	39
Shigella Flexneri III	10
Shigella Flexneri IV	10
Shigella Flexneri V	10
Shigella Flexneri VI	10
Total	322

3. Comments on Routine Work

All the water samples received are collected by two trained water collecting orderlies attached to the department, except water samples received from Security Forces where they have trained personnels to collect water samples. All the samples should be collected under sterile conditions and kept in a cold box or a refrigerator. At least 100 ml. of water is needed for testing. Due to unawareness of these facts some of the institutions send their water samples in small bottles by post.

During the year 1987 the department has tested 54 well water samples out of which 39 were unsatisfactory and 02 were suspicious and only 13 were satisfactory. This high incidence of pollution may be due to contamination of water by bird faecal matter in case of open wells and lack of chlorination.

4. Training Provided

(1) Provides training for M.L.TT. Trainees from M.L.TT. School.

(2) Demonstration to undergraduate medical students, pupil nurses, and public health inspectors.

(3) Training for postgraduate medical officers.

DEPARTMENT OF LEPTOSPIROSIS

1. Introduction

Consultant and Head of Department, Dr. (Mrs.) Maya C. Attapattu M.B.B.S., Dip. Bact. Ph. D. The Staff consists of one Medical Laboratory Technologist, Mr. P. S. V. W. Jinapala B.A. (Senior M.L.T.) and one Laboratory Orderly.

The Department serves both public and private sectors in diagnosis of Leptospirosis. Serological, animal innoculation and cultural methods are performed. Blood, urine, C.S.F., biopsy and autopsy specimens of patients and animals are examined.

2. Work Output for Past Year

	Total No.	*No. Positive*	*Percentage Positive*
Agglutination Lysis test	644	134	20.8
C. S. F. Culture	02	–	–
Urine Culture	02	–	–
Blood Culture	02	–	–

2,920 ml. of Fletcher's semisolid medium and Stuart's leptospira medium were prepared during this year.

3. Comments on Routine Work

Six hundred and forty-four blood samples were examined Serologically for Leptospirosis by use of Agglutination Lysis test during this year. This is an increase of 15.4 per cent when compared with the previous years figure of 558. Out of 644 samples 20.8 per cent (134) were positive, showing an increase of 67.5 per cent in the incidence of leptospirosis against 80 positive samples in the previous year.

32.8 per cent positive cases were from Colombo General Hospital. 26 per cent from Colombo North Hospital. Sri Jayawardenapura Hospital 4.5 per cent, G.H. Ratnapura 3.7 per cent, B. H. Wathupitiwela, 3.7 per cent, G. H. Kandy 4.5 per cent, G. H. Anuradhapura 3 per cent, G. H. Kurunegala per cent, B. H. Kegalle 2.2 per cent, T.H. Karapitiya 2.2 per cent. 10.7 per cent were from B. H. Gampaha, G. H. Badulla, T. H. Peradeniya, B. H. Nawalapitiya, Colombo South Hospital, Lady Ridgeway Hospital, B. H. Matara, G. H., Gampola and the balance 3.7 per cent were from private medical institutions.

Detection of a large number of leptospirosis patients from Colombo General Hospital cannot be considered as a high incidence in Colombo and suburbs, as patients from many parts of the country seek treatment in this hospital. The contribution from Colombo. North hospital has fallen to second place or 26 per cent (35) in this year as against 30 per cent (24) in the previous year, yet showing an increase of 37.5 per cent in this institution.

This year too the list of hospitals from where positive cases were detected shows the island wide distribution of leptospirosis. Wild and domestic animals like rats, bandicoots, dogs, pigs, cattle, etc., have been identified as reservoires of leptospirae. These animals are common in all parts of the country and they continue to infect water pools, marshy lands, paddy fields, gem pits, water ways, etc. Use of these infected places for fishing, swimming and cultivation with bare feet and washing and bathing in infected water tend to spread infection.

Minor and major outbreaks of leptospirosis have been recorded in many countries and in Sri Lanka too. Being an aggricultural country the impact of this disease on economy of the nation and on socio-econmic conditions of farmers cannot be neglected.

Paired sera of acute and convalescent samples should be examined serologically for proper laboratory diagnosis of leptospirosis.

This Department appeals to physicians in outstation hospitals to make use of the facilities available in this Department for diagnosis of leptospirosis.

Sometimes abortions and deaths of domestic animals occur due to Leptospirosis. Interest shown by Veterinarians in laboratory diagnosis of this disease is not encouraging.

4. Services to Other Organizations and Institutions

This Department provides services in laboratory diagnosis of Leptospirosis to medical and veterinary institutions in both Government and Private Sectors throughout the island.

5. **Teaching**

Students following M.L.TT. Course undergo theory and practical training in this Department.

Teaching facilities are provided to M. D. (Microbiology) students.

MEDIA SECTION AND ANIMAL HOUSE

MEDIA SECTION

1. Introduction

Staff.–This Department is in charge of a Specialist Medical Officer, Dr. A. Sathasivam (Virologist). There are three Medical Laboratory Technologists, Mr. B. H. Cooray (Senior M.L.T.), Mrs. G. Kulasingham, Mr. A. P. P. Gajanayake.

2. Work output

All types of media are prepared.

Annexed is a list of media prepared during 1987 :

MEDIA PREPARED AND SUPPLIED TO DIFFERENT UNITS OF THE M. R. I. FROM 01.01.87 TO 31.12.87

Blood agar plates	5,600	Mac Conkey double Strength broth	3,010
Biphase medium	200	Mac Conkey single Strength broth	4,001
Blood tellurite medium	420	B G B	3,100
Brain Heart infusion broth	880	Robertson's cooked meat medium	1,510
Bile broth	2,350	Casein broth	1,010
Nutrient agar	780	Sabouraud agar plain	710
Nutrient broth	4,100	Same with actidione	602
Charcoal agar	310	Of medium	310
Carey blair medium	3,100	Yeastral agar	906
Egg saline	1,080	Aesculin agar	110
Kligler iron agar	4,100	40% bile agar	105
S S agar	3,450	20% bile agar	95
X L D medium	–	Thyoglycollate broth	1,201
Todd Hewitt broth	720	Vaccine flasks	1,201
T C B S agar	680	Sucrose	580
Bile salt agar	310	Lactose	410
Selenite broth	210	Mannitol	675
Tetrathionate broth	3,100	Dulcitol	595
N I H broth	2,200	Inositol	480
N I H agar slants	2,400	Sorbitol	620
Mac Conkey agar	3,100	Xylose	280
		Arabinose	210
		K C N broth	290
		Throat swabs	4,001
		Rectal swabs	3,001
		Pernasal swabs	280
		Charcoal swabs	200
		Lemco agar bottles	–
		Glucose Phosphate	585
		Koser's Citrate	575
		Arginine	310
		Ornithine	610
		Lysine	570
		Glucose	690
		Maltose	710
		Lactose	–
		Lactose egg yolk medium	216
		Milk agar	230
		Gelatin agar	216

4–

DEPARTMENT OF MYCOLOGY

1. Introduction

Consultant and Head of Department, Dr. (Mrs.) Maya C. Attapattu M.B.B.S. (Ceylon), Dip. Bact., Ph.D., M.D. The other staff consists of one Medical Officer, Dr. (Mrs.) M. M. Gunatilleka ; Three Medical Laboratory Technologists, S. M. P. Senanayake (Senior M.L.T.), Miss Rupasinghe and Miss D. Chandralatha. This Department serves in the diagnostic, teaching and research activities in the field of Mycology.

2. Work Output

A total of 938 patients were investigated and the details of the samples are as follows :

Skin scrapings	522
Nails	194
Hair and scalp	76
Mouth and throat swabs	15
Ear swabs	03
Sputum	49
Vaginal swabs	19
Serology	31
Biopsy	33
Corneal smear	12
Miscellaneous	29

3. Comments on Routine Work

Of the 952 patients, 227 were positive for fungi on microscopic examination. Among the positive isolates *T. rubrum* was the most common isolate in skin scrapings. Others included *T. mentagrophytes, M. gypseum,* and *Epidermophyton flocossum. Candida albicans* was isolated in more than 50 per cent of the sputum samples.

4. Research Activities

This year saw the completion of a research project sponsored by NARESA Sri Lanka, entitled, "Some Aspects of Pulmonary Mycotic Disease in Sri Lanka." Preliminary studies as to the fungal flora in sputum of patients with chronic pulmonary disease was conducted with a view to ascertaining their relative significance as a contributor to the pathogenic process. Some interesting facts emerged as a result of this study. A large number of opportunistic as well as potential pathogenic fungi were isolated from the sputum of patients with lung disease. The most prominent being, *Aspergillus sp., Nocardia sp., Candida sp.*

5. Training Provided

(1) Training is provided for Medical Laboratory Technologist Trainees as part of the requisite in service training procedures.

(2) Training in research activities is provided to graduate research students employed under research grants.

6. Services to Other Organisations and Institutions by Head of Department.

6.1. Central Environmental Authority ; Ministry of Local Government, and Housing and Construction. Member for Interagency Committee for the continuous monitoring of Public water supply schemes from Year 1984 to present.

6.2 Natural Resources, Energy and Science Authority of Sri Lanka. Member for Working Committee for Medical and Veterinary Sciences.

6.3 Ministry of Health, Committee for the formulation for the Medium term plan for the control of Tuberculosis in Sri Lanka.

6.4 Postgraduate Institute of Medicine, University of Colombo.

6.4.1. Member, Board of Studies in Microbiology, from the inception.

6.4.2. Examiner M. D. Microbiology, for all examinations held upto date. 1983, 1984 and 1988.

6.4.3. Lecturer,, Mycology, Bacteriology and Immunology for M. D. Microbiology.

6.4.4. Course Director, Mycology component, diploma in Microbiology and M.D. Microbiology.

ANIMAL HOUSE

1. **Introduction**

The Animal House functions under the supervision of Dr. A. Sathasivam (Virologist). The staff consists of two Animal Supervisors– Mr. P. P. Dias and Mr. A. H. Gunatillake. There are also six minor staff.

There is also a section of the Animal House at the Colombo South Virus Department which is housed within the premises of the Colombo South Hospital at Kalubowila, Dehiwela. This is supervised by Dr. (Mrs.) N. Withana and one Animal Supervisor, Mr. R. P. Sathanandan.

The Animal House caters for all types of animal work. The animals bred at the M.R.I. consists of Swiss white mice, white and hooded rats, guinea pigs and hamsters. There are also rabbits, sheep, goats, toads and geese. Rabbits and toads are periodically supplied by a contractor. Sheep too breed at the M.R.I.

At the Colombo South Virus Department, there are only white mice and white and hooded rats.

2. **Comments on Routine Work**

Due to the demolition of a major part of the Animal House for the purpose of reconstructing a New Animal Centre by the Japanese Government, there is a certain amount of lack of space for animal breeding and rearing at the moment.

We are hoping that with the construction of the new Animal Centre, the breeding, rearing and maintenance of animals for laboratory use would be placed on a more scientific basis. We are also hoping to recruit a full time Veterinary officer to look after the laboratory animals, as at present diseases in the laboratory animals go undiagnosed and treatment is therefore on a trial and error basis.

DEPARTMENT OF MYCOLOGY

1. Introduction

Consultant and Head of Department, Dr. (Mrs.) Maya C. Attapattu M.B.B.S. (Ceylon), Dip. Bact., Ph.D., M.D. The other staff consists of one Medical Officer, Dr. (Mrs.) M. M. Gunatilleka ; Three Medical Laboratory Technologists, S. M. P. Senanayake (Senior M.L.T.), Miss Rupasinghe and Miss D. Chandralatha. This Department serves in the diagnostic, teaching and research activities in the field of Mycology.

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6.3 Ministry of Health, Committee for the formulation for the Medium term plan for the control of Tuberculosis in Sri Lanka.

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6.4.3. Lecturer,, Mycology, Bacteriology and Immunology for M. D. Microbiology.

6.4.4. Course Director, Mycology component, diploma in Microbiology and M.D. Microbiology.

6.4.5. Lecturer, M.D. Pathology.

6.4.6. Lecturer, M.D. Community Medicine.

6.4.7. Lecturer, Diploma in Family Health.

6.4.8. Lecturer, *Mycotic Infections in* Animals. M. VSc..

6.4.9. Lecturer, Diploma in Chest Diseases.

6.4.10. Member, Library Committee, from 1984.

6.5. School of Medical Laboratory Technology, Ministry of Health, Sri Lanka

6.5.1. Member, Advisory Committee.

6.5.2. Lecturer, Course Director and Examiner for the Microbiology component.

6.5.3. Member, Curriculum Development Committee.

6.6. Institutional Posts

6.6.1. Member, Library Committee, from 1981 upto the present.

6.6.2. Editor, Bulletin of the Medical Research Institute, in 1986 and 1987.

6.7. Ministry of Health, Government of Sri Lanka

6.7.1. Member, Food Advisory Committee. Ministry of Health, Sri Lanka.

6.7.2. Working Committee for formulation of medium term plan for Control of Tuberculosis in Sri Lanka.

6.7.3. Lecturer, Public Health Inspectors, on food Hygiene and food contamination.

6.7.4. Lecturer, W. H. O Sponsored workshop for Food Inspectors.

6.7.5. Lecturer, P. H. I. NORAD sponsored course, 1988.

6.7.6. Lectures and Demonstrations for Medical Officers attached to the Chest clinics in the periphery, a WHO sponsored course.

7. Publications and Communications for 1987

Read Paper on "Chronic Pulmonary Disease, a new perspective and the Emergence of a new Systemic Mycotic Pathogen." At the 100th anniversary academic sessions of the Sri Lanka Medical Association held in March, 1987.

DEPARTMENT OF NATURAL PRODUCTS CHEMISTRY

1. Introduction

The staff consists of Dr. L.B. de Silva, B.Sc., Chem. Hons. (Cey.), Ph.D. (Sheffield), F.IChem.C., Charted Chemist, Fellow National Acadamy of Sciences, Sri Lanka, D.Sc. (Hon.) Peradeniya. DR. W.H.M.W. Herath, B.Sc., M.Phil., Ph.D. (Peradeniya). A.I. Chem.C., two Research Students engaged in assisting research projects funded by NARESA; two Medical Laboratory Technologists, Mr. N. Perera (Senior MLT), Miss. S. Gunawardena, and four Laboratory Orderlies.

The acquisition of new chemotherapeutic agents in the fight against intractable diseases is a problem of vital importance to the modern man. Medicinal plants, which till recently provided most of the therapeutic agents of man, are still valuable in the empirical search for drugs. Todd holds the view that substances with significant and valuable pharmacological properties remain to be isolated from plant materials and that clues to some of them may still be found in folk medicine of primitive people.

With the rapid progress in synthetic chemistry there developed a tendency to disparage the physiologically active plants and even to proclaim that it is a waste of time. With the discoveries of reserpine, vincristine, the Chinese anti-malarial artimisinin and the anti-implantation drug Yuechukene, it is become evident that the plant kingdom has yet to unlock its secrets.

2. Work Output for Past Year

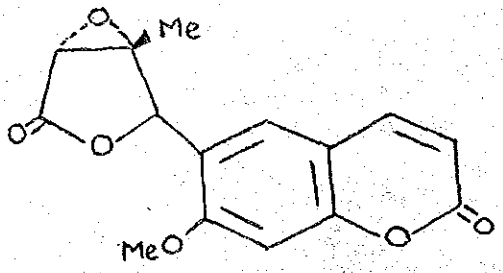
Chemical analysis on *Micromellum minutum* var. *zeylanicum* (S. Walkarapincha) *Clausena indica* (S. Megonkarapincha) *Tabenaemontana divaricata* (S. Wattusudda) and *Cyclea burmanai* (S. Kasipittan) resulted in the isolation and characterization of several coumarins and alkaloids. Fungi, *Aspergillus wentii, S-2* and *S-3*, which show anti-bacterial activity yielded several compounds, including a new carbohydrate dimer.

3. Comments on Routine Work

Sterile solutions required for this institute are prepared in this section.

4. Research Activities and Summary for Past Year

4.1 From the fruits of the Rutaceous plant *Micromellum minutum* var. *zeylanicum*, an anti-tumour compound microzeylanicum, m.p. 218-219, has been isolated. Its structure on the basis of mv, ir, ^{1}H nmr, ^{13}Cnmr, distortionless enhancement by polarization transfer (DEPT) (DEPT) measurements and $[x]_D$ is as shown in Figure I.



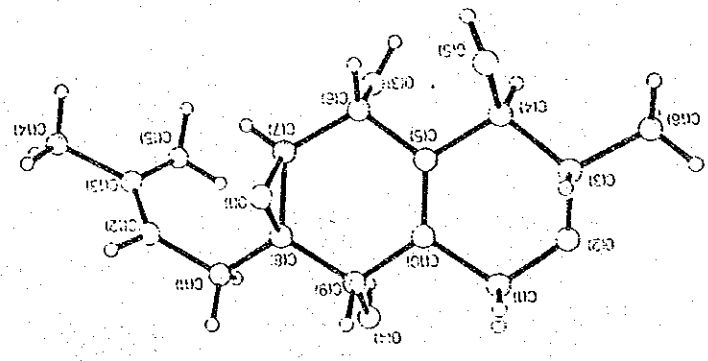
However, attempts are being made to refine this structure with the collected X-ray data. This structure presents an unsolved problem of coordinate displacement and therefore it is being sent to a research institute in Germany for further specialized studies. The other compounds that were isolated and characterized include the carbazole alkaloids, indizoline, 6-methoxyheptaphylline and two simple coumarines.

4.2 The bark of the Apoynaceous plant *Tabenaemontana divaricata* yielded nine alkaloids. The nmr, un, ir, ms data of two of these compound were received and were characterized as coronaridine and voacoengine.

4.3. The leave of the plant, *Cyclea burmanni* of the family Menispermaceae yielded several alkaloids. The physical data of one of the compounds were received. It was identified as the isoquinoline alkaloid argemonine.

4.4 The chemical investigations of the fungus *Aspergillus wentii* led to the isolation of a compound, AW-1, having activity against the bacteria, *Staphylococcus albus*, *Streptococcus viridans* and *Escherichia* coli. The structure elucidation of AW-1 is in progress. Attempts to obtain crystals, for X-ray analysis have not been successful and therefore the preparation of derivatives are being carried out for such investigations at Cornel University.

4.5. The chlorform extract of the fungus S-2, which showed activity against *Staphilococcus albus* and *Streptococcus viridans* gave a white crystaline compound, M.p 144°. It is a new rearranged carbohydrate dimer having the following structure. The biological activity studies on this compound are in progress.



5. **Training Provided**

Under our Postgraduate Research Programme, a NARESA Research Assistant Miss. K. M. Navaratne is in the process of submitting her M.Phil thesis. Two other NARESA Research Assistants have commenced their postgraduate research work.

DEPARTMENT OF NUTRITION

1. Introduction

The staff consists of two Nutritionists Dr. (Ms) C. L. Piyasena, M.B.B.S., M.Sc., Dr. D. G. R. Gunawardena, M.B.B.S., M.Sc., two Medical Officers Dr. (Ms) B. V. de Mel, M.B.B.S., Dr. (Ms) R. K. Munasinghe, M.B.B.S., one Nutrition Assistant Mr. W. H. Gunatilleke, five Public Health Inspectors Mr. D. S. Mendis, Mr. W. A. T. M. Wijayaratne, Mr. J. S. Deen, Mr. S. Navarathnasinghe, Mr. P. G. de A. Wickrema-singhe, one M.L.T. Miss B. M. L. K. Basnayake (assumed duties on 30. 10. 1987) ; and two Laboratory Orderlies.

Mr. I. K. H. Subasinghe (M.L.T.) assumed duties with effect from 09. 03. 1987 and vacated post in September, 1987.

Mr. Percy de Alwis Wickremasinghe (P.H.I) retired with effect from 25. 05. 1987.

Dr. (Ms) C. L. Piyasena, M.O. Nutrition, was on study leave for a period of 9 months from 30. 05. 1987. She obtained the degree of M.Sc. in Applied Nutrition, University of Wijayawada, Hyderabad, India.

Dr. (Ms) R. K. Munasinghe, M. O. Nutrition, participated in a Training programme on Computer Statistics at the Colombo University for a period of one month.

Miss B. M. L. K. Basnayake, M.L.T. was trained in Bomb Calorimetry and Iodine Estimations at the C.I.S.I.R. from 21. 12.1987 to 01. 01. 1988.

2. Comments On Routine Work

(1) *Birth Weight Surveillance Programme.*–Birth weight surveillance of the urban poor was initiated in 1977 as a MRI/CMC/UNICEF Project. Since 1979, seven Municipality Maternity Homes have been covered. Analysis of the results revealed the following :

(*a*) The total number of births in all centres during the period 1979-1986 was 11,283. The percentage of low birth weight was 25.7 per cent, and the proportion of premature births to "small for dates" was 10.1 to 89.9 per cent.

(*b*) The total number of births for the year 1986 was 1,197 of these,11.6 per cent of the 20.3 per cent low birth weight children were premature, while 88.4 per cent were "small for dates".

In all centres, the percentage of "small for dates" over prematures was higher than 85 per cent. This is a clear indication of a high prevalence of foetal malnutrition or intra-uterine growth retardation, probably due to maternal malnutrition.

(2) *Dietary Surveys.*–Three dietary surveys were done during this period :

(*a*) Kapparatota, in the Weligama M.O.H. Area.

(*b*) Weerakoongama, in the Bandarawela M.O.H. Area.

(*c*) Hiripitiya, in the Homagama M.O.H. Area.

In most of the households, that calorie adequacy was around 60 per cent, while the protein adequacy was over 100 per cent.In some households visited, the low calorie adequacy correlated well with the nutritional status of the children. While it is true that there is a protein gap in some developing countries, where the staple is a starchy food like manioc, in countries where the staple is a cereal, like in Sri Lanka, the deficit is that of calories. Our studies show that the communities investigated take inadequate food – the food is lacking in quantity and not in quality.

The actual cause of the deficit differs from community to community. In urban slums, the most important factor is the low purchasing power of the people. In rural areas, this is combined with lack of nutrition knowledge. Among the fishing community, the most important factors were the heavy capital expenditure on fishing vessels and the high cost of fuel. Since 1952, dietary surveys have been repeated in the same communities in order to determine the trends in consumption patterns, and the results of analysis show a steady decline in the consumption patterns during this period.

3. Research Activities

(1) *Iodine Deficiency Disorders Among Pregnant Mothers in the Kalutara District.*–A study was conducted among pregnant women in the Kalutara district in order to determine the degree of iodine deficiency disorders. Of the 1200 mothers so far seen, the prevalence of goitre was 65.5 per cent. Of these, the prevalence of grade 3 goitre was 10.9 per cent. (WHO–goitre visible from a distance). As most of the mothers were in their teens, this would constitute a serious public health problem.

Biochemical Investigations showed that the thyroid hormones (T3&T4) were within normal limits. However, there was a wide variation in the levels of TSH, showing that there was a definite deficiency of iodine.

Dietary studies among these mothers showed that goitrogens probably played no part in the aetiology of goitre in this area. The most important factor was the leaching of the soil due to heavy reains, and the inadequate drainage of rain water.

There were no cases of cretinism among the population so far studied. We hope to do a follow up of these mothers in order to determine the pregnancy outcome.

In addition to hormone estimations, we hope to do iodine estimations of food, water, soil and urine, in order to determine the aetology and severity of this deficiency.

(2) *Vitamin A Study in Horowpotana and Gomarankadawela.*–A very brief study of the Vitamin A status of school children was done in two villages in the dry zone–Horowpotana in the Anuradhapura RDHS area and Gomarankadawela in the Trincomalee RDHS area.

The prevalence of Bitot's spots in the Horowpotana schools was 3 per cent, while in Gomarankadawela, it was 5 per cent. These figures indicate that Vitamin A deficiency is a public health problem in some areas in Sri Lanka.

The importance of such small surveys is to spot pockets of Xerophthalmia. Although Vitamin A deficiency may not be a national problem, it is evident that there are pockets of the condition in various deprived communities.

(3) *Study on Xeroderma (Mosaic Skin).*–This study was done under the Estate Community Development Project in Moneragala. Anthropometric studies among 12–23 month children showed that 12 per cent were acutely malnourished (wasted), 20 per cent were chronically malnourished (stunted) and 4 per cent had concurrent malnutrition (wasted and stunted).

Fourteen children who had clearly visible signs of mosaic skin were chosen for a more complete examination, and a group of children of the same age was chosen as a control.

Analysis of blood samples showed that children with xeroderma had lower levels of Zinc and Iron. The fatty acid pattern of the serum was abnormal. The omega-3 fatty acids were low. Serum Vitamin A Transport protein, Serum Zinc, and Serum Iron levels, too, were low in children with xeroderma.

The study indicates that a deficieny in the supply of fatty acids may have taken place. Skin changes were more prominant among the more severely underweight children.

(4) *Longitudinal Study of the Nutritional status of Mother/Child dyad in relation to Indigenous Supplementary Feeding and Race in*

an Urban slum.–This study was done by Dr. (Mrs.) B. V. de Mel in collaboration with the Lasallian Community Education Services.

A Special weight chart was devised by Dr. (Mrs.) de Mel for charting the weight of pregnant women weekly from conception through lactation. The aim of the study was to increase the weight gain during pregnancy, which mean gain was previously less than 4 kgs, through feeding an indigenous supplementary food–namely rice and hathmalu for 200 days of the pregnancy. Reduce low birth weight which was around 30 per cent and ensure successful lactation up to 6 months.

The mean weight gain in the 15 muslim pregnant women was 6.66 kgs. The percentage of low birth weight was reduced to 10 per cent from the original 30 per cent.

The mean weight gain among the 23 Sinhalese women was 6.2 kgs. The percentage of low birth weight was 8.3 per cent whereas previously it was 28 percent. Successful lactation was achieved in 95 per cent of young infants.

The weight gain in the 15 Tamil pregnant women was 6.92 kgs. There were no low birth weight babies born. Mothers were over 80 per cent days on the supplement. All young infants were successfully breast fed.

4. Training Programmes

The following lectures were given by Dr. D. G. R. Gunawardena during the year under review :

(*a*) Lectures to trainee sisters at the Post Basic School of Nursing, General Hospital, Colombo ;

(*b*) Conclusion of Lecture/demonstrations to M.Sc. students of the Kelaniya University who are following a course in Food and Nutrition ; assisted at the examinations, *viva voce*, and correction of papers ;

(*c*) Master Teacher Trainers Training Course at the Curriculum Development Centre.

5. Services to Other Organizations and Institutions

(1) Participation in the Committee Meeting of the National Nutritional Status Survey 1988/89 (F & NPPD/MRI/WHO) at the Ministry of Plan Implementation.

(2) Participation in the Committee on Preparation of a Midday meal for school children (F & NPPD/FHB).

(3) Members of Committee on Food & Nutrition Surveillance and Data Bank Project in collaboration with the Ministry of Plan Implementation.

(4) Preparation of Project Document for Cabinet memorandum.

6. Publications and Papers For The Past Year :

(1) Choice of Nutritional Foods by Dr. D. G. R. GUNAWARDENA in Nutrition News, Vol. 8, May, 1987.

(2) Vitamin E Deficiency in phrynoderma Cases in Sri Lanka by EARLING N. CHRISTIANSON, CHANDRANI PIYASENA, et. al. in American Journal of Clinical Nutrition, 47:253–5, 1988.

(3) Vitamin Deficiencies in the Aetiology of Phrynoderma by EARLING N. CHRISTIANSON, CHANDRANI PIYASENA et.al. in Ceylon Journal of Medical Siences, Vol.30, No. 1, June,1987.

DEPARTMENT OF PARASITOLOGY

1. Introduction

The Department of Parasitology which functions under the guidance of the Director, M.R.I., has a staff consisting of two Medical Officers, Dr. (Miss) S. Samarasinghe and Dr. (Mrs.) U. Seneviratne; one Research Officer, Mr. Y. Wijayaratnam; three Medical Laboratory Technologists, Mr. D. K. C. Amarasinghe, (senior M.L.T.), Mrs. K. Gunasekara and Mrs. S. M. P. Amarasinghe; and three Laboratory Orderlies.

2. Work output for 1987

The following investigations were performed during the past year :

(*a*) *Stools :*	
Direct Smear and, MIFC technique for AOC	146
Amoebic Culture	12
(*b*) *Blood and Serum :*	
(i) Blood films for–	
1. Malaria parasite	22
2. Microfilaria	18
(ii) Immunological Tests–	
1. Fluorescent Antibody Test for–	
(i) Filaria	4890
(ii) Toxoplasma	461
(iii) Amoebiasis	37
2. Indirect Haemagglutination test for	
(i) Toxoplasma	461
(*c*) *Other Specimens :*	
(i) Sputum for Pneumocystis carinii	01
(ii) Vaginal swabs for Trichomonas Vaginalis	01
(iii) Pus for Amoebic culture	01
(*d*) *Identification of Worms :*	
A worm extracted from the sub–conjuntival space of a 16 year old girl was sent for identification to this Department and it was identified as the filarial worm *Loa Loa.*	

3. Research Activities

(1) A survey of incidence of Cryptosporidium in diarrhoea patients in Colombo and its suburbs being carried out by Dr. (Miss) Samarasinghe in collaboration with Dr. R. S. B. Wickremesinghe, Consultant Microbiologist, M.R.I.

(2) A Project started in 1986 to determine the levels of filarial antibodies in clinical cases of Filariasis after treatment was continued this year by Mr. Y. Wijayaratnam, R.O., in collaboration with Dr. H. N. Rajaratnam, V.P., General Hospital, Ragama.

4. Teaching and Training

Dr. (Miss.) S. Samarasinghe and Mr. D. K. C. Amarasinghe continued to give a course of lectures and participate in the training programme of laboratory work in parasitology for the M.L.TT. Trainees. Dr. (Mrs.) U. Seneviratne gave a course of lectures on Parasitic Infections and their relationship to nutrition to the students following the M.Sc. course in Food and Nutrition conducted by the University of Kelaniya with W.H.O. Collaboration. Mr. D.K.C. Amarainghe carried out the practical demonstrations for these students.

Training courses for P.H.II. in stool examination for ova funded by the JOICEF is also being conducted by our department.

Short lectures on collection and transportation of specimens for parasitological diagnoses were given by the staff of our Department to pupil nurses from the Nurses Training Schools on their visits to the M.R.I.

5. Services to Other Organizations

The Department continues to provide services to the government and private medical institutions.

6. Workshops

Dr. (Miss.) S. Samarasinghe participated in a Workshop sponsored by W.H.O. on Diarrhoeal Diseases held at the National Institute of Cholera and Enteric Diseases in Calcutta (Sep. 14th-23rd, 1987). At a Workshop for M.L.TT. conducted by W.H.O. in July 1987, lectures on Parasitology were delivered by Mr. Y. Wijayaratnam while the practicals were conducted by Mr. D. K. C. Amarasinghe.

DEPARTMENT OF PATHOLOGY

1. Introduction

The staff of this Department. consists of Dr. Sriya Gunasekara M.B.B.S. (Cey), D. Path (U.K.); D.C.P. (Lond.), Consultant Pathologist and Head of Section; Two Medical Officers, Dr. Mrs. L. Balakumar and Dr. Mrs. A. Seneviratne; Senior MLT Mr. M.M. Dassanayake and two other M.L.TT. Mr. P. Wickramasinghe and Miss S. Thambawita; and three Laboratory Orderlies.

Dr. Gunasekara left the island in June 1987 on six months of earned leave. Dr. A. De Tissera, Pathologist Colombo South Hospital covered up her work. M.L.T. Miss S. Thambawita left for Japan in March for further training. The work undertaken includes Clinical Pathology, Haematology, Histopathogy and Cytopathology.

2. Work Output for Past Year

A total of 12,060 investigations were performed on 7,165 specimens received during the year 1987.

Nature of specimens and types of investigations are as follows:

Histopathology – Surgical	624
Urine for Pregnancy testing	155
Urine for full analysis	1,118
Blood for WBC/DC	793
Blood for ESR	504
Special Haematological investigations B.M., etc.	778
Abnormal Haemoglobins and ADT	526
Blood group serology	167
Antinuclear Antibody fluorescent tech.	2,029
Miscellaneous investigations	471
Total	7,165

3. Comments on Routine Work

The simple haematological and other tests continue to be carried out as part of the service to the staff of the Institute and on private requests. The more specialised investigations are undertaken for all hospitals where such facilities are not available.

Histological examinations of surgical material was temporarily hampered by problems in processing techniques.

4. Research Activities and Summary for Past Year

A study of abnormal haemoglobins was done and an unusual combination for Sri Lankan laboratories, of HbS and HbC was detected. But this happened to be from a non-national, an Egyptian working in Colombo.

5. Training Provided (By Dr. Gunasekara Pathologist)

(1) Pathology, training to medical officers following the Diploma and MD courses in Forensic Medicine.

(2) Lectures in Haematology to M.OO. following the D.Path Course.

(3) Department participates in the training programme of M.L.TT. students in Histopathology and laboratory management.

6. Services to Other Organisations and Institutions

(1) Is visiting Histopathologist to the Dept. of J.M.O. Colombo and covers up the work by visiting once a week.

(2) Visits outstation hospital laboratories to study and report on conditions there when instructed by the Department of Health.

(3) Is a council member for the College of Pathologists of Sri Lanka and elected editor for 1985–1986.

7. Teaching (Dr. Gunasekara)

(1) Histo-pathology for M.D. Forensic Medicine

(2) Histo-pathology for Diploma in Forensic Medicine

(3) Lecture demonstration in Haemolytic Anaemia to M.OO. in D. Path Course.

8. Work-shops

Two refresher courses in Haematology, each lasting 10 days were conducted in July and November for MLTT from provincial and Base Hospitals.

DEPARTMENT OF PHARMACOLOGY

1. Introduction

The Department of Pharmacology which functions under the guidance of the Director, M.R.I., Dr. U. T. Vitarana has a staff comprising of one Medical Officer Dr. (Mrs.) R. M. S. Rajapaksa; two Medical Laboratory Technologists, Mr. N. Praisoody (Senior M.L.T.) and Mrs. K. S. N. Jayaratne; and one Laboratory Orderly.

The following assays are being carried out in this Department :-

(*a*) Urinary Catecholamine Estimation,

(*b*) Urinary Vanilyl Mandelic acid Estimation,

(*c*) Urinary 17-Ketosteroids Estimation,

(*d*) Urinary 17-Ketogenic Steroids Estimation,

(*e*) Urinary 5 (OH) Indole Acetic Acid Estimaion.

2. Work Output for the Year 1987

Tests	*No. of specimens tested*	*No. of Positives*
(*a*) Catecholamines	224	5
(*b*) V.M.A.	2	-
(*c*) 17-Ketosteroids	87	-
(*d*) 17-Ketogenic steroids	25	-
(*e*) 5(OH) Indole acetic acid	12	1

3. Comments on Routine Work

Bio-assay is done for Catecholamine estimation and chemical assay is done for all other estimations. Several factors affect the final out come of these routine estimations. For Catecholamine and V.M.A., at least 48hrs, prior to the collection of urine all drugs specially Methyl dopa, Monoamine-oxidase inhibitors, Phenothiazines, barbiturates and excessive intake of bananas, tea, coffee and chocolates should be avoided. Ideally the collection of sample should be made when the B.P. is elevated and the sample should be kept at 4°C (refrigerated) during the collection and sent to the laboratory without delay.

Preservatives used are as follows –

(*a*) Catecholamine estimation– 150 mg. of Ascorbic acid and 2ml. of conc. HCl.

(*b*) V.M.A.– 25 ml. of 6N HCl

(*c*) 17-Ketosteroids and 17-Ketogenic Steroids – 10 ml. of conc.HCl and 0.5 gm. of $CuSO_4$

(*d*) 5(OH) I.A.A. – 25 ml. of glacial acetic acid.

4. Services to Other Organisations and Institutions

This section extends its services to Government and Private Medical Institutions.

DEPARTMENT OF RABIES DIAGNOSIS AND RESEARCH

1. **Introduction**

Staff.–This department is in charge of a specialist Medical Officer, Dr. A. Sathasivam (Consultant Virologist). There are two Medical-Laboratory Technogists Mr. B. M. Jayaratne (Senior M.L.T.) and Mrs. C. H. Jayasooriya. There are two Laboratory Orderlies.

2. **Work Output**

(*a*) *Routine.*–The routine work consists of the diagnosis of rabies by one of two methods :

(i) Direct microscopy of brain smears after staining with Seller's stain.

(ii) Fluorescent Antibody Test. This test is done on specimens which are found to be negative by direct microscopy.

Shown below is the summary of work done in 1987 :

Number of specimens received	736
Number of specimens decomposed	76
Percentage decomposed	22.6
Number of specimens examined	660
Number positive by direct microscopy	304
Number Negative by direct microscopy	356
Number of fluorescent antibody tests	356
Number FAT positive	111
Number FAT negative	245
Total positive	415
Percentage Positive	62.87

(*b*) *Research Work.*–Research work in assessing the feasibility of intradermal vaccination using 1/10th normal dose of Human Diploid Cell Tissue Culture Vaccine prophylactically yielded interesting results.

3. **Services to Other Organizations** (by Dr. A. Sathasivam)

3.1 Member Board of Study in Microbiology, P.G.I.M.

3.2 Vice-President, College of Microbiologists of Sri Lanka.

4. **Teaching** (by Dr. A. Sathasivam)

(i) Lectures and demonstrations to students at the Postgraduate Institute of Medicine Courses :

(*a*) Diploma in Microbiology,

(*b*) Family Health Medicine.

(ii) Lectures in Rabies to School of Medical Laboratory Technology.

5. **Publications and Papers**

5.1 Post-exposure Intradermal Antirabies Vaccine-evaluation as a cheaper alternative for developing countries.

DR. A. SATHASIVAM (Consultant Virologist, M.R.I.) and PROF. D. RAMDAS (Professor of Paediatrics, University of Jaffna).–In print–Ceylon Medical Journal.

A TRIBUTE

It is with great regret that we record the untimely death of our Senior M.L.T., Mr. B. M. Jayaratne, on 07th October, 1988 after an illness well borne. He had served this Department loyally and honestly for the past 22 years. His capacity for work and the willingness to carry out any work given to him cannot be equalled. A man of his calibre can never be replaced. We miss him very much.

MAY HE ATTAIN NIBBANA

DR. A. SATHASIVAM.

DEPARTMENT OF SEROLOGY

1. Introduction

This laboratotry is the only Serology Laboratory performing six diagnostic tests daily and serving the whole island as a Reference Laboratory. Serological tests are also performed on samples received from the institutions in Colombo and some outstation laboratories that are not capable of doing certain tests due to lack of facilities.

The Department is supervised by Dr. T. J. P. Ratnayake M.B.B.S.(Cey), Dip. Bact.(Toronto) assisted by two Medical Officers Dr. (Mrs.) J. T. S. Saverimuttu and Dr. (Mrs.) S. Gunawardene ; three Medical laboratory Technologists, Mrs. S. V. Galhena (Senior M.L.T.), Mrs. M. Pattiarachchi and Mr. U. H. Bandula with experience in Serology of 30, 15, and 8 years respectively. They handle the serological work and preparation of antigens. Two Orderlies help them in these duties.

It is envisaged to distribute the work of this Department to other departments when the new M.R.I. Building Complex is ready in 1990. An Immunology Department has been created.

2. Work Output for 1987

Tests	*Public*	*Private*	*Total*
(*a*) Anti-streptolysin "O" titre (ASOT)	5,288	17	5,305
(*b*) Brucella agglutination (melitensis, abortus)	96	37	133
(*c*) Latex flocculation test (LFT) (Rheumatoid arthritis factor)	2,031	16	2,047
(*d*) Paul-Bunnel	289	25	314
(*e*) Standard agglutination test (SAT – Widal)	2,665	10	2,735
(*f*) Weil Felix	22	08	30
Total	10,391	173	10,564

Antigen Prepared

	Prepared	*Issues to other Laboratories*
	ml.	ml.
(*a*) SAT	84,600	25,000
(*b*) Weil Felix	300	Nil
(*c*) ASOT	1,200	Nil
Total	86,100	25,000

Weil Felix and ASOT tests are not done in other laboratories of the island.

3. Routine Work

The laboratory still continues to receive a large number of decomposed and haemolysed specimens. On certain days of the week 50 percent of the samples received are decomposed. Outstation institutions continue to send requests on small pieces of paper, sometimes as small as two and a half inches sqare. It is also observed that specimens are received long after the collection, are sent later having forgotten to despatch them. Diagnostic kits are available for the LFT test and this test can be easily done in provincial laboratories at least twice a week, depending on the number of samples received in the laboratory.

4. Training Provided

(*a*) Medical officers attached to this Institute.

(*b*) M.L.TT. in service.

(*c*) Trainees of the School of Medical Laboratory Technology.

5. Services to Other Organizations and Institutions

(*a*) Supply of antigens to laboratories where particular tests could be done,

(*b*) Specimens sent by Private Medical practitioners, Nursing homes, private laboratories and consultants are undertaken for testing.

6. Teaching

(*a*) Para-medical personnel from Private Sector and Government Institutions.

(*b*) Postgraduate students preparing for the Diploma in Bacteriology Examination.

) In service training of M.L.TT. in outstation laboratories.

DEPARTMENT OF VACCINES

THIS Department is divided into two :

1. Viral Vaccine Department
2. Bacterial Vaccine Department.

Viral Vaccine Department

1. Introduction

Consultant and Head of Department, Dr. A. Sathasivam (Virologist), Dr. O. Wimalaratne, Medical Officer. There are three Medical Laboratory Technologists, Mr. D.N.L.W. Jayamanne (Senior M.L.T.) is also one of the Resident M.L.TT., Mr. P.K. Jayaweera, Mr. B.M.K. Bandara has been now transferred to the Department of Rabies Diagnosis and Research.

2. Work Output - 1987

Goat brain tissue rabies vaccine (Semple type) is no longer produced. From October, 1986 a better vaccine with no neurological complications as in the case of the Semple vaccine is being imported by the Ministry of Health. This is a tissue culture rabies vaccine (Imovax : Merieux) using WI 38 strain of rabies virus grown on monkey kidney cell culture and killed by using betapropiolactone. The post-exposure course of treatment consists of 5 injections given on DO, 3, 7, 14, 30. A 6th injection on D 90 is given for those receiving anti rabies serum (severe exposure cases). This vaccine is also used prophylactically for persons continuously handling rabies virus like Laboratory Workers, Veterinarians, etc.

Given below is the data concerning tissue culture rabies vaccine for 1987 :

Amount of vaccine received in 1987	71,098 doses
Amount of vaccine consumed as shown by monthly vaccine returns from the different hospitals	78,965 doses
This converted into number of persons given post-exposure treatment for 1987	15,793

Vaccine is stored at the State Medical Stores and brought to the Cold Room of the M.R.I. in batches. The entire distribution of this vaccine is done by this department. Vaccine is issued to most General Hospitals and Base Hospitals.

A list of these hospitals is maintained at the Vaccine Department of the M.R.I. and is updated from time to time. Vaccine is not issued to General Practitioners or Private Institutions.

3. Research Work

As mentioned in the chapter on Rabies diagnosis and research, the feasibility of intradermal vaccination using 1/10th dose of Human diploid cell tissue culture vaccine prophylactically yielded interesting results.

Bacterial Vaccine Department

1. Introduction

The consultant and M.O. are the same as for Viral Vaccines. In addition there are two M.L.TT. Mr. U. Rajapakse (Senior M.L.T.) and Mr. V. Somasunderam. There are three Laboratory Orderlies.

2. Work Out put for 1987

Production and Consumption	*Production*	*Consumption*
Antityphoid Vaccine	47,985 ml.	64,062 ml.
Anticholera Vaccine	31,550 ml.	24,227 ml.
Reconstitution of Tuberculin	Two batches	
Pharmaceutical Sterility testing	56 samples	

Antityphoid and Anticholera Vaccine are sold to the public from time to time. These vaccines are sold to the Maldives when requested.

5-

DEPARTMENT OF VIROLOGY – I

1. Introduction

The staff consists of Dr. U. T. Vitarana, M.B.B.S.(Cey.), Dip.bact.(Lond.), M.D.(Cey.), Ph.D.(Lond.), Consultant Virologist, Head of Section. Two Medical Officers, Dr. (Mrs.) G. Colombage, Dr. (Mrs.) V. Bandaranayake.

A Medical Officer, Public Health Inspector, Public Health Nurse and an Orderly, employed in the WHO/DHF Project are also attached to the section.

The M.L.T. staff consists of M. Kanapathipillai, (Senior M.L.T.), N. Ariyaratnam, H. D. N. Gunasekera, S. M. W. W. B. Rajapakse, Ms D. M. L. C. Hettiarachchi, Ms K. L. Peiris, Ms W. A. Rani Sriyanthi, a Japanese volunteer Ms Seiko Tateoka and four Laboratory Orderlies.

INVESTIGATIONS

(1) Arboviruses – JE, Dengue, Chikungunya, Sindbis–routine isolation and Serology (HI, MAC ELISA for JE, CF, NT)

(2) Hepatitis – Serology for B (ID as routine and RIA), A (RIA) ; RIA tests limited use due to expense. It is hoped to develop the ELISA test soon.

(3) Rubella – HI Serology (IgG and IgM).

(4) CMV – CF Serology and isolation.

(5) Measles, Adenovirus, Varicella zoster, Vaccinia, Mumps, Psittacosis, Mycoplasma and Rickettsiae – routine Serology(CF).

(6) Herpes Simplex – CF Serology and isolation.

(7) AIDS – ELISA, IF, Western Blot and Agglutination tests for confirmation.

(8) HFRS – IF test.

Note.– (*a*) MAC-ELISA for Japanese Encephalitis (JE) permits the diagnosis from a single sample of CSF or serum,

(*b*) All specimens for Virology must be collected under sterile dry conditions. For Serology two blood samples are needed, an early (acute) and a late (convalescent), the latter preferably 10 or more days after the first. For virus isolation specimens must be sent packed in ice, preferably with the specimen collected into a transport medium. Bottles and transport medium can be obtained from the laboratory when required.

2. Routine Work Output – 1987

	Test	*No. tested*	*No.+ve*
2.1. Arboviruses Haemagglutination inhibition test (HI) for Chikungunya, Sindbis, Dengue and Japanese Encephalitis (JE) & MAC ELISA for JE	HI	1536	27
	MAC ELISA-Blood	50	31
	CSF	1224	267
2.2. Hepatitis B Markers HBsAg (Hepatitis B surface antigen) In Chronic Liver disease cases, and some HBsAg ID negative cases of acute viral hepatitis, HBsAg testing was done by	ID	2812	245
Radioimmunoassay	RIA	572	30
Anti-HBs	ID	2812	02
Anti-HBc	RIA	95	09
Hepatitis A Markers Anti-HAV IgM	RIA	95	43
2.3. Rubella (includes congenital syndrome, pregnancy and others)	HI	366	03 (+? 07)
2.4. Measles (includes neurological cases and rashes)	CF	52	(+? 06)
2.5. Herpes simplex (buccal, genital and neurological)	CF	28	00
2.6. Mumps	CF	04	00
2.7. Adenovirus	CF	06	00
2.8. Mycoplasma pneumoniae	CF	07	00

3. Research Activities 1987

(1) *Japanese Encephalitis.*– The National Surveillance of Japanese Encephalitis was continued. There was a major outbreak of Japanese

Encephalitis which commenced in September and peaked about the beginning of December and continued till February 1988. 309 samples of CSF were received from Anuradhapura and 125 were confirmed positive by IgM ELISA and a further 17 were positive on HI serology. The incidence in the Chilaw/Puttalam district appears to be less than in the previous outbreak (35 out of 54 CSF positives by IgM ELISA and 6 out of 14 by HI serology). Kurunegala was also significantly affected (10 out of 30 CSF IgM positives).In comparision with the previous outbreak there appears to be an increase of cases in Polonnaruwa (18 CSF positives by IgM ELISA out of 31 samples), Batticaloa (7 out of 9 bloods positive by IgM ELISA and 4 out of 5 HI positives), Kuliyapitiya (4 out of 5 CSF and 5 bloods positive by IgM ELISA), and Trincomalee (3 out of 3 bloods positive by IgM ELISA). There was the usual scatter of cases in the other endemic areas but nowhere else did it reach epidemic proportions. A disturbing feature therefore has been the wider area of the epidemic and its persistence at a high level in the Anuradhapura destrict. There have also been a few cases in the hill country.

A sero-survey was done in Anuradhapura, Chilaw and Puttalam districts in August 1987 to get baseline data to compare with subsequent surveys after the outbreak.

A sero-survey is to be done soon after the outbreak is over in 1988 to get a better picture of its extent and magnitude. Recommendations were made to the Health Ministry to intesify control measures, specially immunization of humans and pigs, water management and the use of larvivorus fish. Pilot studies were initiated to test the feasibility of some of these meaures.

(2) *Dengue Haemorrhagic fever Study.*–The plaque reduction neutralization test (PRNT]). was done on a sample of children in the school cohort for the six month period September 1982 to March 1983. Out of a sample of 100 tested 19 had been infected by Dengue 2 while five were positive for Dengue 1 and three for Dengue 4. This supports the earlier conclusion from a study of fever cases that there was an outbreak of Dengue 2 in Colombo at that time. Further the PRNT study confirmed that Dengue 4 had also been circulating in Colombo though we had not made any isolations. Blood was received from 32 suspected cases of DHF but only four were positive.

(3) *Genetic Studies on Sri Lankan Dengue Isolates.*–the preliminary results from the Queensland Institute of Medical Research show that the Dengue 2 isolates obtained in Colombo in 1982 are similar to those obtained in 1967.From among the limited number tested there is no evidence of the Dengue 2 types associated with Dengue Haemorrhagic Fever (DHF/DSS) in Thailand and Malaysia occurring in Sri Lanka. Though limited these findings tend to support our conclusions from the 1980-85 dengue Study in Colombo that strain of virus rather than the type itself determined the outcome of a dengue infection.

(4) *Study of Haemorrhagic Fever with Renal Syndrome (HFRS).*–More rats were caught in the Colombo Harbour and tested for antibody-13 (13.5%) of 96 were positive, showing highest titre against Seoul virus. Of the 27 collected in 1987, 10 were positive suggesting that a larger proportion of rats in the harbour may be infected than before (1984/85). All the positive rats were Rattus norvegicus.

The first isolation of Hantavirus in South Asia was made from a rat caught in Colombo Harbour in 1987. The results of comparative titrations, using monoclonal antibodies against known Hantaviruses, showed it to be related to Seoul virus though with some minor differences.

A study of human sera from patients thought likely to be suffering from HFRS (non-leptospirosis, NANB Hepatitis, non-Dengue Haemorrhagic Fever and Acute Nephritis) was carried out in 1987. Of 140 sera tested 11 (7.9%) were positive. and of these 4 had evidence of recent infection. Two of these patients had a leptospirosis-like illness (one of them also having

bronchitis), one a viral hepatitis-like illness and the fourth a meningo-encephalitis with renal and hepatic involvment that ended fataly. The latter is an unusual presentation for HFRS.

The Serological studies on the sera of the human patients by IF, ELISA and PRN tests suggested that the infecting virus was a Hantavirus that was related to the two Korean viruses, Hantaan and Seoul, but different from them. The 11 positive cases came from a wide area extending from Galle in the South to Anuradhapura in the North Central region. These findings suggest that there is an endemic Sri Lankan hantavirus which is different from the virus in the Colombo Harbour that has probably been more recently introduced by rats in ships coming from affected countries like Korea, China and Japan. More studies are planned with WHO support to determine the ecology of this endemic Sri Lankan Hantavirus.

(5) *Rubella Studies.*–Sixteen pregnant women were tested for Rubella antibody and of them one was positive and two others were possible positives. Among 11 index cases two were positive and a further two possible positives. Among 76 babies tested for evidence of Rubella syndrome none were positive.

(6) *Aetiology of Acute Viral Hepatitis.*–These studies were handicapped by the lack of RIA kits. Blood was received during the year from 1,498 cases. Only 170, (11.3%) were positive for HBsAg by ID. This is a lower figure than in previous years. 322 of the negatives were tested by RIA and only 13 (4%) were positive. This also tends to support the lower incidence of Hepatitis B. 95 of the Hepatitis B negative sera were tested for Hepatitis A by RIA (anti-HAV IgM) and 43 (45.3%) were positive. From this small sample 52 (54.7%) were therefore non-A non-B (NANB) Hepatitis. It would therefore appear that the proportion of Hepatitis B may be declining while that of NANB Hepatitis may be increasing. However larger scale testing of cases of acute viral hepatitis requires to be done to really determine trends. (With the assistance of WHO and CDC Atlanta ELISA tests kits are being developed at the MRI for the Hepatitis Markers).

6–

(7) *Aetiology of Chronic Liver Disease.*–Despite the completion of the WHO Project these studies are being continued by the M.R.I. Blood samples are received from 72 patients and only one was positive by ID and of 16 tested by RIA none were positive for HBsAg.

(8) *Myocarditis Study.*–Blood was received from 90 patients having Myocarditis and/or Pericarditis and Cardiomyopathy. Unfortunately paired sera were received from 10 and only one of them was positive. The negative sera were sent to Virology II for Coxsackie Serology.

(9) *Study of Subacute Sclerosing Panencephalitis(SSPE).*–Blood and CSF were received from six suspected cases during the year and four of them were positive.

4. Training and Teaching Provided

(1) Practical Training of MLT students in Virology.

(2) Training of medical laboratory technologists following a refresher course in Microbiology.

(3) Mr. H. D. N. Gunasekera – part-time tutor.

(4) Lectures in Virology by Dr. Tissa Vitarana at the School of Medical Laboratory Technology.

(5) Lectures and demonstrations by Dr. Tissa Vitarana for students of Postgraduate Institute of Medicine–

(*a*) Diploma in Microbiology,
(*b*) M.D. in Community Medicine,
(*c*) M.D. in Pathology.

5. Services to Other Organizations (by Dr. Tissa Vitarana)

(1) Served on Panel of Experts in Virology, WHO, Geneva.

(2) Temporary Adviser to the WHO Regional Director at Meeting on Viral Hepatitis, New Delhi.

(3) Secretary, National Standing Committee on Health and Medical Research.

(4) Founder Member, National Laboratory Accreditation Committee for Sri Lanka.

(5) Member, Advisory Committee on Communicable Diseases, Ministry of Health.

(6) Acting Chairman, Advisory Committee of the School of Medical Laboratory Technology.

(7) Convenor, National Committee for the Control of Dengue vectors.

(8) Convenor, National Committee for the Control of Japanese Encephalitis vectors.

(9) Member, Board of Studies in Microbiology, PGIM.

(10) Virologist on National AIDS Task Force.

(11) WHO Temporary Adviser at International Meeting on Japanese Encephalitis, HFRS and Viral Vaccines held in Seoul, Korea.

(12) Dr. Tissa Vitarana received a WHO Visiting Scientists Grant and visited CDC Atlanta, CDC, Puerto Rico, Pasteur Institute, Paris and Middlesex Hospital, London to update knowledge on AIDS, Hepatitis and Dengue.

6. **Publications and Papers** (by Dr. Tissa Vitarana)

(1) Paper on "the Dengue Situation in Sri Lanka" at the International Conference on Dengue held in Mexico in February 1987.

(2) Paper on "Dengue 2 Outbreak with high secondary infection but low DHF" at the International Conference on Dengue held in Mexico in February 1987.

(3) Paper on "Viral Hepatitis in Sri Lanka" at WHO Meeting on Viral Hepatitis, SEARO, New Delhi. July 1987.

(4) Paper on "Hantavirus Infection and Disease in Sri Lanka" at Asia Pacific Science Congress, Seoul, Korea.

(5) Paper on "Haemorrhagic Fever with Renal Syndrome in Sri Lanka ; the first report in South-Asia". Centenary Sessions of the Sri Lanka Medical Association (Awarded H. E. Senaviratne Prize).

(6) Chaired symposium on "1985/86 Japanese Encephalitis Outbreak" and read paper on "Virological Aspects". Centenary Sessions of the Sri Lanka Medical Association.

(7) Paper on "Viruses and Liver Disease" at symposium on "Liver Disease" at Centenary Sessions of the Sri Lanka Medical Association.

(8) Sir Marcus Fernando Oration. Centenary Year of the Sri Lanka Medical Association on "Viral Hepatitis in Sri Lanka".

DEPARTMENT OF VIROLOGY–II

COLOMBO SOUTH VIRUS LABORATORY

1. Introduction

The staff consists of Consultant Virologist, Dr. Nalini Withana, M.B.B.S(Cey), Dip. Bact. (Manchester), M.Sc.(Liverpool); Medical Laboratory Technologists, Mr. Kuganesan; (Senior M.L.T.), Mr. U. C. Hettiarachchi and Mrs. G. T. Nandanie; Animal Supervisor, Mr. R. T. Sadananthan; and six Orderlies.

2. Work Output

(1) Tissue culture–

(*a*) *Primary.*–Six pairs of Human Embryonic Kidney (HEK) were processed.

(*b*) *Established Cell Lines.*–The following cell lines are available in our cell bank – HEL, LLCMK$_2$, Vero, Vero E6, RK$_{13}$, C$_{6/36}$, HEp$_2$ (Cincinnati), McCoy and MDCk. Vero-E6 was brought by Prof. Ho Wang Lee of South Korea.

(2) Enteroviruses–

(*a*) *Virus Isolation.*–189 stool samples from 75 patients were received for virus isolation. Polioviruses were isolated from 28 samples – 27 were type 1, and 1 was type 2. All were wild strains.

(*b*) *Serology.*–

	For Polio Antibody	*For Coxsackie Antibody*
No. of single sera received	168	50
No of paired sera received	58	08
Definite evidence of recent infection	43 (all Polio 1)	07 (5-Cox B$_3$, 2-Cox B$_5$)

(3) Influenza Viruses–

(*a*) *Virus Isolation.*–

No. of throat washings collected	186
No. positive	Nil

(*b*) *Serology.*–

No. of single sera collected	82
No. of paired sera collected	07
Evidence of recent infection	Nil

(4) Herpes Simplex Virus–

No. of genital swabs tested (including screening of prostitutes)	392
No. positive	29

(5) Chlamydia–

No. of eye swabs tested (new born babies)	125
No. positive	Nil

(6) Animal House–

352 mice, 108 pregnant mice and 98 rats have been issued.

3. Research Activities

(1) *Sero-conversion to Oral Polio Vaccine (OPV).*–Neutralizing (NT) antibodies to polioviruses 1, 2, and 3 were measured in 172 babies at 3 months of age prior to giving the first dose of OPV. The test was repeated in 65 children 1 month after the 3rd dose of OPV.

Sero-conversion to Polioviruses After OPV

Blood	*Negative*	*Positive*							
		1,2,3	*1*	*2*	*3*	*1+2*	*1+3*	*2+3*	*Total tested*
Before the 1st dose of OPV	113	05	19	23	6	10	02	0	172
1 month after the 3rd dose	01	63	0	0	0	0	0	1	65

Antibody titres in Children who have had all 3 Doses of OPV – (Blood Taken 01 Month After the 3rd Dose of OPV)

	8	*8*	*16*	*32*	*64*	*128*	*256*	*512*	*1024*	*Total*
Polio 1	2	1	3	5	5	3	11	17	18	65
Polio 2	1	0	0	0	6	12	20	15	11	65
Polio 3	1	3	2	5	7	13	12	16	03	65

(2) *Aetiology of Neonatal Conjunctivitis.*–125 conjunctival swabs collected from cases of Neonatal Conjunctivitis and controls were inoculated into Cycloheximide treated McCoy cells. After incubation the cells were stained with Giemsa and examined under dark ground illumination. No chlamydial inclusions were seen in any of the specimens.

(3) *Investigation of an Outbreak of Paralytic Poliomyelitis in Northern Sri Lanka.*–An outbreak of Poliomyelitis occured in some coastal fishing villages in Northern Sri Lanka in July - September 1987. The affected villages were Iranativu and Nachikuda in the Kilinochchi M.O.H. area, Chavakadu in Manipay M.O.H. area and Gurunagar in the Jaffna municipal area (Jaffna R.D.H.S's Report – July/Aug. 1987) Virological studies carried out in our laboratory showed that the outbreak was caused by Polio type I virus. All the strains isolated were of the wild type. Vaccine samples collected from the affected M.O.H areas were tested and found to be satisfactory.

4. **Services to Other Organizations and Institutions**

Herpes simplex virus isolation for Anti V. D. Campaign. Supply of rats and mice to Ruhuna and Colombo universities. Oral Polio vaccine potency testing for the Epidemioloical Unit.

5. **Teaching**

(*a*) Lectures and demonstrations for post-graduate students following the Dip. Bact. Course.

(*b*) Visiting lecturer at the School of Medical Laboratory Technology.

THE RABIES SITUATION IN SRI LANKA (CEYLON)

A. Sathasivam

RABIES is endemic in Sri Lanka and man becomes exposed to rabies infection by the bite of a rabid animal. In Sri Lanka, the dog is the most important transmittor of rabies to man while the cat is second in line. However several other species of animal have been implicated.

At present the Rabies Laboratory of the Medical Research Institute, Colombo, is the only place in Sri Lanka where rabies diagnosis is carried out. Specimens for rabies diagnosis are received from the whole island.

Figure 1.–Shows a map of Sri Lanka depicting the nine provinces. An average of 77 percent of specimens received at the Rabies Laboratory of the M. R. I comes from the Western Province.

FIGURE 1

Sri Lanka Showing the Nine (9) Provinces

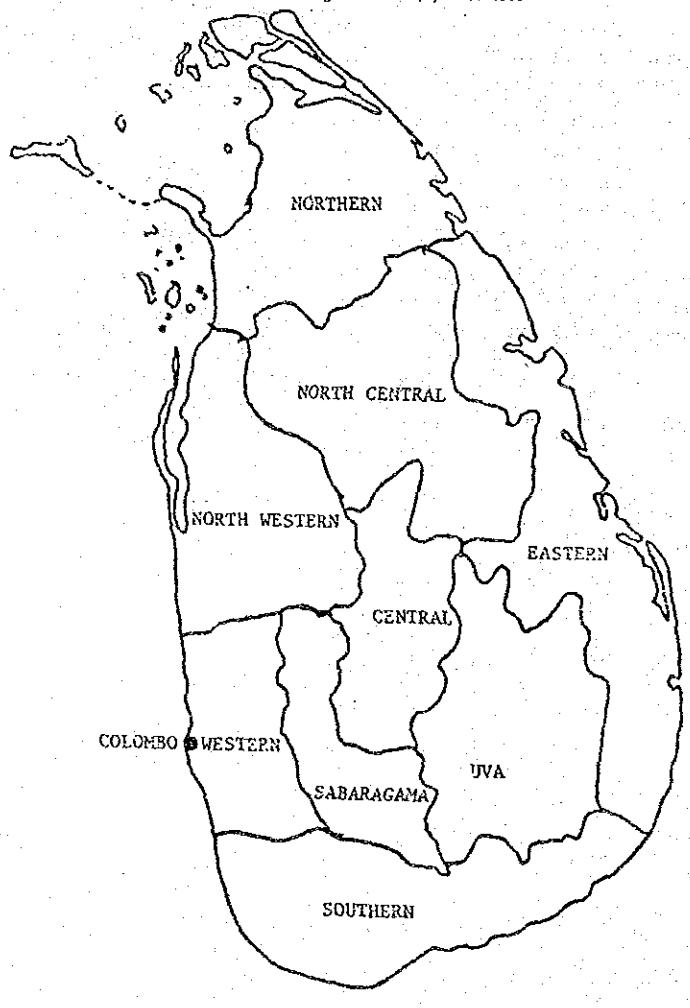


Table I.–Shows the number of specimens received for rabies diagnosis and the percentage of decomposition. Most of the decomposed specimens come from far away places. Due to the relatively high temperature and humidity in Sri Lanka decomposition takes place within 10 – 12 hours of the death of the animal. Hence the urgent need for decentralisation of Rabies diagnosis. This is being actively pursued by us in conjunction with the W.H.O.

Table I

Year	No. of Specimens Received	No. Decomposed	Percentage Decomposed
1970	906	118	11.8
1971	921	118	14.7
1972	864	123	13.2
1973	1117	164	14.6
1974	759	67	8.8
1975	786	82	10.4
1976	772	95	12.3
1977	765	79	10.3
1978	917	102	11.1
1979	1075	148	13.7
1980	925	126	14.0
1981	632	102	16.0
1982	644	80	12.0
1983	708	90	13.0
1984	686	71	10.0
1985	675	56	8.3
1986	762	57	7.5
1987	736	76	10.3

Table II.–Shows a breakdown of specimens received province wise. The Western province includes the Colombo Municipal Council area which had its own Rabies control programme.

Table III.–Shows the number of specimens examined and the percentage positivity as shown by the direct smear examination and fluorescent microscopy. The fluorescent microscopy is only carried out in direct smear negative cases. One can see that the percentage positivity does not show a significant change over the last 18 years.

Table IV.–Shows the human deaths as given by the Public Health Veterinary Officer. It will be seen that the statistics for the latter years are not confirmed by the Registrar-General's Department. However, in my opinion these figures are apparent and should be considerably higher. These figures are only those rabies deaths recorded in hospitals whereas most rabies deaths occur outside hospitals.

Table V.–Shows the type of animal heads received. Most of the animal heads received are that of the dog while the cat comes second. This laboratory has also received other species of animals for rabies diagnosis.

Table VI.–This table gives the results of a survey conducted by me and my staff to find the sylvatic reservoir of rabies in Sri Lanka.

The different species of animals examined were negative in respect of rabies infection of carrier state. However 6 specimens of grey mongoose showed neutralising antibody levels in their blood.

Hence this preliminary study gives a possible indication that the mongoose could be the wild life carrier of rabies infection in Sri Lanka. The jackal however could not be ruled out as only a few samples were examined. The six positive mongooses came from the Polonnaruwa district in the Eastern Province. We were also able to isolate virus from the salivary gland of one specimen.

Table VII.–Gives the Rabies Vaccine situation in Sri Lanka over the past ten years. From 1978 until October 1986, Sample type vaccine prepared at the M.R.I. Colombo was used for post exposure treatment of humans. There is no appreciable difference in the number of persons treated. From November 1986 till December 1987 the Vero Cell Tissue Culture Rabies Vaccine is being used. This vaccine is imported from Merieux laboratories (France) and is being used now.

TABLE II
Specimens Received for Diagnosis–by provinces

Year	Cmc	W.P.	C	Sab	U	N	Nwp	Ncp	S	E	Remarks		Percentage
1970	212	511	150	25	14	13	18	4	13	15	W.P.+CMC	723	71
											CMC	212	22
											Others	254	26
1971	264	392	84	11	16	14	41	47	17	11	W.P.+CMC	656	76
											CMC	264	30
											Others	201	23
1972	250	477	62	17	16	15	35	17	28	7	W.P.+CMC	727	78
											CMC	250	27
											Others	198	21
1973	259	620	118	12	12	9	24	11	42	9	W.P.+CMC	879	79
											CMC	259	23
											Others	238	21
1974	172	368	93	11	06	12	45	17	28	7	W.P.+CMC	540	71
											CMC	172	22
											Others	219	29
1975	178	417	79	5	13	3	25	18	16	10	W.P.+CMC	595	76
											CMC	178	22
											Others	191	24
1976	180	468	52	12	5	10	17	12	10	6	W.P.+CMC	648	84
											CMC	180	23
											Others	124	16
1977	145	434	83	13	16	10	34	13	11	7	W.P.+CMC	579	75
											CMC	145	19
											Others	186	25
1978	233	520	72	9	32	8	15	10	13	5	W.P.+CMC	753	82
											CMC	233	25
											Others	164	17
1979	261	660	66	15	12	15	10	13	21	4	W.P.+CMC	921	85
											CMC	261	24
											Others	154	15

TABLE III

Year	No. of Sp. Examined	Positives	Percentage Positive of Heads Examined
1970	861	535	62.1
1971	731	442	60.4
1972	802	521	64.9
1973	953	601	63.1
1974	692	442	63.9
1975	704	456	64.7
1976	677	389	50.7
1977	686	401	58.4
1978	815	412	50.5
1979	927	512	55.2
1980	799	420	52.5
1981	530	292	55.1
1982	564	315	55.9
1983	618	368	59.5
1984	614	410	66.8
1985	619	344	55.5
1986	705	428	60.7
1987	660	415	62.9

TABLE IV

Human Deaths (Rabies)

Year	No. of Deaths	Rate per 100,00. Population
1972	295	
1973	377	
1974	347	
1975	288	
1976	257	
1977	312	2.24
1978	242	1.71
1979	265	1.83
1980	153	1.04
1981	136*	0.90
1982	135*	0.88
1983	118*	0.72
1984	93*	0.60
1985	82*	0.52
1986	85	0.53

* Provisional - To be confirmed by the Registrar-General

TABLE V

Specimens Received for Rabies Diagnosis – Breakdown Into Animal Species Involved

Year	*Dog*	*Cat*	*Cattle*	*Donkey*	*Goat*	*Jackal*	*Monkey*	*Rat*	*Pole cat*	*Squirrel*	*Horse*	*Human*	*Mongoose*	*Others*		*Percentage of Dogs to Others*	
1975	732	34	7	0	2	0	5	2	1	0	0	0	0	Rat	1	93	7
														Sheep	1		
														Pig	1		
1976	716	35	5	0	4	1	3	2	0	0	0	4	1	Sheep	1	92	8
1977	699	36	13	0	1	2	2	2	1	0	1	0	3	Deer	1	91	9
														Pig	1		
1978	871	35	6	0	0	1	1	0	0	1	1	1	2			95	5
1979	963	65	14	1	4	2	5	4	1	1	1	3	9	Bear	1	89	11
														Civet	1		
														Cat	1		
														Buffalo	1		
1980	803	82	5	0	3	0	9	4	1	1	1	13	7	Deer	2	87	13
														Buffalo	2		
														Rabbit	2		
1981	553	53	5	0	1	1	3	4	0	1	0	2	6	Rabbit	1	87	13
														Buffalo	1		
														Squirrel	1		
1982	564	51	5	1	3	1	5	1	0	1	0	9	2	Rabbit	1	87	13
1983	622	64	5	0	2	1	1	2	2	1	0	5	3			88	12
1984	641	31	3	0	1	0	3	2	2	0	0	1	2	Loris	1	93	7
1986	678	60	4	0	3	2	3	1	1	1	0	5	3			89	11
1987	657	44	6	0	0	4	3	4	0	4	1	7	5	Rock			
														Squirrel	1	89	11

TABLE VI

Nature of Animal	*No. examined*	*Direct microscopy of Brain*	*Fat of Brain*	*Fat of Salivary Gland*		*Serum Virus Neutralisation Test*	
				No. Examined	*Result*	*No. Examined*	*No. Positive*
Red Mongooze	31	All Negative	All Negative	15	All Negative	11	Nil
Grey Mongooze	54	All Negative	All Negative	12	One positive	38	6
Rook Sqirrel	21	All Negative	All Negative	6	All Negative	15	Nil
Togue Monkey	02	All Negative	All Negative	01	Negative	02	Nil
Pole Cat	08	All Negative	All Negative	02	All Negative	04	Nil
Civet Cat	03	All Negative	All Negative	01	Negative	01	Nil
Hare	17	All Negative	All Negative	12	Negative	12	Nil
Wild Bear	02	All Negative	All Negative	Nil		02	Nil
Field Rat	39	All Negative	All Negative	16	All Negative	25	Nil
Bat (Flying Fox)	21	All Negative	All Negative	21 (brown fat)	All Negative	14	Nil
Jackal	03	All Negative	All Negative	02	All Negative	02	Nil

TABLE VII

Antirabies Vaccine – Production and Consumption

Year	*Type of Vaccine*	*How Obtained*	*Amount Produced or Obtained*	*Total Consumption*	*No. of Patients Given post Exposure Treatment*
			doses	*doses*	
1978	Semple	Produced at M.R.I., Colombo	153,184	151,062	8,886
1979	Semple	do.	227,700	173,681	10,216
1980	Semple	do.	173,608	172,405	10,141
1981	Semple	do.	151,591	141,475	8,322
1982	Semple	do.	122,900	120,530	7,090
1983	Semple	do.	134,500	122,270	7,192
1984	Semple	do.	130,683	116,890	6,875
1985	Semple	do.	160,736	146,221	8,601
1986	Jan.– Oct. Semple	do.	179,007	175,827	11,079
	Nov.– Dece. Vero cell	Imported	19,822	3,685	
1987	Vero Vero cell	Imported	71,098	78,965	15,793

Semple vaccine prepared at M.R.I. Colombo is a 5 percent goat brain tissue vaccine inactivated using Beta propiolactone.

Vero Cell Vaccine is an inactivated tissue culture vaccine produced by Merieux Laboratories, Lyon, France and imported by the State Pharmaceuticals Corporation on behalf of the Government of Sri Lanka.

HAEMOGLOBINOPATHIES AND A STUDY OF THEIR INCIDENCE IN SRI LANKA

A. de Tissera

Introduction

Haemoglobinopathies constitute a group of disorders which result from–

(1) synthesis of structurally abnormal haemoglobins,
(2) defective rate of synthesis of normal haemoglobins,
(3) failure of the normal switch from foetal to adult haemoglobin production.

Gross structure of all normal human haemoglobins are similar[1]. Each has a molecular weight of about 67,000 and consists of four (2 pairs) of globin chains, each globin being associated with one molecule of haem. The structure of haem is the same in all animal haemoglobins[2]. The type of globin chains determines the type of haemoglobin. In man there are six types of globin chains recognised, alpha (α), beta (β), gamma (γ), delta (δ), epsilon (ε), and zeta (ζ). The alpha chains consists of 141 aminoacids and the non alpha chains, 146 aminoacids. Different periods of life are characterised by particular types of haemoglobin, namely,

in embryonic and foetal life	Hb Gower 1	($\varepsilon_2\zeta_2$)
	Hb Gower 2	($\alpha_2\varepsilon_2$)
	Hb Portland	($\zeta_2\gamma_2$)
	foetal Hb or HbF	($\alpha_2\gamma_2$)
after 1 year of life	adult haemoglobin HbA	(96–98%)
	HbA2	(2–4%)
	HbF	(1%)

The globin chains conform to an alpha helical pattern with several bends depending on the siting of either charged (polar) or noncharged (non-polar) aminoacids[3]. The internal nonpolar aminoacids allow a tertiary structure with pockets which provide a hydrophobic enviornment for the haem to lie in. Hence they are of importance for the proper oxygen transport function of haemoglobin. The outer charged aminoacids keep the chains soluble. The four globin chains are grouped together by definite sites of contact to provide a quarternary structure which confers properties of stability and oxygen affinity on the haemoglobin molecule. It is therefore evident that the siting of some aminoacids is extremely important for the normal structure and fuction of haemoglobin. Further proof of this is seen in that the aminoacid sequence in certain areas of the globin chains are found to be identical throughout the animal kingdom.

Structural Variants

The structurally variable haemoglobins result from aminoacid substitutions usually due to a single base change in the genetic code. At present over 326 pathological variants are described[3] But only a proportion of these are found to cause disease, the severity of which will depend on whether the aminoacid substitution occurs in a polar or nonpolar aminoacid, whether it affects the solubility and the stability of the molecule, rate of transport of oxygen and the rate of production of haemoglobin. The charged aminoacids on the surface of the molecule determine the electrophoretic mobility in an acid or alkaline medium. When there is a substitution in one of these with a change in charge the new haemoglobin can be seperated by electrophoresis. The common clinically important variants described are HbS, HbC, HbD, HbE, all beta chain variants. Substitutions for these are as follows–

HbS–glutamic acid to valine in the sixth position
HbC–glutamic acid to lysine in the sixth position
HbD–glutamic acid to glutamine in 121 position
HbE–glutamic acid to lysine in 26 position

HbS is 50 times less soluble than HbA on deoxygenation. As a result HbS molecules form long polymers or tactoids causing sickling of the cells. All structurally variant haemoglobins are inherited in a simple Mendelian pattern, with heterozygous trait and homozygous disease forms. Combination of different structural variants are described ; a combination of 2 per globin chain, one from each parent.

Defective Production

The term thalassaemia first used in 1936[1] was derived from the Greek word for sea, because of the association with the Mediterranian region. Defective production of the alpha or the beta globin chains is known respectively as the alpha thalassaemias or the beta thalassaemias. The imbalance in synthesis leads to accumilation and precipitation of the excess type of globin chains and ultimately to haemolysis. In the beta thalassaemias there is deficient beta chain production resulting in reduced HbA (α 2 β 2) but increased HbF (α 2 γ 2) and HbA2 (α 2 δ 2). In the alpha thalassaemias there is reduced or absent alpha chain production with excess gamma chains in the foetus and beta chains in the adult, forming gamma four tetramers (HbBarts) or beta four tetramers (HbH) respectively.

The genetic control of alpha and gamma globin chain production is by 2 pairs of non-allelic genes and each of the other globin chains by a pair of allelic genes. In the thalassaemias there is either a deletion of the particular gene responsible or defective mRNA production or function[2]. Inheritance of this type of gene from one parent and the gene for a structural variant from the other, can result in the offspring having a combination haemoglobinopathy, for example HbS beta thalassaemia.

Faliure of Normal Change Over

During late foetal life HbA starts being produced and gradually replaces HbF. If this normal switch does not happen HbF continues to be produced. The molecular basis for this is suggested to be either abnormalities of the operator/regulator genes or deletion defects of beta or delta genes. The related clinical conditions are grouped under hereditary persistance of foetal haemoglobin.

Pathological and Clinical Features

Haemoglobinopathies when producing disease cause a haemolytic anaemia of varying severity. In addition there may be features peculiar to the type of abnormal haemoglobin. For example the vascular and infarctive lesions of HbS, cyanosis produced by the methaemoglobin of HbM.

When investigating a patient with anaemia especially if there is an element of haemolysis too, it becomes necessary to exclude a haemoglobinopathy. This is suggested very early in the course of investigation if the blood film shows target cells, microcytes, nucleated red cells, coarse basophilic stippling in red cells, sickle cells, a high reticulocyte count, inclusion bodies in a reticulocyte preparation, or reduced MCH with normal or near normal MCHC values. Family studies are required to detect new cases and in some instances to establish the homozygosity of a haemoglobinopathy.

Incidence in Sri Lanka

A study of abnormal haemoglobins was carried out on 225 samples sent to the M.R.I., during 1978, from various hospitals in the island. These were from a selected population consisting of patients with anaemia, often thought to be haemolytic and from siblings and parents of patients on whom the diagnosis of a haemoglobinopathy was made. The samples from the peripheral hospitals were received by post and some times the accompanying details of patient were incomplete.

The results were analysed and are shown in tables 1 and 2. The highest number of samples were received from the under 5 age group, as expected, for a type of inherited disease. The large number in the over 20 age group could be explained by the fact that parents of diagnosed children were subsequently called up for examination and were included there. It was observed that the haemoglobin levels were most frequently in the 5–10g per cent range. Unfortunately about one third of the samples were unsuitable for haemoglobin estimation.

TABLE 1

Distribution of Haemoglobin Levels Related to Age and Sex

Age Group		Hb ≤ 5g	Hb 5 - 10g%	Hb > 10g%	Not done
0 – 5 yrs.	67	10	24	09	24
5 – 10 yrs.	25	05	08	06	06
10 – 20 yrs.	20	03	08	00	09
Over 20 yrs.	62	07	20	16	19
Not stated	51	06	22	09	14
Total	225	31	82	40	72

TABLE 2

Distribution of Abnormal Haemoglobins Related to Age Groups

Age Group	Hb A	Hb F	Hb S	Hb E	Hb H	Total abnormal Hb
≤ 5 yrs.	51	18	03	05	–	26
5 – 10 yrs.	16	02	00	02	–	04
10 – 20 yrs.	15	02	02	01	01	06
Over 20 yrs.	52	08	01	05	–	14
Not stated	40	08	02	03	–	13
Total	174	38	08	16	01	63

There were 38 patients with raised levels of HbF. This was in combination with either HbS or HbE in 12 patients. The concentration of HbF and family studies indicated 2 to be sickle cell thalassaemias, 1, a homozygous sickle cell disease and 9 were HbE thalassaemia or HbE disease. The remainder were patients with beta thalassaemia. As facilities for HbA2 level estimations were not available, related heterozygous states were not identifiable. There were 5 with HbS of sickle cell trait and 7 with HbE haemoglobinopathy. The rare haemoglobin of HbH was identified in one patient.

The distribution of the various haemoglobinopathies among the different ethnic groups found in this study is as shown in table 3. The high incidence of HbS, HbE and beta thalassaemia among the Sinhalese has been observed by earlier authors[1]. HbE has been found in high frequency among the veddahs of Sri Lanka. This has been of special interest as the original concept of them being related to the aboriginals of South India had to be changed as the latter had a high frequency of HbS linking them to the Middle East, whereas, the veddahs of Sri Lanka who had HbE, were linked to the proto Malays of South East Asia, among whom a high HbE was found.

TABLE 3

Distribution of Abnormal Hbs in Various Ethnic Groups

	Hb F	Hb S	Hb E	Hb H
Sinhalese	20	7	12	–
Tamil	2	–	2	–
Moor	–	–	2	1

Analysis on a geographical basis indicated that the beta thalassaemias were generally found in all parts of the country suggesting increased movement and migrating patterns of the population. HbS and HbE were however found predominantly in the Anuradhapura and Kurunegala districts. This is accounted for by the process of natural selection in these malarial areas. It is stated[2] that the infected red cells with the developing malarial parasites adhere to the walls of the blood vessels of internal organs like the liver, and when so immobilised, red cells with HbS undergo sickling due to the low oxygen concentration. This facilitates phagocytes to

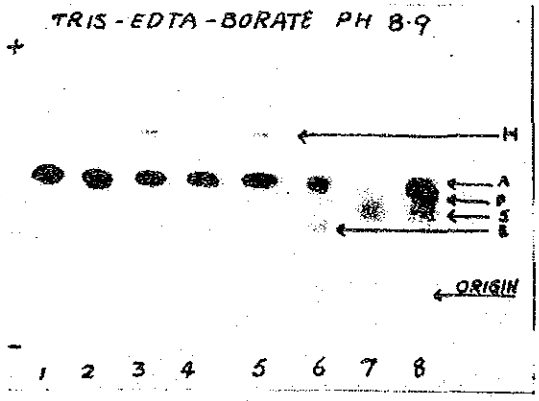
destroy both the sickled cell and the malarial parasite. The single case of HbH was from Matale.

Studies on haemoglobinopathies in Sri Lanka[4], [5] have described the occurence of HbD. However in this study no HbD was found.

Methods

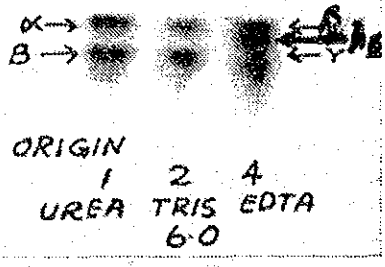
In the recomended system for identifying abnormal haemoglobins[6] there is an initial screening by alkaline electrophoresis of the haemolysate on cellulose acetate (figure 1) followed by a citrate agar electrophoresis if the zonal band pattern indicates an abnormality. If HbS is suspected it can be confirmed by the sickling and solubility tests. However, the agar electrophoresis helps to distinguish between HbS and HbS + HbD, as they migrate together on alkaline electrophoresis. Also the presence of small amounts of HbA and HbF are easily recognised by this method and it helps to categorise sickle cell anaemia, sickle cell beta thalassaemia, sickle cell hereditary persistance of foetal Hb. Functional tests such as inclusion bodies are used to characterise HbH. The acid elution test helps to distinguish between the

FIGURE 1



Photograph of Electrophoresis on Cellulose Acetate pH 8.9, ponceau S stain. 1 & 2 normal, 3, 4, 5 HbH disease, 6 HbE thalassaemia, 7 sickle cell disease, 8 HbS thalassaemia.

FIGURE 2



Photograph of Globin Chain Separation on Cellogel, Tris–EDTA–borate citrate pH 6.0, stain ponceau S 1 normal, 2 excess beta chains in HbH disease, 3 beta E chains in beta E thalassaemia.

raised HbF in HPFH and beta thalassaemia. Acidic and alkaline electrophoresis on cellogel of globin chains (figure 2) is used for identification of mutant chains.

Conclusion

The structural analysis and study of haemoglobin and its variants has been a fascinating subject and an important landmark in the field of medicine. It was using sickle cell haemoglobin that Linus Pauling developed the concept of molecular disease[2]. The presence of these haemoglobin variants in isolated communities and various geographic regions in the world has provided an insight into population migration patterns and helped in anthropological studies. Management of a patient once diagnosed as a haemoglobinopathy, becomes quite different to other forms of anaemia. This study gives an idea of the different types of abnormal haemoglobins presently detected and their distribution in Sri Lanka. The inferences drawn from it could be strengthened by continued assimilation of related data with perhaps inclusion of sample surveys from the general population too.

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