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MEDICAL RESEARCH INSTITUTE

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Editorial

THE ROLE OF THE M.R.I. IN MEDICAL RESEARCH

The Medical Research Institute came into existence at the present site in 1902, and is engaged in performing a number of vital functions in the Department of Health. Its first Director, Dr. Aldo Castellani played a leading role in researching into Medical problems of the day. His pioneering work in Sri Lanka is cited in medical literature even today. Paradoxically, at the present moment, it is not in the field of Medical Research that we excell ! Even in the Director's report, describing the activities of the M.R.I, medical research has been relegated to 6th place ; with other activities such as routine work, reference work, vaccine production and teaching and training all taking precedence over research.

We are now fast in the process of stepping into a new era-with the generous gift of a new Medical Research Institute from the Government of Japan becoming a reality in the near future. It is also heartening to note that the Ministry of Health has afforded this project top priority. May this now be an incentive to those of us who have been with the M.R.I. in its darkest times as well as the young officers who joined us recently, to take up this challenge, and dedicate ourselves wholeheartedly in ensuring that we lead the way in the field of Medical Research in Sri Lanka.

We are now fortunate in having as our Director, a Researcher of world repute. Therefore, my fervent prayer, in this second issue of the Bulletin of the Medical Research Institute is "let us all work togetherto ensure that there be **more research** BETTER RESEARCH and the **BEST RESEARCH** coming out of the M.R.I. in the days to come!".

Maya C. Attapattu

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 largestlaboratory servicing both the curative and preventive services. Its activities in 1985 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. Infields like Virology, Mycology and Leptospirosis the M.R.I. continues to provide the main routine diagnositc 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 was initiated through W.H.O. to obtain such kits and also to set up a unit here to assemble them. The work load has also increased with the introduction of new routine tests.

2. National Reference Laboratory

The M.R.I. continues to fulfil 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. participates in the International External Quality Assessment Scheme for Clinical Chemistry from February 1985. Action was initiated to introduce W.H.O. recommended methods for the testing of glucose and Bilirubin With the assistance of W.H.O. action was initiated to have a workshop in 1986 to commence the quality control programme in Microbiology. The M.R.I. assisted the Health Ministry in the drug quality control programme as well, by testing for potency and sterility.

3. 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.

The first major outbreak of Japanese Encephalitis in Anuradhapura and Puttalam districts was diagnosed and investigated by a team led by the M.R.I.

Serveral members of the staff also serve in committees of the Health Department, e.g. Communicable Disease Advisory Committee, Diarrhoea Control and other organisations like the Bureau of Standards, The M.R.I. staff assists the epidemeologist in the investigation of epidemics and outbreaks and in the expanded Programme on Immunisation.

4. 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. The M.R.I. also produces sterile distilled water, saline, bicarbonate, citrate and glucose for use by hospital laboratories. A variety of antigens and antisera e.g. Salmonella typing sera are also produced and distributed.

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. The work load however was much greater as the annual intake was increased from 30 to 90. Despite handicaps such as the shortage of tutors and repairs to the roof the tutorial staff and the advisory committee put in a tremendous amount of work so that the training programme could go on uniterrupted. The curriculum had to be modified to cope with the increased intake but without significant lowering of standards.

(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 HealthWorkers.

(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) Post-graduate training—The staff of the M.R.I. participated in the training programmes in Micribiology, Pathology, Community Medicine organized by the post-graduate insitute of medicine. Several research students continued their training at the M.R.I.

6. Research

Despite the shortage of consultant staff over 40 research projects and activities were carried out at the M.R.I. in 1985. Several of these projects received funding from W. H. O. and NARESA. The lack of any research fund interfered with the work of the institute and this was shown up very clearly during the Japanese Encephalities outbreak. The research could only be started after the outbreak had ended due to the delay entailed in obtaining W.H.O. funding.

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. Depsite the depleted staff the collection of requisitions, indenting and distribution continued. An effort was initiated to streamline the progress and reduce delays.

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.

DEPARTMENT OF ANAEROBIC BACTERIOLOGY & STERILITY TESTING

CONSULTANT : Dr. Maya C. Attapattu
M.B.B.S., D. Bact., Ph.D.
STAFF : 2 M. L. TT.
1 Laboratory Orderly.

Specimens are received from hospital patients for anaerobic infections from Operating Theatres as a routine procedure or when anaerobic contamination is suspect and from wards and premature baby units. In addition, testing of high pressure sterilizers are carried out routinely generally at regular intervals. Such requests are made from the operating theatres of Government and Private Hospitals.

Isolates of Anaerobes :

The Sri Lanka Standards Institute and other Government and non Governmental Institutes refer isolates of anaerobic bacteria for identification to this Department which serves as reference centre in this field.

Work Load for 1985 :

For the year 1985, 1340 specimens were processed for the presence of anaerobes. The number of anaerobes isolated were however few. One isolate of Clostridium perfringens and 2 isolates of Clostridium sporogenes were observed. 44 high pressure sterilizers were tested and of these 39 were found to be functioning satisfactorily.

Teaching & Training :

M. L. T. Students,
M. D. Students, (Post Graduate Institute of Medicine).

BACTERIOLOGY DEPARTMENT – 1

INTRODUCTION

The Department is staffed by **Dr. T. J. P. Ratnayake**, M.B.B.S. (Cey.); D. Bact. (Toronto) Head of Section, three Medical Laboratory Techologists and two Laboratory Orderlies.

1. This Department is under the supervision of a Bacteriologist. Some of the tests in Bacteriology are done in this Department. Specimens are received mainly from Institutions outside Colombo where laboratory facilities are either not available or laboratories in Institutions have no experienced personnel to perform culture methods. Large number of specimens are sent by post. There is a long delay in receiving specimens. About 25% specimens are contaminated or leaked out.

2. Work Output

	Cultures	*Antibiotic Sensitivity Tests*
Urine	1,744	907
Blood	98	37
Pus	756	461
Cerebro spinal fluid	234	38
Sputum/Bronchial swabs	373	152
Throat swabs/nasal swabs	220	52
Total	3,425	1,642

2:1 Samples sent by private Institutions and General Practitioners and Consultants :

Cultures :

Urine		26
Pus		07
Throat/nasal swabs		02
Blood cultures		02
	Total	37

2.2 Disinfectant Samples Tested in 1985

2.2.1 Total private samples tested : 27

Effective	—	8	27
Partially effective	—	4	
Ineffective	—	15	

2.2.2 Total samples sent by Government Institution

Total — 7

Effective	—	1	7
Partially effective	—	2	
Ineffective	—	4	

3. Comments on Routine Work :

Due to wrong methods used in collecting samples for culture, large number of samples are not suitable. No description of the specimen is given. The sites from which the sample is collected is very often not given on the request forms. Very often small pieces of paper are used as request forms with hardly any information. Sometimes the address of the sender is not given. Where necessary treatment given to the patient is not indicated, when antibiotic sensitivity tests are requested. Requests are written on discarded pieces of paper, torn pieces from fever charts, O.P.D. tickets and forms used for other purpose.

C.S.F. Specimens sent from Institutions outside Colombo are received only 4-5 days after collection. Many of the specimens are contaminated. The best way to send C.S.F. specimens for cultures through messenger.

4. Training Provided :

45 Medical Laboratory Technologist Trainees were given bench training in batches for 7 - 10 days. In service training to Medical Laboratory Technologists of the Department were given.

5. Services to other Organizations and Institutions :

Service is provided to all private hospitals, General Medical Practitioners, Consultants and the Jayawardenapura hospital. Charges are made according to a schedule of charges prescribed by the Department. Some Institutions have accounts opened to obtain this service.

Lectures to Medical Laboratory Technologists in training are given by the staff. Para-medical personnel are also given demonstration and lectures by the Consultant-in-charge of the Department. Refresher courses are conducted and workshops are held for technologists in service.

Sale of antibiotic discs to private laboratories have been stopped due to difficulty in getting the materials for manufacture of discs.

DEPARTMENT OF BIOCHEMISTRY—I

INTRODUCTION

1. The Staff consists of four Research Officers

Dr. S. Sentheshanmuganathan, B.Sc. (Hons.) Ph. D. (Sheffield) F. I. Chem C. & Chartered Chemist. Dr. Piyaseeli Premachandra B.Sc. (Hons.) Cey. Ph.D. (Manch.) M. I. Chem C. & Chartered Chemist, Dr. V. K. Samuel (B.Sc. Hons.) Cey. Ph.D. and Mrs. P. Uluwita B.Sc. Cey.) M. Phil.). (U.K.) The Section is headed by Dr. S. Sentheshanmuganathan, Dr. P. Premachandra is in charge of the Internal and External Quality Control Assessment Schemes in Clinical Chemistry, and Dr. V. K. Samuel heads the Nuclear Medicine Unit.

There are four Medical Laboratory Technologists. In addition there is Volunteer Japanese Technologist provided by the kind courtesy of the Govt. of Japan under the Japan Overseas Co operation Volunteer Scheme.

There are four laboratory orderlies.

2. Routine :

During the year the number of quantitative estimations carried out was 15,226 as compared to 13,912 in the previous year. The details of the tests are given in the annexed sheet. There is an increase of about 10% which is attributed to the following :—

(a) Introduction of the estimation of cholesterol bound to low, very low and high density lipoprotein in routine assays.

(b) Introduction of serum protein electrophoresis using cellulose acetate paper.

(c) 160 samples of blood were estimated for ceruloplasmin level in one of the research studies.

3. Research activities and Summary :

(i) Bio chemical changes in diabetes:— Dr. S. Sentheshanmuganathan The following parameters were investigated cholesterol (chol) Triglyceride (TG) Lipoprotein pattern, Total proteins, Albumin, Globulin and Fibrinogen. Thirty diabetic cases were investigated. Out of the 30, cases investigated 16% had cholesterol increased, 26% had Triglyceride increased and 6% had both Chol and TG increased. The Chol / TG ratio was greater than 1.5 in 50% of the cases, and 50% less than 1.5. From the Lipoprotein pattern 66% belonged to II a of Fredricksens classiffcation, 20% to II b and 6% to Type III floating B. The results suggest that the increases are induced by carbohydrates and fat consumption. Though the total proteins were normal in most case 36% were hyper globulinemic and 13% Hypoalbuminemic. The fibrinogen contents were estimated in 23 patients and those results indicated that 16% had elevated fibrinogen. This work was done in collaboration with Dr. S. Ramachandran and associates of the General Hospital, Colombo.

(ii) Absence of Hyperlipidamia in Sri Lankan Patients having Chronic Renal Failure :

C. A. Herath, A. Natkunam, S. Sentheshanmuganathan and S. Ramachandran.— Hyperlipidaemia has been noted in patients having chronic renal failure, in patients on maintainance dialysis and after renal replacement and has been incriminated as a factor for cardio vascular disease in these patients. Serum lipids were studied in 24 patients having chronic renal failure and their age range was 15 to 52 years. Only one patient had a raised serum cholesterol (4%) and 2 had triglyceride values exceeding the upper range of normal (8%). Only one case showed a slight increase of beta and pre beta lipoproteins in lipoprotein electrophoresis (7%), which was done in 14 patients. Dietary survey showed that the average calorie intake in these patients was around 1,500 Kcals with 60 to 70 per cent contributed by carbohydrates and about 25 to 30 per cent by fats. Experience from the developed nations are contrary to this finding. Similar observations were made in Bombay and Chandigarh

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This phenomenon is attributed to the low calorie and carbohydrate intake in diet of these patients compared to patients in those studies in the West.

(iii) Pyridoxin and Iron status in patients presenting with squamous cell carcinoma of the oral cavity in Sri Lanka. P. Ward Booth R. Cooke, V. K. Samuel and S. Sentheshanmuga nathan.

Pyridoxin deficiency has been shown in humans and to be apparently associated with changes in the oral mucosa. Iron deficiency has for sometime seemed to be associated with oral abnormalities. Two groups of patients were connectively selected. The control samples were from the blood bank while the test samples were from patients from Maharagama Cancer Institute, who were histologically proven oral cancer, Hb, PCV, RBC, MCV, MCHC, MCH, SGPT, SGOT, red cell erythrocyte GPT and GOT were recorded in both groups.

From the results it appeared that the erythrocyte GPT was significantly lower in oral cancer patients. This may be due to pyridoxine deficiency. Comparison of the results in terms of the indices separating patients into normal and Iron deficiency states on the basis of M CH C, then there was no significant difference in the erythrocyte GOT in the two groups. Thus the erythrocyte GOT changed only with the presence of oral cancer.

Studies of serum proteins, Vitamin B 12, Albumin and Globulin serum Iron and U I B C levels did not suggest malnutrition.

(iv) Brief Survey of patients undergoing the estimation of Protein Bound Iodine(P. B. I.) content with special reference to sex and age. Mrs. P. Uluwita

Serum Protein Bound Iodine content was measured in 70 suspected cases for any abnormalties in the Thyroid metabolism (i.e. Hyper, Hypo thyroidism etc.). Serum samples were analysed for nearly a period of 1 year.

From the samples we analysed during this period there were 9 cases of *Hypothyroids* and they were all females. Number of Hyperthyroids were 16. Here 2 were males and rest were females.

Low and high values for protein bound iodine i.e. above and below 3 - 8 μg./100ml. were observed mainly in the age group of 25 - 40 years. In this age group there were 7 hypothyroids and 11 hyperthyroids.

(This paper has been read for the Fourth Biennial Sessions of the Nutrition Society of Sri Lanka in 1984).

Papers Published :

1. 1975, 88th Anniversary Sessions (Scientific). Ceylon Med. Assn. The probable Significance of Hypertriglyceridaemia in Viral Hepatitis.

2. 1975, J. Nat. Sci. Coun. Sri Lanka 3 (1) 51-63. In vitro studies on human blood cholinesterase and its action towards organophosphate. S. Sentheshanmuganathan and M. Rajaratnam.

3. 1975. International Rubber Conference, Kuala Lampur, Malaysia. "Some aspects of Lipid Chemistry in Natural Rubber". S. Sentheshanmuganathan, S. Kasinathan, P. A. J. Yapa and M. Nadarajah.

4. 1975. J. Nat. Sci. Coun. Sri Lanka 2 (2) 135-140. A shortened method for the separation and estimation of plasma phenyl alanine and the establishment of the clinical norm for Ceylonese subjects. S. Sentheshanmuganathan, Seetha I. Rodrigo and S. S. Kamalanathan.

5. 1975. J. of Anaeath, 47 No. 8, 889-893. Accidental sub arachanoid injection of Gallamine and its Management. S. Sentheshanmuganathan, T. W. Gunawardane and R. Kanagasunderam.

6. 1975. Proceedings of the 9th Singapore Malaysia Congress of Medicine, Probable signi ficance of Hypertriglyceridaemia and raised serum glutamic pyruvic transaminase in viral hepatitis J. A. J. Alyathurai, S. Sentheshan muganathan, C. Nagahawatte and others.

7. 1975. J. of Natn. Sci. Coun. Sri Lanka 3 (2). 117-127 Clinical Norm for Pacudocho linesterase with distribution of a typical enzyme in Ceylonese with two families exhibiting abnormal enzymes. S. Sentheshanmuganathan, T. W. Gunawardane and B. P. Ratnapala.

8. 1976. Brit, J. Trop. Med. & Hygiene. Vol. 79-97 — 101. Serum Proteins in Hepatic Amoebiasis. S. Sentheshanmuganathan S. Ramachandran and N. Nagarajah.

9. 1976. Aust. & New Zealand of Med. Vol 6, 532 - 536. Triglyceride in Viral Keto acidosis. S. Sentheshanmuganathan and J. E. J. Alya thurai and others.

10. 1975. Presidential address — "Research on Lipidaemia". Section S.L.A.A.S.

11. 1976. Antibacterial Action of Pletranthus zeylanious and Coleus aromaticus. Proc. Cey. Assn. for Adv. Sc. Part I, L. B. de Silva, S. Sentheshanmuganathan, R. S. B. Wickremesinghe, Tuley de Silva and K. Sangara Iyer.

12. 1976. Brit. J. of Trop. Med. & Hyg. Vitamin B 12 in Amoebic abscess. R. Ramachandran, S. Sentheshanmuganathan and N. Nadarajah.

13. Pyrodoxime and Iron status in patients presenting with squamous cell carcinoma of the oral cavity in Sri Lanka. P. Ward Booth, R. Cooke, V. K. Samuel and S. Sentheshanmuganathan J. of Radiotheraphy 1984.

14. Biochemical changes in Diabetes. Annual Session of S.L.M.A. (1983). S. Sentheshanmuganathan, S. Ramachandra and others.

15. Absence of Hyperlipidaemia in Sri Lankan patients with chronic renal failure. Annual Session of the S. L. M. A. (1984) S. Sentheshanmuganathan, S. Ramachandra, C. A. Herath and A. Natkunam.

5. **Training Provided.**—Mr. D. Dharmadasa, Mrs. S. Wijeratne and Miss. N. J. Gammanpila, Hospital Biochemists, Ministry of Health underwent a comprehensive training in Biochemical analysis of body fluids for 26 different constituents for a period of six months. During this period they were also trained in Internal Quality Control methods in Clinical Chemistry.

6. **Request for Services from the Section.**—Dr. S. Sentheshanmuganathan serves as Chairman in three Committees of the Sri Lanka Standard Institutions as the M.R.I. Representative. Dr. V. K. Samuel serves in one of the Committees of the S.L.S.I. and also, in the Nuclear Medicine : Committee of the Atomic Energy Authority of Sri Lanka.

7. **Publications: (in 1985)**—1985, 1.53. J. of the Med. Res. Inst. of Sl. S. Sentheshanmuganathan. Lipidaemias. A. Research Review.

Tests Carried out During The Year 1985

(1) *Liver Function Test :*	
(a) Alkaline Phosphatase	944
(b) Bilirubin Direct	1,804
Indirect	895
(2) *Total Proteins :*	
(a) Albumin	834
(b) Globulin	834
Electrophoresis	69
(3) Acid Phosphatase	117
Tartrate Labile	117
(4) S. G. P. T.	1,775
S. G. O. T.	595
(5) Serum Electrolytes—	
(a) Serum Sodium	268
(b) Serum Potassium	258
(c) Serum Lithium	181
(d) Serum Chloride	45

(6) Serum Amylase	89
(7) Serum Calcium	95
(8) Serum Phosphorus	65
(9) Urine Amino Acid	02
(10) Low density Lipoprotein	229
(11) High density Lipoprotein	229
(12) Cholesterol	972
(13) Triglycerides	381
(14) Serum Iron	42
(15) Total Iron Binding Capacity	27
(16) Lipo Protein Strip	186
(17) Cholin Esterase	01
(18) Caeruloplasmin	10
(19) G 6 PD	12
(20) Phenyl Alanine	03
Total	11,097

DEPARTMENT OF BIOCHEMISTRY II

Dr. Piyaseeli Premachandra, B.Sc.(Hons.), Ph.D. (Manch.) M. I. Chem. Chartered Chemist.

1. Introduction

The Section provides a routine service for the estimation of glucose, urea, uric acid, creatinine, creatinine clearance, aldolase and creatine phosphokinase, in blood and urine for the diagnosis of diseases and to monitor control of treatment of patients. This is the only centre to perform the estimations for serum aldolase and creatine phosphokinase and is mainly used in the diagnosis of various types of muscular dystrophies.

2. Work Out for past year

The section has carried out 3,989 routine tests for the year 1985.

Blood glucose	2,035
Blood Urea	1,024
Serum Uric Acid	312
Serum Creatinine	146
Urine Creatinine	31
Creatinine Clearance	31
Serum Aldolase	91
Serum Creatine Phosphokinase	319
Total	3,989

3. Comments on routine work

Blood samples received from outstation hospitals for glucose and urea estimations are very often unsuitable for testing. 280 samples sent for glucose and urea were reported unsuitable. The results on samples that are reported two or three days after collection are incorrect and misleading. It is important to note that detection of diabetes mellitus can be missed in patients whose blood glucose concentrations lie just above the upper limit of the normal range. As early detection and management is essential to prevent diabetic complications steps should be taken to provide facilities for the estimation of blood glucose levels in all hospital laboratories or to get the test performed at the nearest hospital laboratory.

Oral Glucose Tolerance Test should be performed only for diagonsis of diabetes mellitus and never to assess the treatment for diabetes. The test should be performed in the morning after at last three days of unrestricted diet and usual physical activity. The test should be preceded by an overnight fast of 10-16 hours. After collection of the fasting blood sample the subject should take 75g. of glucose dissolved in 200-300 ml. of H_2O. Blood samples must be collected two hours after the test load, if appropriate samples may also be taken every half an hour during this period.

4. Research activities and summary of results for past 5 years

The research activities of the section is primarily directed towards improving and maintaining the quality of clinical chemistry results at the M.R.I. and in other hospital laboratories The section has introduced effective internal quality control methods and statistical analysis of results to all the tests performed in the Biochemistry Department. The section is also involved in modifying the W.H.O. recommended methods in Clinical Chemistry to suit the local needs.

4.1 A liquid quality control serum has been prepared according to W. H. O. manual. Aliquots of this preparation are stored at — 22° and used in the Internal Quality Control programme. This preparation is stable for about one year and has proved to be satisfactory to monitor the precision of the analytical methods for glucose, Urea Total Proteins, Albumin Creatinine, Uric Acid and A L P.

4.2 The methods for the estimation of Total Protein, Albumin, Uric Acid and Creatinine have been modified to simple and reliable methods. The reference range for Creatine Phosphokinase, Creatinine, Albumin and Uric Acid have been estiblished for Sri Lankan subjects.

4.3 Chronic Liver Project.—The project sponsored by the W. H. O./SEARO/NSC was carried out in collaboration with the Dept. of Virology. The primary objective being to study the aetiology of Chronic liver disease in Sri Lanka. A total of 680 cases have been studied over a period of five years. The CLD cases included were Alcoholic and Non-Alcoholic Cirrhosis of liver, Primary Carcinoma of liver, Chronic Active Hepatitis, Chronic persistent hepatitis, Wilson s disease and Alcohlic hepatitis.

The biochemical investigations carried out were total bilirubin A.S.T., A.L.T., A.L.P., Total Protein, Albumin and Globulin. Serum G.G.T.P. levels were performed in few cases. The liver function tests are in no way specific for the presence of liver disease and many of them are abnormal in conditions which do not primarily affect the liver. However, these tests may be applied in the diagnosis and the management of liver disease in combination with clinical findings.

This study included 425 cases from the G.H.C. and the rest were from the Lady Ridgeway Hospital for children and provincial hospitals. The percentage of male patients with liver disease were found to be more than female consisting of 93% of the total. The majority of the C.L.D cases were alcoholics and 63.5% were found to be excessive drinkers with a histroy over 10 years. There were only 13.6% with previous history of infective hepatitis or Jaundice.

The biochemical findings in 79.7% of the cases correlated with the clinical diagnosis of chronic liver diseases. In 16.5% there was no biochemical evidence supporting the clinical diagnosis and 3.8% it was doubtful. This study has indicated that abnormal results were more frequently observed for A S T, Albumin and Globulin levels in patients with Chronic Liver Diseases.

4.4 The evaluation of gamma glutamyl transpeptidase activity as a sensitive index for liver damage.

Liver Function tests for Bilirubin, ALT, AST ALP, Total Proteins, Albumin globulin, GGTP and 5' Nucleo Idase were performed in 30 Chronic alcoholics from G.H.C. The results indicated that both GGTP and ALT were elevated in 46% of the cases and in 27% only the GGTP was elevated. This study was carried out in collaboration with Dr. Ramachandran from G.H.C.

4.5 Radioimmuno Assay Techniques for Hormone Studies—Preliminary study was undertaken with the gynaecology department of the University of Colombo for investigation of disorders in the reproductive system using Radioimmunoassay Techniques. The tudy included cases of primary and secondary Amenorrhea, Galactorrhea, subfertility and Azoospermia. The hormones levels of FSH, LH, Prolactin and Thyroxine were estimated using RIA kits supplied by the IAEA. Unfortunately IAEA could not continue the supply of RIA kits and a grant was awarded to continue with the Project. There is a delay in supplying the RIA reagents.

Few cases of male subfertility on clomiphene theraphy were included in the study. In addition to the above hormone levels 17 Ketosteroids have been estimated using a chemical method.

4.6 Assessment of Thyroid function in alcoholics. A pilot survey of thyroid status in alcoholics were carried out using RIA kits supplied by the AEA Serum Thyroxine (T_4) and Trilodothyronine T_3 and the liver function tests for ALT, AST, Total Proteins, Albumin and Globulin were studied in 40 alcoholics. Thyroxine (T_4) levels were within normal range and the Trilodothyronine were low in 68% of the cases.

4.7 Vitamin A toxicity.—Vitamin A concentrations were measured in patients who had fallen ill after a meal of fish liver of Talapath and admitted to G. H. C. with symptoms of Vitamin A toxicosis. Serum from these patients had raised levels of Vitamin A in the first few days of the illness and the decreasing levels of Vitamin A coincided with the loss of clinical manifestations. This study was carried out in collaboration with Dr. Ramachandran from G. H. C.

4.8 Quality Control Project.—In October 1984 a workshop sponsored by the WHO/DANIDA on Quality Control in Clinical Chemistry was organised at the M. R. I. The objectives were to improve the quality of clinical chemistry results in Sri Lanka. There were 16 participants representing the Clinical Chemistry laboratories in the Island. As recommended by the W. H. O. following steps have been taken by the section to improve the quality of Clinical Chemistry results.

4.8.1 Implementation of Internal Quality Control Procedures for Glucose, Urea, Bilirubin and Total Protein in Provincial Laboratories.

4.8.2 Modification of W.H.O. recommended methods for Glucose. Calcium and Bilirubin.

4.8.3 Conventional units have been converted to the System of International Units.

4.8.4 Participation in the International External Quality Assessment Scheme for Clinical Chemistry.

4.8.5 Acceptable variance for Glucose, Urea, Total Protein, Bilirubin, Albumin, Creatinine, Uric Acid, A. L. T., A. S. T. and A. L. P. have been established for the Biochemistry Laboratory.

4.9 Cardiovascular risks associated with hyperuricaemia and hypercholesterrolaemia in obese subjects. This is in collaboration with Dr. Ramachandran G. H. C.

4.10 Preparation of Ethylene glycol stabilised Liquid Quality-Control serum at three different concentrations and evaluation for biochemical stability at four different temperatures.

5. Training provided

5.1 Training of M. L. TT. Interns in Internal Quality Control Procedures and statistical analysis of quality control data.

5.2 Education of M. L. TT. in the Department on the Importance of Quality Control procedures and statistical analysis of data in producing reliable results on patients specimens.

6. Services to other organisations and Institutions

6.1 Functions as the National Reference Laboratory for Clinical Chemistry.

6.2 Serves on the Advisory Committee on Quality Control in Clinical Chemistry.

6.3 Interlaboratory comparison of analytical results on identical samples and statistical analysis of results are carried out with G. H. C., L. R. H. and C. S. H. and this will be extended to other General Hospitals.

6.4 Organisation and operation of External Quality Assessment Scheme in Clinical Chemistry for General Hospitals and Provincial Hospitals.

7. Publication and papers last year

7.1 Quality Control in Clinical Chemistry. Journal of the M. R. I. S. L. 1985 I 29.

7.2 Preparation of stabilised liquid quality control serum to be used in Clinical Chemistry W. H. O. Publication 1985.

8. Bibiliography of work for the past 10 years

8.1 Biochemical findings in chronic liver diseases. W. H. O. workshop on chronic liver diseases in Sri Lanka 1981 P. Premachandra.

8.2 Acute Vitamin A toxicity from ingesting fish liver curry. British Medical Journal 1983, 287, 897. R. S. Ramachandran, P. Premachandra, D. K. D. Silva.

DEPARTMENT OF ENTOMOLOGY

The Staff consists of the following:—

Mrs. Nalini Jayasekera, B.Sc. (Gen.) B. Sc. (Hons.) Cey. M. Sc. (Lond.) M. I. Biol. Entomologist Head of Section. Two Medical Laboratory Technologists, one Japanese Volunteer M.L.T. four Entomological Assistants, five Field Attendants and Two Laboratory Orderlies.

Research on mosquito vectors of disease is the main activity of the Department. This Department also provides the mosquito surveillance for Dengue Haemorrhagic Fever vectors in the course of routine work to guide health authorities in implementing successful vector control programmes. Special investigations on mosquito borne disease problems are undertaken as and when requested by Health Department in order to assist in controlling epidemics. This Department also serves as a teaching and training centre for public health personnel, laboratory personnel and university students in Medical Entomology.

The staff of this Department is actively engaged in field studies in addition to laboratory work.

2. Work out put — 1985.

2.1 Research Projects.

2.1.1 Study of mosquito vector borne disease problems in newly irrigated areas (Mahaweli and Kirindioya) funded by W.H.O./PEEM/SACEP. This collaborative study with the Department of Virology/M.R.I., Anti-Malaria Campaign and Anti-Filariasis Campaign was completed during this year.

2.1.2 Dengue Haemorrhagic Fever Study : (Funded by W.H.O).—This collaborative study with Department of Virology/MRI commenced in September, 1980 and was continued in 1985.

2.1.3 Studies on laboratory culturing and colonisation of vectors of Japanese Encephalitis.

These studies commenced during the year.

2.1.4 Studies on oviposition behaviour of Cx. quinquefasciatus and Cx. gelidus. This project was continued during the year.

2.2 Special investingations :

2.1.1 Japanese Encephalits (JE) Vector Investgations.—Following an outbreak of Japanese Encephalitis in Anuradhapura and Chilaw districts, special investigations were carried out in collaboration with the Entomology Unit of the Anti-Malaria Campaign to evaluate the efficacy of different insecticides used in fogging operations for control of JE vectors.

Special JE Vector investigations were also carried out at Moratuwa, following the reports of the Virologist/MRI and the potential JE vector mosquitoes collected were handed over to Virus Laboratory/MRI for virus isolation studies.

3. Work out put for past year

3.1 Routine work :

Aedes surveillance in the seaport of Colombo and the Airports of Katunayake (Colombo International Airport) and Ratmalana was continued in accordance with W.H.O. International Sanitary regulations.

Aedes surveillance in Colombo and Sri Jayawardanepura were also continued.

	Larvae	Adults
Total number ofspecimens examined for the year 1985	14,812	257

4. Research activities and Summary of results : (1980/1985

4.1 Japanese Encephalities (JE) Vector Study Project

A study on the ecology and behaviour of potential vectors of JE was carried out in relation to the ecology and epidemiology of the disease in Sri Lanka. The study areas were selected from different provinces of Sri Lanka with reported (JE) Virus activity. *Cx. tritaeniorhynchus, Cx. gelidus* and *Cx. fuscocephala* which

are the established vectors of JE in other South East Asian countries were found to be prevalent in many parts of Sri Lanka. The population densities of these mosquito species varied according to the area, as well as the seasons of the year, with peak densities coinciding with monsoon seasons. *Cx. tritaeniorhynchus* was found to breed predominently in rice fields reaching a maximum, soon after monsoonal rains when rice fields are fallow after harvest. Outdoor natural resting sites were preferred to indoor resting places by the adult vector mosquitoes. The type of outdoor natural resting sites selected by vector species, varied from area to area. The adult densities reached a maximum during the period October to December. Man vector contact studies revealed that the rate of biting is much higher outside, than inside houses and the peak biting period is 18.00 hrs. to 20.00 hrs. However, as they are zoophilic in nature, they were mainly attracted to animals for feeding.

The above study was financially supported by NARESA (RGB/78/26 and RGB/81/33).

4.2 Mosquito Studies in Sri Jayawardanepura.

The study was carried out for a period of 12 months covering different townships and villages of the New Capital.

45 species of mosquitoes belonging to 11 genera and 20 subgenera were encountered during the study period. The established vector of Malaria was not found in the New Capital. The most predominent species 95% of total catch resting inside houses was *Cx. quinquefasciatus*, the established vector of Bancroftian Filariasis in Sri Lanka. 20 man-biting mosquito species were collected including potential vectors of Japanese Encephalitis and Dengue Haemorrhagic Fever. *Mansonia* and *Armigeres* species when dissected, were found to harbour filarial larvae of animal origin. Approximately, 33% of the domestic cats and dogs showed filarial infections. *W.bancrofti* infection rate in *Cx. quinquefasciatus* ranged from 1.70 to 9.72 with a mean infection rate of 2.84. Over 16 different types of breeding places of mosquitoes were classified for the study area for implementation of successful vector control programmes in the New Capital. The study was supported by NARESA (RGB/81/67).

4.3 Bancroftian Filariasis Vector Study :

Transmission studies of Cx, quinquefasciatus on carriers with different levels of microfilaraemia of *W.bancrofti* were carried out in collaboration with the Colombo Municipality and the Anti-Filariasis Campaign. *Cx.quinquefasciatus* showed a tendency to ingest more microfilariae then expected at different microfilarial densities. This tendency was observed to increase as the microfilarial density levels decreased. A good correlation value (r-0.907) was observed between the average number of microfilariae ingested and the number of infective larvae produced for mosquito at different mf densities. The study also suggested that human carriers-with-microfilaraemias below 29 mf. per 1 ml. of blood may play an important role as reservoirs of infection of *W.bancrofti*. The lowest mf. density level at which mosquitoes became infective (to produce at least 1 infective larvae) was found to be 3 mf. per 1 ml. of blood. Nuclepore filtration technique was used to determine mf. densities of human carriers.

The study was supported by WHO/TDR/ (Grant No. ID 810012) and carried out in collaboration with Colombo Municipality and Anti-Filariasis Campaign.

4.4 Dengue Haemorrhagic Fever Study

The vector surveillance system of this study is being carried out in the city of Colombo in order to monitor the vector densities and to correlate the data with annual dengue infection rates. Date from the year 1982-1985 show that breeding of the vectors. *Aedes aegypti* and *Aedes albopictus* is predominently outdoor (app. 95.0%). Rubber tyres was the main source of breeding. A seasonal fluctuation in larval breeding was observed, with highest breeding activity soon after monsooral rains. Colombo South showed after breeding indices than Colombo North and Colombo Central.

The study is supported by W.H.O. and is carried out in collaboration with the Department of Virology/M.R.I.

4.5 Study of Mosquito Vector Borne Disease Problems in Newly Irrigated Areas (Mahaweli and Kirindioya

The entomological component of this included the determination of the mosquito fauna and study of the prevalence and abundance of known mosquito vectors of Malaria, Filariasis and Arboviral diseases, 45 and 47 species of mosquitoes were recorded from Kirindioya and Mahaweli system C, Zone 2 respectively, with 2 new records for Sri Lanka. (Cx.hutchinsoni and Ur.edwardsi). The established vectors of the four major mosquito borne diseases were found in both areas. The vector of Japanese Encephalitis was found to breed predominantly in rice fields. *Cx.quinquefasciatus* was found in high densities with some of them harbouring larvae of *W. bancrofti*, which would result in infecting people in these areas. The study was funded by W.H.O./PEEM and carried out in collaboration with Dept. of Virology/M.R.I., Anti-Malaria Campaign and Anti-Filarisis Campaign.

4.6 Mosquito Studies in Husk Pits of Sri Lanka

Studies were carried out in coconut husk pits of the South Western coastal belt covering four districts, to determine the species association and to determine the extent of breeding of vector of Bancroftian Filariasis. The results showed that *Cx.gelidus* a proven vector of Japanese Encephalitis in South East Asia, is breeding predominantly in husk pits (approximately 70.0%)

4.7 Studies on susceptibility of liberian strains of Cx. quinquefasciatus to W.bancrofti in Sri Lanka.

Strains of *Cx.quinquefasciatus* collected in Liberia showed low susceptibility to *W.bancrofti* donors from Liberia. When the same mosquito strains were fed on *W.bancrofti* donors from Sri Lanka, they showed equally high susceptibility as Sri Lankan strains of *Cx.quinquesfasciatus*. The Liberian strains did not respond to selection for refractoriness and hence could not provide genes for use in the construction of a refractory strain intended for the replacement of Sri Lankan vector population. This study was done in collaboration with London School of Hygiene and Tropical Medicine.

5. Training Provided :

Training is provided to Entomologists, Entomological Assistants and Medical Laboratory Technologists of specialised vector control campaigns in Medical Entomology. Entomological Assistants spend nine months of their 2 year training period in this Department for specialised training in field and laboratory techniques in insect vectors of disease.

6. Services to Other Organisations and Institutions :

Mrs. N. Jayasekera, Head, Department of Entomology serves on the following Committees:

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

(ii) Syllabuses and Examination Committee, Institute of Biology, Sri Lanka. (Member).

She also served as an Examiner in Medical Entomology for :—

(I) B.Sc. (Special Degree)Medical Entomology, Sri Jayawardanepura Campus, University of Sri Lanka, Nugegoda.

(ii) P.H.I.—Final Examination. National Institute of Health Sciences, Kalutara.

(iii) M.L.T.—Final Examination, Medical Laboratory Technologists' School Colombo 08.

7. Teaching :

Teaching programmes in Medical Entomology are conducted for B.Sc. (Special Degree) Course in Universities and for Para- medical Staff (P.H.I. and M.L.TT) of the Ministry of Health.

8. Publications and Papers last year :

8.1 Jayasekera Nalini, Chelliah R. V., Jansen C. G., and Pathmanathan S. (1985). Mosquito studies in Sri Jayawardanepura.

Mosquito Borne Disease Bulletin (submitted for publication).

8.2 Jayasekera Nalini, studies on vectors of Dengue and Dengue Haemorrhagic Fever in Sri Jayawardanepura. New Capital of Sri Lanka.

Journ. Med. Res. Inst. Sri Lanka Vol. I 61-62.

9. Bibiliography of work (1975-1985).

Publication :

1. Jayasekera Nalini and Chelliah R. V. (1980). An Annotated checklist of mosquitoes of Sri Lanka UNESCO-MAB Publication No. 8. National Science Council of Sri Lanka.

2. Jayasekera, N., Curtis C. F., Zielke, E., Kuhlow. F., Jansen C. G. and Chelliah R. V. (1980). Susceptibility of Liberian *Culex quinquefasciatus* to *Wuchereria bancrofti* in Sri Lanka. Tropenmedizin un Parasitologie. 31 507-512.

3. Jayasekera Nalini, Samarawickrema W. A., Jansen C. G. and Chelliah R. V. (1981). Filariasis in Sri Lanka (II) Crossing relations of Natural Populations of *Culex quinquefasciatus* in Sri Lanka. Journ. National Sci. Council, Sri Lanka. 9 (2) 177-182.

4. Jayasekera Nalini, Gubler D. J., Chelliah R. V., Jansen C. G., Karandawela F. R. (1983). The prevalence and biting habits of *Aedes albopictus* and *Aedes aegypti* in the city of Colombo Sri Lanka.

W.H.O./Dengue News letter (Dec. Issue) 30-32.

5. Jayasekera Nalini—Studies on vectors of Dengue and Dengue Haemorrhagic Fever in Sri Jayawardenepura, New Capital of Sri Lanka.

Journ. Med. Res. Inst. of Sri Lanka. Vol. I, 61-64.

6. Peyton E. L., Jayasekera Nalini and Chelliah R. V. (1979). The Biology and Immature stages or *Uranotaenia* (psendoficalba) *Sri Lankansis* Mosquito systematics 11(3) 215-220.

7. Samarawickrema, W. A., Jayasekera Nalini, Chelliah R. V. and Jansen C. G. (1981). Filariasis in Sri Lanka (I) Susceptibility of *Culex quinquefasciatus* in Sri Lanka. Journ. National Sci. Council. SRL — 9(2) 171-176.

8. Samarawickrema W. A., Jayasekera Nalini, Jansen C. G., Chelliah R. V., Karandawela F. R. and Pathmanathan S. (1982)

Significance of coconut husk pits as larval habitats of *Culex quinquefasciatus* in the filariasis endemic belt of Sri Lanka. South East. Asian Journ. Med. Public Health 11 (4) 590-595

9. Samarawickrema W. A. and LaurenceBR. I (1978) Loss of filarial larvae in a natural mosquito population. Ann. Trop. Med. Parasit. 72 (6) 561-566.

10. Wickremesinghe R. S. B. and Mendis L. (1980) Bacillus *Sphaericus* spore from Sri Lanka demonstrating rapid larvicidal activity on *Culex quinquefasciatus*. Mosquito News 40 (3)387-389.

11. Wickremesinghe R. S. B. and Mendis C. L. (1981). Evaluation of *Bacillus thuringiensis var israelensis* and *Bacillus sphaericus* 1593 on Sri Lankan strains of larval *Culex quinquenfasciatus*.

Mosquito News 43 (3) 558-559.

Papers and other articles, *Reports* etc.

1. Jayasekera Nalini, De Silva C. S. S., Munasinghe C. H., Chelliah R. V., Jansen C. G. and Samarawickrema W. A (1981). Transmission studies of *Culex quinquefasciatus* on carriers of *W. bancrofti* with different levels of microfilaraemia in Sri Lanka.

Paper presented at the W.H.O. Worshop on " Diagnosis of Infection and evaluation of control

in lymphatic filariasis" held in Colombo, 12th-16th October, 1981.

2. Jayasekera Nalini (1984). Mosquito studies in New Capital of Sri Lanka. Paper presented at the symposium organised by ALAAS, Institute of Biology and Cdntral Environmental Authority on "Mosquito Research in Sri Lanka".

3. Jayasekera Nalini. The Ecology and behaviour of Japanese Encephalitis vectors in Sri Lanka (1981). Final report submitted to NARESA

4. Curtis C. F. and Jayasekera Nalini (1979). Tests in Sri Lanka of filaria susceptibility and cytoplasmic incompatibility of stocks of *Culex pipens fatigans*. Articles in Progress Report of London School of Hygiene and Tropical Medicine, 36, 12-14.

5. P. R. J. Herath, Jayasekera Nalini, Kalpage K. S. P. and Wickremesinghe M. W. B. (1985). "Mosquito Borne Disease problems in Newly Irrigated Areas-Entomological Aspects, Working paper presented at IMI, Digana organised by WHO/PEEM.

DEPARTMENT OF ENTERIC BACTERIOLOGY

Consultant : **Dr. Maya C. Attapattu, M.B.B.S., D.Bact.,PhD.**

One Medical Officer assists the Consultant in the Bacteriology and Mycology Departments overlooked by her.

3 M.L.TT. 2 Laboratory Orderlies also serve in this Department.

This Department is engaged in isolation of enteric bacterial pathogens from stools, monitoring and surveillance of staff in coconut Mills around Colombo, assists the Epidemiology Department during epidemics of diarrhoeal disease, cultures of blood for Salmonella typhi and paratyphi and in the serotyping of Salmonella Shigella and E.coli.

Work Done in 1985

	Total	% +ve.
Stools samples	710	
No. positive for Salmonella	11	1.55
No. positive for Shigella	16	2.2
No. positive for E.coli	12	1.6
Blood clots	3,729	—
Number positive	60	1.9

Comments

Enteric bacterial pathogens were isolated in 5.4% of the samples received. This low figure is accounted for by the fact that a large number of samples are received for routine estimation of intestinal pathogens eg. from mill workers and not from actual patients.

Teaching and Training

M.L.TT. trainees from the School of M.L.TT are being trained regularly in this Department.

DEPARTMENT OF FOOD & WATER BACTERIOLOGY

Consultant and Head of Department : Dr. Maya C. Attapattu, M.B.B.S., D.Bact., PhD.

Staff : 2. M.L.TT.

1. Laboratory Orderly.

This Department necessarily serves the Public Health Sector and deals with food and water samples referred from the following sources.

Surveillance of water supply schemes outside Colombo for bacterial pollution. This service includes a surveillance of water supply schemes supported by UNICEF.

Examination of food and water samples referred by the Medical Officer of Health for evidence of bacterial contamination. These include routine checks as well as investigations during epidemics of diarrhoeal disease.

Investigation of outbreaks of food poisoning.

Requests from private individuals and export organizations are accommodated depending on the work load of the department and the staff availability. This service is made use of by residents in and around Colombo whenever a source of water supply is suspected and by a number of export organisations for certification before export.

This Department is also engaged in the preparation of antisera to Salmonella and Shigella for use in the M.R.I. and for distribution to outstation laboratories.

2. Work done in 1985

2.1 Nature of Sample	Total Number	No. Satisfactory	% Satisfactory
Water	504	266	53
Sea Food	14	14	100
Thriposha	14	14	100
Canned Food	08	06	75
Miscellaneous	05	04	80

2.2 Antisera Production

			ml.
Salmonella	O 4,5,12	..	20
	O 1,9,12	..	30
	O 1,2, 12	..	30
	Vi	..	50
	Poly A	..	45
	H.d.	..	40
	Total	..	215
			215
Shigella	Poly A	..	55
	Poly B	..	70
	Poly D	..	55
			180

3. Research Activities : (1981-1985)

1. Surveillance of UNICEF assisted water supply schemes for evidence of pollution.

2. Examination of the bacteriological quality of lobsters exported from Sri Lanka. A collaborative study with Sri Lanka Standard Institution.

4. Teaching and Training

Provided to trainees in the M.L.T. School Demonstrations to undergraduate Medical students.

DEPARTMENT OF LEPTOSPIROSIS

Consultant and Head of Department : **Dr. Maya C. Attapattu,** M.B.B.S., D.Bact., PhD.

Staff : 1. M. L. T. and 1 Laboratory orderly

This Department receives specimens for the diagnosis of leptospirosis from the Government and private sector. Both serological diagnosis and culture of leptospira is performed. The agglutination lysis test is performed for the serodiagnosis of leptospirosis.

Culture isolations are performed both in artificial media and in animals.

2. Work Performance :

	Total	*No. +ve*	*% positive*
Agglutination lysis test	387 ..	40 ..	12
Culture Urine	.. 2 ..	2 ..	100
C.S.F. Culture	.. 1 ..	— ..	0

The preparation and culture media for this organism is prepared in this Department. 2074 ml. of culture media were prepared during this year.

3. Teaching : M.L.T. Trainees.
M.D. (Microbiology).

MEDIA SECTION

Dr. A. Sathasivam (Virologist) is in charge of this Section. The staff at present consists of two M.L.TT. and 5 Laboratory Orderlies. Different types of media work is carried out catering mostly to the Bacteriology, Mycology and Vaccine Sections.

This Section plays an important function during epidemics by supplying media.

The following media were prepared in 1985.

Media prepared and supplied to different units of the M.R.I from .1..1.–85 to 31.12.–85

Blood agar plates	—	3934
Biphase medium	—	2100
Blood tellurite medium	—	1401
Brain Heart Infusion Agar	—	811
Brain Heart Infusion broth	—	750
Bile broth	—	1511
Nutrient agar	—	650
Charcoal agar	—	200
Carey blair	—	1000
Egg Saline	—	1250
Kligler Iron agar	—	1600
S.S. agar	—	2250
Todd Hewitt broth	—	250
T.C.B.S. agar	—	550
Tetrathionate broth	—	1500
Seleanite broth	—	250
Lemco broth	—	2275
NIH broth	—	1311
NIH slants	—	1202
Mac Conkey Double Broth	—	1600
Mac conkey single broth	—	2500
B.G.B.	—	1800
Robdrtson's cooked meat medium	—	1201
Casein broth	—	3400
Sabouraud agar (Plain)	—	548
Same with acidione	—	420
Same with Acdione slants	—	430
O.F. medium	—	250
Yeastal agar	—	750
Aesonlin agar	—	150
20% Bile agar	—	75
40% Bile agar	—	80
Rice agar	—	85
Noble agar	—	100
Thioglycollate broth	—	975
Vaccine flasks	—	850
Lemco agar bottles	—	860
Glucose phosphate	—	350
Koser's citrate	—	375
Arginine	—	250
Onithine	—	275
Lysine	—	300
Baain	—	300
Glucose	—	600
Maltose	—	475
Mannitol	—	575
Lactose	—	615
Sucrose	—	580
Dulcitol	—	450
Inocitol	—	125
Sorbitol	—	130
Xylose	—	125
Arabinose	—	125
K.O.N. broth	—	250
K.O.N. broth (Plain)	—	250
Throat swabs	—	2100
Rectal swabs	—	1800
Pernasal Swabs	—	100
Charcoal Swabs	—	125

Animal House

The Animal House is under the supervision of Dr. A. Sathasivam (Virologist).

The Staff consists of two Animal Supervisors and nine minor staff. This section caters for all types of animal work done in the M.R.I.

The animals that are bred in the M.R.I. consists of white mice, white and hooded rats and guinea pigs. Animals like, rabbits, goats and toads are supplied periodically by a contractor.

The M.R.I. Animal House also has sheep, geese and monkeys.

There is also a Section of the Animal House at the Colombo South Hospital Virus Department. This is supervised by Dr. (Mrs.) N.Withana.

DEPARTMENT OF MYCOLOGY

Consultant and Head of Department : **Dr. Maya C. Attapattu** M.B.B.S. D. BACT. Ph. D.

1. Staff

The Department is staffed by one Medical Officer, 3 Medical Laboratory Technologists and One Japanese Volunteer graduate Technologist. There is in addition one graduate Research Assistant, who is engaged in assisting in a research project funded by NARESA. As the only recognised Centre in the Island for the diagnosis of human mycotic infections, this Department serves in diagnostic, teaching and research activities in this field.

2. Work carried out in 1985

A total of 822 patients were investigated and 8100 tests were carried out for this year. The following samples were processed :—

Skin scrapings	.. 428
Nails ..	.. 184
Hair and Scalp	.. 47
Vaginal Infections	.. 25
Pulmonary ..	.. 32
Corneal ..	.. 08
C.S.F. ..	.. 09
Serology ..	.. 10
Biopsy Samples	.. 73
Urine ..	.. 02
Pus ..	.. 04

3. Comments on routine examinations

Multiple samples are examined from patients referred to this Department and each sample is subjected to a number of tests ranging from 3-15 depending of the specimens and the type of fungus cultured. Therefore the number of tests performed is far in excess of the number of patients examined.

4. New techniques

During this year, the preparation of antigens and antisera of 2 candida species were introduced. This work is being carried out as a part of research project sponsored by NARESA.

5. Research Activities for the past 5 years

(1) Extensive subcutaneous hyphomycosis by Fusarium Oxysporium (1985)

This report describes acase of hyalohypho mycosis, a rare mycotic infection in a Sri Lankan teenaged girl from Badulla. She had extensive lesions in both arms almost from infancy. The fungus fusarium oxysporium was demonstrated repeatedly from her lesions. Combined therapy with ketoconazole and 5 fluorocytocine resulted in marked improvement.

(2) Tinea Capitis in Sri Lanka (1982-1985)

Investigation into the causation, clinical features and the epidemiology of Tinea capitis infections among the Sri Lanka is being conducted at this Department. This project has been in existence for the past 3 years, and the following information has been collected to date. The following tentative conclusions have been made :—

(i) An increasing trend in the incidence of tinea capitis is observed during the 4 years 1982—1985.

(ii) The zoophilic fungi are more often associated with tinea capitis infection in Sri Lanka.

(3) The pattern of superficial mycotic infectinos in Sri Lanka

An analysis of patients with superficial mycotic infections in Sri Lanka was carried out for the 5 year period January, 1974—December, 1978. 7 different types of infection were encountered namely pityiasi versicolor, dermatophytosis, candidiasis, orychomycosis, piedra, trichomycosis axillaries and erythrasia. The 1st three accounted for the bulk of these infections (94%) 9 species of dermatophytes were responsible for dermatophyte infections. In 78% of these

infections, the dermatophyte species. *T. rubrum* was responsible. Pityriasis, versicolor was seen in 6% of school children examined and was observed to be the commonest superficial fungal infection present in Sri Lanka. Fungi of the candida species were responsible for an unusually high proportion of infections of the groins, nails and toe webs. It was concluded that a greater awarenese among clinicians would result in the detection of other infections in larger numbers.

(4) Investigation of Bronchial Asthmatics for evidence of allergy to aspergillus species (1981).

This was a preliminary study to evaluate allergy to fungi of the aspergillus species among Sri Lankan Asthmatics 35 unselected patients from hospitalised confirmed bronchial asthmatics were tested for skin test reactivity to *Aspergillus fumigatus* and *Aspergillus niger*. An additional Wbc & DC and an Eosinophil count was done on each patient. 57% of patients tested showed skin test reactivity to these fungi.

(5) Allergic Bronchopulmonary Aspergillosis in a chronic asthmatic

A case report—The first Sri Lankan patient with the clinical syndrome of Allergic Bronchopulmonary Aspergillosis was detected in this Department in 1979. This patient was followed up for 3 years and the report was published in the Ceylon Medical Journal. This disease is an immunologically mediated lung disease and its recognition in other countries is also fairly recent. This patient was a chronic asthmatic and showed precipitating antibodies to aspergillus fumigatus antigens, a positive skin test reactivity, persistent lung infiltrates and fungus aspergillus fumigatus was isolated repeatedly in the sputum.

(6) Allergic Bronchopulmonary Aspergillosis Incidence and diagnostic criteria as applicable to Sri Lanka

An investigation of bronchial, asthmatics for the presence of Allergic Bronchopulmonary Aspergillosis (ABPA) was performed during the years 1982—1984. 636 patients ware examined. Of these 134 patients were subject to detailed examination in the form of skin tests, serological tests, sputum examinations and peripheral blood eosinophil counts. 8 patients (0.12%) with ABPA were detected. An additional 50 patients (8%) were classified as "likely candidates for ABPA".

6. Teaching and Training :

1. The Department—

Provides in service training for M. L. T. trainees, M. D. (Microbiology Students) & M. D. (Pathology) students.

Dr. Attapattu, Head of the Department Provides the following

2. Post Graduate Institute of Medicine University of Colombo (PGIM) Teaching of Bacteriology, Mycology and Immunology to M. D. (Microbiology). Lecturer in Mycology for M. D. (Pathology) Diploma in Family Medicine.

3. M. L. T. School—Teacher and Examiner in Microbiology.

4. Public Health Inspectors—Lecturers in Food Sampling.

5. Undergraduate Medical Students—Lecturer—Demonstration on collection and testing of water.

7. Services to other Institutions : By Dr. Attapattu

1. Member on board of studies in Microbiology, PGIM.

2. Member, Library Committee, PGIM,

3. SLSI Member Drafting Committee for Sri Lanka Standards for many food products and Chairman of the Drafting Committee for Microbiological test methods.

4. Member,Working Committee—Medical and Veterinary Sciences, NARESA, Sri Lanka.

5. Member Food Advisory Committee — Department of Health, Govt. of Sri Lanka.

6. Consultant Mycologist—to Health Department and the Private Sector.

7. Member, Permanent interagency Committee for monitoring of water quality in Sri Lanka —Central Environmental Authority, Ministry of Local Govt. and Housing.

8. Participation atW. H. O.sponsored Seminar (1 week) on control of food borne diseases.

9. Participation at CINTEC sponsored workshop on computer applications in Health.

10. Member and Treasurer—Sri Lanka College of Microbiologists.

8. Bibliography of publications and communications for the past 10 yrs.

1. Histoplasmosis of the buccal cavity. B. Jayaweera, Maya Attapattu et al. Ceylon Medical Journal 1975, Vol. 20, P. 45.

2. Immunological approach to Ring-Worm Infections. Maya Attapattu. Paper presented at the Annual Sessions of the S.L.A.A.S. December, 1978. Abstracted in Proceedings.

3. Superficial Mycotic Infections in Sri Lanka. Maya Attapattu. Paper presented at the 93rd Annual Sessions of the S.L.M.A. March, 1980. Abstracted in proceedings.

4. Some systemic Mycotic Infections seen in Sri Lanka. Maya Attapattu. Paper presented at the 93rd Annual Sessions of the S.L.M.A. 1980. Abstract in proceedings.

5. The pattern of superficial Mycotic Infections in Sri Lanka. The Sri Lanka Medical Journal 1980. Vol. 25, p.86.

6. Humoral Antibodies in Dermatophytosis Factors affecting the antibody response in *Trichophyton rubrum* infections. Maya Attapattu and Yvonne Clyton, Saboraudia. The International Journal for Human and Animal Mycology, 1982. Vol. 20, p. 273.

7. Investigation of Bronchial Asthmatics for evidence of allergy to the Aspergillus Species. Maya Attapattu. Paper presented at the 94th Anniversary Sessions of the S.L.M.A. 1981.

8. Allergic Bronchopulmonary Aspergillosis in a chronic Asthmatic Ist Sri Lanka report. Ceylon Medical Journal 1983. 28 251-253. Author Maya C. Attapattu.

9. Allergic Bronchopulmonary Aspergillosis. An assessment of its significance as a cause of chronic lung disease among Sri Lankan Asthmatics and diagnostic criteria applicable to Sri Lanka. Maya Attapattu. Paper presented at the S.L.M.A. Anniversary Sessions March, 1983. (Won a merit award). Abstracted in proceedings and submitted for publications.

10. A case of Pheohyphomycosis of 13 years duration in a Sri Lankan. S.L.M.A. Session March, 1984. Maya Attapattu and C. Ananda-Krishnan. Abstracted in proceedings.

11. Superficial Mycotic Infections in School Children in and around Colombo. Work carried out on Grant No. RG/74/1 of the National Science Council of Sri Lanka. Report published.

12. Tinea capitis—No more a rarity in Sri Lanka by Maya Attapattu. Paper presented at the Annual Sessions of the Sri Lanka Medical Association 1986. Abstracted in proceedings.

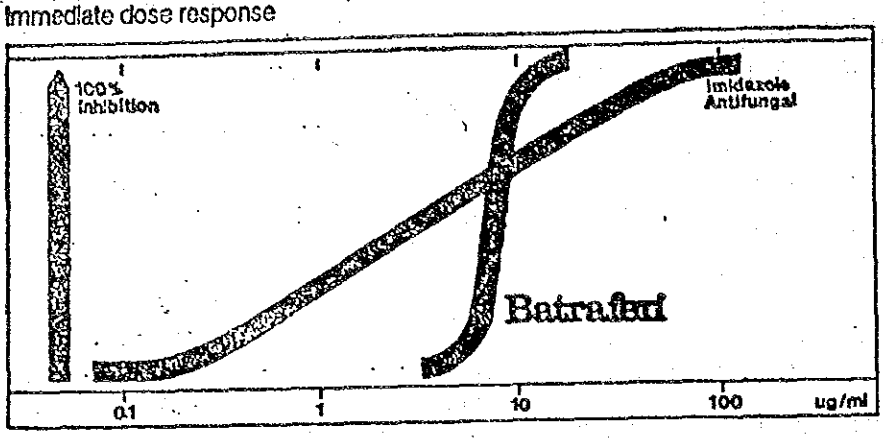
13. Extensive subcutaneous Hyphomycosis in caused by Fusarium oxysporium. Maya C. Attapattu and C. Anandakrishnan. Journal of Medical and Veterinary Mycology 24 (2) 1986, 105.

Batrafen®

The new therapy to combat skin fungi

Batrafen promises much faster and more reliable therapeutic results

Immediate dose response



Batrafen exhibits a quick and uniform action on skin fungi represented by a steeper dose-response curve, compared with the recent imidazole derivatives (e.g. clotrimazole and miconazole) which give rise to a slower and delayed curve, and therefore fail to achieve a 100% inhibition in concentrations where Batrafen succeeds to do so.

Source: Dittmar, W. et al., Microbiological Laboratory Studies with Ciclopiroxolamine, Arzneim.-Forsch./Drug Res. 31 (II), Nr. 8a (1981), p. 1317

- Broad antimicrobial spectrum including Gram-positive and Gram-negative bacteria
- Higher penetration even into horny layers
- Fast therapeutic results
- Short duration of treatment
- Excellent results in onychomycoses

Batrafen cream. Composition: 1 g of Batrafen cream contains 10 mg of ciclopiroxolamine.
Properties: The active substance ciclopiroxolamine contained in Batrafen cream is effective against dermatophytes, yeasts, moulds, Gram-positive and Gram-negative bacteria.
Indications: All fungal infections of the skin.
Contraindications: None reported so far.
Side effects: Batrafen cream is generally very well tolerated. In isolated cases temporary itching, smarting or skin irritation may be experienced.
Dosage and administration: Unless otherwise prescribed, Batrafen cream should be applied to the infected area two to three times a day – or more frequently if necessary. To prevent a recurrence the treatment should be continued for 1–2 weeks after the symptoms have subsided.
Special notes: Batrafen cream, like any other drug, should only be administered during pregnancy on the advice of the doctor. The same applies to its administration to infants and small children. Batrafen cream is not suitable for treatment of the eyes. The cream must be kept in a cool place.
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Also available as solution and vaginal cream with applicators.

Scientific information and literature on request.

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NATURAL PRODUCTS SECTION

Dr. L. B. de Silva, B.Sc. Chem. Hons. (Cey.) Ph.D. (Sheffield), F.I. Chem. C., Chartered Chemist, Fellow. National Academy of Sciences Sri Lanka. D.Sc. (Hon.) Peradeniya. Head of Section.

Dr. W. H. M. W. Herath, B.Sc., M.Sc., Ph.D., (Peradeniya) M. I. Chem-C. (Presently at Pennsylvania State University).

Research Assistants and 2 M.L.TT. are also attached to this Department.

There are more than 300,000 species of higher plants and only a small proportion of this has been investigated phytochemically and less so pharmacologically. Pharmacological investigations are decisive in the discovery of both synthetic drugs and natural products. However, with natural, products there is the advantage that there is often a lead from the use of a particular plant in folk medicine or as in the case of reserpine from its age old usage in Indian medicine. Further if variants of certain structural types are sought, it is more likely that desired compounds would be found in plants from the same genus, from which the basic structural type has been discovered. When analogues of digitoxin first isolated from *Digitalis purpurea* were sought the choice fell on D. *lanata* which was easily adapted for cultivation and contained five fold greater concentration of active principle than fox glave.

This section has been solely devoted to research on Sri Lankan medicinal plants. In the absence of any pharmacological leads, the plants selected for investigation are from the vast array of medicinal plants used in indigenous medicine. Only these plants which have been screened for pharmacological activity and found to possess such activity by the central Drugs Research Institute, Lucknow are selected for chemical study. Whenever possible plants belonging to the families Rutaceae, Compositae and Rubiaceae, shown to exhibit anti tumour properties on screening are selected for phytochemical study.

2. **Work output for past year :** Medicinal plants, *Wendlandia bicuspidata*, (S. Rawan Idala), *Tricalysia erythrospora* (S. Galseru), *Morinda Citrifolia* (Ahu), *Morinda umbellata* (kiriwel), *Neonauclea zeylanica* (Diya-me), *Hedyotis auriculata* (S. Getakola, *Hedyotis fruticosa* (S. Weraniya) belonging to the family *Rubiaceae* have been studied for their iridoid glycosides. This study was undertaken as plants belonging to this genus are known to elaborate iridoid glycosides and these iridoids which contain the α-β unsaturated lactone grouping are known to exhibit invitro anti-tumour activity.

Work on these seven plants is now, complete and we are awaiting NMR data on some compound before the results are published.

3. **Comments on routine work**

Sterile solutions required for this Institute as well as the parenteral 7.5% sodium bicarbonate for the Government Hospitals are prepared in this Section.

Training Provided :

A post-graduate research programme was initiated in this section with supplementary NARESA funding. Mr. U. L. L. de Silva R.O., M.R.I. and Mr. K. Sangara Iyer, Lecturer in Chemistry from the Department of Ayurveda were awarded M.Sc. degrees from Colombo and Sri Jayawardenapura Universities. Mr. W. H. M W. Herath, R.O., M.R.I. was awarded the Ph.D. (Peradeniya) for his work at the M.R.I. Subsequently Dr. Herath was awarded a Fulbright Post Doctoral Fellowship at Pennsylvania State University for this Ph.D. researches on Medicinal Plants. Another Research Assistant Mr. Positha Premaratne (M.Sc. London) left for

London without completing his Ph.D. thesis. There are at present 2 NARESA Research Assistants Miss R. M. Navaratne and Miss Sriyani Caldera reading for their M.Sc. from the Colombo University.

Dr. L. B. de Silva is a member of the Standing Committee on Biological Sciences of the University Grants Committee. He is also a member of a Committee appointed by the Ministry of Indigenous Medicine for the preservation of medicinal plants under the World Wild Life Fund.

Dr. L. B. de Silva was awarded the D.Sc. (Hon.) from the Peradeniya University for his researches in medicinal plants, in December, 1985.

Research during past 5 years :

1. L. B. de Silva, U. L. L. de Silva, M. Mahendran and R. C. Jennings Indian J. Chem, 1980, 19B, 820.

Micromellum Zeylanicum a shrub belonging to the family Rutacea was examined for coumarins. The main coumarin was isolated and its structure was established as 7-4^1 (4^{11} methyl- 5^{11} oxo 2^{11}, 5^{11} dihydro 2^{11} furyl) 3 methyl 2^1 butenyloxy coumarin. This coumarin was tested for anti-tumour activity by the National Cancer Institute, Bethesda, Maryland, on their request. It was however found to possess no significant anti tumour activity.

2. L. B. de Silva, U. L. L. de Silva, M. Mahendran and R. C. Jennings and D. Arnold, J. Nat. Sci. Council S. L. 1980. 8.2

On further examination of *micromellum zeylanicum* three other coumarins umbelliferone, 5 oxo auraptem, 5^1 oxo 3^1 aurapten were isolated.

3. L. B. de Silva, U. L. L. de Silva, M. Mahendran, R. C. Jennings; Phytochemistry 1980. 19, 2794.

The ornamental shrub *Murraya paniculata* contained 3, 5, 6, 7, 3^1, 4^1, 5 heptamethoxy flavone 4^1 Hydroxy 3, 5, 6, 7 3^1, 5^1, hexamethoxy flavone.

4. L. B de Silva, W. H. M. W. Herath, R. C. Jennings, M. Mahendran and G. P. Wannigama. Phytochemistry 1981, 20, 2776.

From *Triphasia trifoliata* a new coumarin with a trivial name triphasiol was isolated and its structure established.

5. L. B. de Silva, W. H. M. W. Herath, R. C. Jennings and G. P. Wannigama. Phytochemistry, 1982, 21 1173, Maurice Kupchan from Wisconsin has isolated Elephantopin from the Abyssinion plant *Elephantopus elatus*, a sesquiterpene lactone with an α-β unsaturated, double bond. This exhibits significant anti tumour activity. On Chemotaxonomic grounds we expected *Elephantopus* scaber (S. Athadi) to possess anti tumour activity. However, we obtained only deoxydihydro elephantopin, a new compound without any activity due to the hydrogenation of the α-β double bond.

6. L. B. de Silva, W. H. M. W. Herath, R. C. Jennings, M. Mahendran and G. P. Wannigama. *Indian J. Chem.* 1982, 21B, 703. From *Stereospermum personatum*, an irridoid glycoside speciosIde was isolated.

7. S. Palasunderam, L. B. de Silva, K. Sangara Iyer and Tuley de Silva. *Indian J. Med. Research*, 1982, 76 (supplement) 71.

Coscinium fenestratum, S. *weni wel* is used as a household prophylactic against tetanus. We have established that berberine the major alkaloid present inhibited in vitro growth of *Clostridium tetani* and *Staph. aureus* at concentrations of 50/μ/ml.

8. L. B. de Silva, W. H. M. W. Herath, Miss. K. M. Navaratne, V. U. Ahmad and K. A. Alvi, J. Natural Products (in press).

The Iridoid glycoside scandoside methyl ester hexa acetate was isolated and its structure established by IR, VU, NMR, C^{13} NMR from *Wendlandia bicuspidata*.

PAPERS PUBLISHED

1. L. B. de Silva, U. L. L. de Silva, M. Mahendran and R. C. Jennings.

Kokusaginine and Evolitrine from *Acronychia pedunculata Phytochemistry*, 1979, 18, 1225.

2. L. B. de Silva, U. L. L. de Silva, M. Mahendran. The chemical constituents of *Symblocus racemosa J. Nat. Sci. Council, Sri Lanka*. 1979 7 (1), 19.

3. L. B. de Silva, U. L. L. de Silva, M. Mahendran and R. C. Jennings. Isolation of 4^1 Hydroxy 3, 5, 6, 7, 3^1 : 5^1 hexamethoxy flavene from *Murrayapaniculata* Linn Jack. *Phytochemistry* 1980, 19, 2794.

4. L. B. de Silva, U. L. L.de Silva, M. Mahendran and R. C. Jennings.-Isolation of 7-4^1 (4^{11} methyl — 5^{11} oxo, 2^{11} 5^{11} dihydro — 2^{11} furyl) 3 methyl 2^1 butenyloxy Coumarin from *Micromellum ceylanicum* Swingle. *Indian J. Chem.* 1980, 19 B, 820.

L. B. de Silva, U. L. L. de Silva, M. Mahendran and R. C. Jennings. Flavanoids of *Murraya paniculata* Linn Jack. J. Nat. Sci. Council. Sri Lanka, 1980, 8.2.

5. L. B. de Silva, W. H. M. W. Herath, R. C Jennings, M. Mahendran and G. P. Wannigama. Coumarin from *Triphasis Trifoliata*, *Phytochemistry* 1981, 20, 2776.

6. L. B. de Silva, W. H. M. W. Herath, R. C. Jennings, M. Mahendran and G. P. Wannigama. A new sesquiterpene from *Elephantopus Scaber* (*Phytochemistry*) 1982, 21, 1173.

7. 7. Isolation of speciocide from *Stereospermum personatum* L. B. de Silva, W. H. M. W. Herath, R. C. Jennings, M. Mahendran and G. P. Wannigama. *Indian J. of Chem.* 1982, 21B, 703.

8. S. Palasuntheram, L. B. de Silva, K. Sangara Iyer and Tuley de Silva, Anti bacterial activity of *Coscinium fenestratum* and the rationale of its use as a prophylactic treatment in tetanus. *Indian J. Medical Research*, 1982, 76 (Supplement) 71.

9. L. B. de Silva, U. L. L. de Silva, M. Mahendran, R. C. Jennings and D. Arnold. Coumarins from *Micromellum Zeylanicum*. *J. Nat. Sci. Council. Sri Lanka* 1983. 11. (1) 1.

10. Iridoid glycoside Feretoside from *Wendlandia bicuspidata* L. B. de Silva, W. H. M. W. Herath, Miss. K. M. Navaratne, V. U. Ahmed and K. A. Alvi (Submitted to *J. of Natural Products*), and accepted.

DEPARTMENT OF NUTRITION

1. Introduction

The staff consists of three Medical Officers Dr. C. L. Piyasena, M.B.B.S., Dr. B. V. de Mel, M.B.B.S., and Dr. D. G. R. Gunawardane, M.B, B.S., M.Sc., one Nutrition Assistant, Five Public Health Inspectors and one laboratory orderly.

The Department of Nutrition was started in 1938, with the main purpose of researching into the prevailing major nutritional problems.

A consultative service was thereby provided mainly to the Ministry of Health and other Government Departments such as Education, Food and Agriculture, Fisheries, Census and Statistics, Rural Development, Local Government and Voluntary Organizations, both National and International.

With the creation of the Food and Nutrition Policy Planning Division in the Ministry of Plan Implementation, the main thrust of this Department, is to provide the technical know how in tackling the nutritional problems at the Planning and Implementation level.

Nutrition expertise service is also provided for the preparation of nutrition education material, training, and a field service for carrying out Nutritional Status and Dietary Surveys.

The major nutritional problems prevailing, in SriLanka today are.

(1) Protein energy malnutrition.

(2) Nutrition anaemia (Iron, folate and vitamin 'B 12' deficiency are widespread throughout the country).

(3) Goitre (Iodine deficiency disorders is limited to the endemic goitre belt).

(4) Xerophthalmia (Vitamin 'A' deficiency is limited to a few districts and to a lesser extent).

2. Work Output for past year

Following activities were carried out during the year 1985.

(i) Birth weight surveillance of the Urban Poor in the C.M.C Area. This is a continuous programme since 1977.

(ii) Nutritional Status Survey of Kandegama village in Badulla District. This has been carried out with the F & N P P D.

(iii) Analysis of the Dietary intakes and Nutritional Status of the purana village, Hirigollagama, now included in Mahaweli H5 Area, in collaboration with the Mahaweli Voluntary Specialist Clinics.

(iv) Nutritional Status Survey of the Urban Poor at Henemulla Camp Area.

(v) A Study of the effect of diarrhoeal disease on the growth of the urban poor children in Henemulla.

(vi) A study of the effects of supplementation with Thriposha on the weight gain during pregnancy and of birth weight. A total of 35,000 mothers were examined out of a total of 195,000 Thripcsha beneficiaries.

(vii) Preparation of age-height, weight table for school children of the Western Province.

(viii) Recommendation on dietary allowance for energy, protein, calcium, Iron, vit. A & D, Thiamin, Riboflavin, Niacin and Ascorbic acid. These are being frequently revised, guided by the safe allowances of nutrients recommended

by various expert groups of the FAO/ WHO 1960, 73, 85 and the Nutrition Advisory Committee of the ICMR, 1944, 58, 68 and 81 and the UN University in 1979.

(ix) Balanced diet for all age-sex and activity groups have been formulated based on Sri Lankan traditional food consumption pattern keeping in mind their nutrient content watching the R.D.A. as closely as possible. This is being cyclostyled and widely distributed.

(x) Based on the above a National Food Requirements have been devised and made available to the relevant Ministries and Sectors.

3. Comments on routine work

Apart from the acting in an Advisory capacity and in training activities' the Nutrition Dept. represented in a number of Committees relating to Nutrition.

(a) Bureau of Standards for Infant foods and maldive fish.

(b) Food & Drugs Committee.

(c) National Food and Nutrition co-ordinating committee regarding the following :

(i) Report on Nutrtion Studies of pre-school children (Islandwide).

(ii) Report on Goitre Control by iodisation of salt.

(iii) Report on prevalence and aetiology of anaemia in pre-school children and pregnant mothers.

(iv) Report on formulation of a food and nutrition policy plan for Sri Lanka.

(v) Nutritional Surveillance.

(d) A committee to look into the formulation for Indigenizing Thriposha.

4 Research activities and summary of results for the last five years.

4.1 Birth weight surveillance of the urban poor in the C.M.C. area initiated in 1977 in collaboration with the CMC/UNCIEF was conducted in 07 CMC Maternity Homes. Birth weights of infants have been collected and data is being analysed. A tentative look into the data indicates a high prevalence of low-birth weight infants in the area.

4.2 A study was conducted among urban slum children who showed growth retardation and the effects of an indigenous weaning food is now observed.

4.3 Dietary Surveys :

(a) Mahaweli area-Rajangane-March 1977.

(b) Hangarapitiya March/April 1979.

4.4 Development of methodologies to evaluate the nutritional and health impact of developmental projects 1981/82/84. (MRI/Oslo University).

4.5 Study of the Impact of Soil transmitted helminthiasis on the nutritional status of children (MRI/Dept of Parasitology. M.R.I./Dept. of Nutrition/Dept. of Parasitology, Faculty of Medicine/JOICEF)-1982/83.

4.6 Health and Nutritional Survey in Mahaweli system 'C'. (MRI/Professor of Paediatrics Peradeniya) 1984.

4.7 Report on the assessments of the Nutritional Status of pre-school children in Mahaweli Area 1 & 5 (Talawa, Ottappuwa and Galedlulwewa).

5. Training Provided

(i) Training of Community Development Officers in the Mahaweli.

(II) Training of trainees in the child survival and development Programme.

6. Services to other Organizations and Institutions.

Provision of Nutrition expertise to CARE.

7. Teaching

Lectures were conducted at—

7.1 Post Basic School of Nursing

7.2 Private Medical College

7.3 Post Graduate Institute of Medicine.

8. Bibilography of work for the past 10 years.

Islandwide Nutritional Status Surveys.

8.1 *Sri Lanka Nutrition Status Survey* 1975.—E. W. Brink, W. D. A. Perera, S. P. Broske, N. R. Huff, N. W. Staehling, J. M. Lane and M. Z. Nichaman. International Journal of Epidemiology, Oxford University Press 1978. Vol. I No. I Printed in G.B.

8.2 Nutrition and Socio Economic Surveys 1980/82. Published as "Statistics on Child Nutrition", F & NPPD.

8.3 "The Nutritional Status Surveys of pre school children in Sri Lanka-W. D. A. Perera Pages 14-51. Nutritional Status, its Determinants & Intervention Programmes (Final Report).

8.4 Effect of Income on the food habits of the Ceylonese—I. N. Perera, V. S. N. Fernando, B. V. de Mel, T. Poleman FAO Newsletter, Dept. V II No. 3 pp. 9-24 (1973).

8.5 Sri Lankan Nutrition Intervention Plan using Extruded Products—B. V. de Mel (1976). Nutrition Workshop Project June 2-5, Colarado State University, Fort, Collins, Colarado, U.S.A. 80523.

8.6 Traditions, Modernity and Value movements. A study of Dietary Changes in a Sri Lanka village-Waerrakonegama. B. V. de Mel and Marina Fernando. 1980 Marga Vol. 6 No. 1

8.7 Population growth Nutrition and Food Supplies by B. V. de Mel and T. Yogaratnam-ESCAP Country Monograph. Series No. 4 1976 and Marga Vol. 4 No. 3, 1977.

8.8 A simple growth chart for use in Sri Lanka. B. V. de Mel—Sri Lankan Journal of Child Health 1973.

8.9 Current Nutrition Programmes in Ceylon-Dr. C. C. Mahendra Ist. Asian Congress of Nutrition-1972.

8.10 Tables of Food Composition, Complied by Dr. W. D. A. Perera, Miss. Padma M. Jayasekera, Miss. Sithy Z. Thaha. World Health Foundation of Sri Lanka, 1979. Ranco Printers and Publishers Ltd., Colombo 03.

8.11 Reports :

Country documents sponsored by WHO—

(i) Endemic goitre by B. V. de Mel 1967
(ii) Nutritional Anaemia by B. V. de Mel 1973.
(iii) Xerophthalmia in Sri Lanka 1975.
(iv) Methodology for developing a Nutritional Policy Plan—Dr. W. D. A. Perera, Oslo University.
(v) Protein Energy Malnutrition by Dr. W. D. A. Perera

IUNS International Conferences.

(i) Need for weaning food in Sri Lanka by B. V. de Mel, Ist Asian Conference, 1971.
(ii) Nutritional Anaemia in Sri Lanka by B. V. de Mel 2nd Asian Conference 1972.
(iii) The Nutrition Situation in Sri Lanka. 4th Asian Conference 1980.
(iv) Nutrition Activity at Community Level by B. V. de Mel IUNS Conference at Hyderabad 1977.

DEPARTMENT OF PARASITOLOGY

This section is overlooked by the Director, M.R.I., Dr. U. T. Vitarana, Mrs. S. Ekanayake is away in U.S.A. on study leave. The present staff consists of Dr. (Miss). S. Samarasinghe (M.O.) Mr. Y.Wijayaratnam (R.O.), four (4) M.L.TT and three (3) Orderlies. Three of the M.L.TT. attended the regional training course in soil transmitted helminthiasis (two weeks in Bangkok). In addition the Senior M.L.T. was awarded a WHO Fellowship (3 months in India and Bangkok) and was trained in Serological diagnosis of Parasitic diseases mainly amoebiasis.

The Department received samples from government hospitals as well as from the private medical Institutions.

2. Routine Investigations

Total of 7138 investigations were performed on 5136 specimens received during the year 1985.

No. of Specimens for A.O.C. (Direct smear and MIFC Technique)	..	402
Amoebia Cultures	.. ..	32
Examination of Blood films		
For Malarial Parasites	.. ..	29
For Microfilarias	.. ..	112
Fluoscent antibody investigation		
ForFilariasis	.. ..	2,470
ForToxoplasmosis	.. ..	2,002
For Amoebiasis	..	82
Indiect Haemagglutination Test		
For Toxoplasmosis	.. ..	2,006

3. Teaching

A course of lectures in Parasitology is delivered for the M.L.T. trainees by Dr. (Miss.) S. Samarasinghe.

4. Training

The Department of Parasitology conducts a PHI Training Course in stool examination for ova, funded by the JOICEF.

5. Research Work

An Investigation to determine the titres of antifilarial antibodies found in patients with complaints-usually attributed to filariasis has been undertaken with the collaboration of Dr. H. N. Rajaratnam of the Colombo North (Teaching) Hospital, Ragama, and Prof. C de S. Kulasiri of the North Colombo Medical College.

A study is also being carried out to determine the role of filariasis in cases of Hydrocoels.

6. Research Papers

Kulasiri C. de S. (1981) Indirect Immunofluorescent test in the diagnosis of amoebiasis. *Jaffna Medical Journal* 16, 37,-43.

Kulasiri C. de S. and Ekanayake Sriyani (In preparation) Influence of Splenectony and Prednisolone treatment on microfilaraemia in rats due to implanted *Dirofilaria* repens

Summary

Though there was no statistically significant difference in the results of the two groups not subjected to treatment schedules that normal control rats implanted with *Dirofilaria* repens, one group showed a higher microfilaraemia than the other group.

The results of the splenectomised and normal rats did not show any statistical significance except in the first and fifteenth week though the microfilaraemia was generally higher than its control group during the period of observation.

The comparison of the results of the microfilaraemia in the splenectomised and prednisolone treated rats with those from the control group did not again show a statistical significance in the microfilaraemia between the two groups. The microfilaraemia in the experimental group was again higher than those in the control group. There was a statistical significance observed on the 49th and 51st weeks.

DEPARTMENT OF PATHOLOGY

Introduction

The Departmant is staffed by **Dr. Sriya Gunasekera**, M.B.B.S. (Cey.), D.Path (U.K.), D.C.P. (London.), Consultant Haematologist His to pathologist and Head of Section, two Medical Officers. three Medical Laboratory Technologistt, one Japanese volunteer graduate technologist and three laboratory orderlies.

The Department consists of Clinical Pathology, Haematology, Histopathology and Cytopathology Sections.

2. Work output for past year

Histopathology	1015
Urine for Pregnancy tests ..	872
Urine for full report	1512
Blood forWBC/DC, E.S.R. ..	2017
Special Haematological investigations, Hb., PCV., Retics, Platelet counts ..	580
Abnormal Haemoglobin and Alkali denaturation tests	206
Blood for sickling tests	25
Anti Nuclear Antibody	1580
Blood group Serology	522
Stools for occult blood ..	20
Blood marrow films	28
Body fluid analysis	36
Cytological Examinations ..	29
Special stains for malignancy ..	38
Coagulation tests	33
Cerebro spinal fluid	110
Urine for special investigations (prpohyrin, porphoblionogen, bilinogen and muco polysaccharides etc.) ..	22
Total ..	14,387

3. Comments on routine work

Several special stains have been introduced into Cytopathology and Histopathology. The preliminary work is being done to start a Dept. of Clottology.

An unusual case of Rhinosporidiosis presenting as a lump at the ankle was diagnosed by Histology The patient was from Polonnaruwa Hospital.

4. Research Activities

4.1 Study in breast disease patterns in Sri Lanka.

4.2 Participated in chronic liver disease Project.

Research in Progress

4.3 Continuation of Haemolytic Anaemia Project with Dr. V. K. Samuel of the Dept. of Biochemistry.

4.4 Participation in the Dengue Haemorrhagic Fever Project.

4.5 Filarial Aetiology in Hydrocele with Mr. Y.Wijayaratnam of the Dept. of Parasitology.

4.6 Cytological study of Nasal Smears in Chronic Asthmatic children.

5. Training Provided

By Dr. Gunasekera, Pathologist.

5.1 Pathology training to Medical Officers in Diploma and M.D. Courses in Forensic Medicine.

5.2 Haematology—To M.O. in D. Path., Course.

5.3 Department participates in the training programme of M.L.TT. students in Histopathology and Laboratory Management.

6. Services to other Organisations and Institutions

The Pathologist Dr. Gunasekera.

6.1 Is visiting Histopathologist to Dept. of J.M.O. Colombo and covers up the work by visiting the Dept. one day a week.

6.2 Visits outstation hospital laboratories to study and report on conditions there when instructed by the Dept. of Health.

6.3 Is a Council Member of the College of Pathologists of Sri Lanka and elected Editor for 1985—1986.

7. Teaching

1 Dr. Gunasekera.

1(*a*) Histopathology for M.D. Forensic Medicine.

1(*b*) Histopathology for Diploma In Forensic Medicine.

1(*c*) Pathology to D.M.O. In Workshop by W.H.O. In Forensic Medicine—2 weeks.

1(*d*) Lecture Demonstrations In Haemolytic Anaemia to M.O. In D. Path. Course.

8. Publications and Papers

8.1 Gunasekera, Sriya.

A Clinico Pathologic study of Breast Disease Journal of the M.R.I. (1985)—1. 37—521

8.2 Lucas G. N., Gunasekera Sriya, Samarasooriya A. D. K. H.

A fully documented case of Sickle Cell Beta Thelassaemia presented with a venu occlusive crisis. Paper at 21st Congress of Sri Lanka Paediatric Association 1985.

9. Publications and Papers for the past 10 years

9.1 Thilakaratne, N.

Wickremesinghe P., Perera, D. J. B., Genetic and Clinical Studies in Abnormal Haemoglobinopathies in Sri Lanka. Paper S.L.A.A.S. 1980.

9.2 Management of Snake Bite by poisonous snakes found in Sri Lanka. Perumlnar N., Perera D. J. B. Prescriber 1977 5,15.,

DEPARTMENT OF PHARMACOLOGY

Introduction

The Department of Pharmacology which functions under the guidance of the Director, M.R.I., Dr. U. T. Vitarana has a staff comprising one Medical Officer, three Medical Laboratory Technologists and two orderlies.

The following routine assays are being carried out in this Section.

(a) Urinary catecholamine estimation
(b) Urinary V.M.A. estimation
(c) Urinary 17 Ketosteroid estimation
(d) Urinary 5 (OH) I.A.A. estimation
(e) Urinary Gonadotrophins estimation
(f) Testing of samples (drugs) for pyrogens
(g) Drug assays :

(i) Insulin potency estimation (Quality
(ii) Heparin potency estimation control)

2. Work out-put last year :

Test	*No. of specimens tested*	*No. of positives*
Catecholomines ..	208 ..	04
17 Ketosterolds and Ketogenic sterolds	119 ..	36
5 (OH) I.A.A. ..	7 ..	0
Insulin potency tests ..	1 ..	0
Gonadotrophin assays ..	3 ..	0

3. Comments on Routine Work

As several factors effect the final out come of these routine assays, it would be appropriate to add a few words about the precautions to be taken and the proper collection of samples.

(i) Urinary Catecholamines/V.M.A. Assay

At least about 48 hours prior to the collection of urine, all drugs specially methyldopa, mono-amine, oxidase, inhibitors, phenothiazines, barbiturates and the excessive intake of bananas, tea, coffee and chocolates should be withdrawn.

Ideally the collection of sample should be done when the B.P. is elevated and the sample should be kept at 4.0°C (refrigerated) during the collection and sent to the laboratory without delay. 150 mg. of Ascorbic acid and 2 ml. of conc. HCL is added as preservative.

(pH should be kept below 3.5)

(ii) 5 (OH) I.A.A. Assay

As false positive results could occur with 5HT containing food substances, bananas, pineapples etc. should be withdrawn prior to the collection of urine.

4. Research Activity :

The estimations of urinary gonadotrophins and 17 ketosteroids was done in collaboration with Dr. (Mrs.) P. Premachandra of the Depart ment of Biochemistry for a project on male infertility.

5. Services to other Organisations and Institutions :

The section provides services to the Govern-ment medical Institutions, hospitals and private medical institutions. Quality control work is undertaken through the State Pharmaceuticals Corporation.

RABIES DIAGNOSIS AND RESEARCH

Dr. A. Sathasivam, M.B.B.S. (Cey.), D.Bact. Is Head of this Dept.

There is a trainee Medical Officer who is attached to the Department, two Medical Laboratory Technologists and two laboratory orderlies.

Work :

The work in this Section is divided into
(a) routine
(b) research

(a) Routine :

The routine work consists of the diagnosis of rabies by one of two methods namely (i) direct microscopy of brain smears after staining and (ii) fluorescent antibody test. The latter test is done on specimens which are found to be negative by the first test i.e. direct microscopy.

Shown below is the summary of work done in 1985 :—

Number of specimens received ..	675
Number of specimens decomposed (ie. 8.3%) ..	56
Number of specimens examined ..	619
Number of positive by direct microscopy	218
Number negative by direct microscopy	401
Number of Fluorescent antibody test..	401
Number positive by FAT ..	126
Number negative by FAT ..	275

The above results show that the number of specimens received during 1985 is roughly the same as the previous year. It also shows that the percentage positivity of the specimens examined namely 55.5% shows that there has been no control of the disease (refer Table I).

(b) Research Work

At the present moment two research studies are being undertaken namely.

(1) Wild life reservoir of rabies in Sri Lanka. This study has been temporarily stopped due to unavoidable difficulties.

(2) The intradermal vaccination of prophylactic and postexposure cases using 1/10th the normal dose of human diploid cell rabies vaccine.

Training Programmes :

Training in the field of rabies diagnosis is provided for the M.L.T. trainees. There has also been a request for training field officers of the Department of Animal husbandry.

Services :

The services of the diagnostic laboratory is available to everybody free of charge. In fact it is the only laboratory in Sri Lanka that is capable of handling rabies diagnostic work at present.

Teaching :

This laboratory regularly teaches M.L.T. trainees at present. The Virologist in Charge lectures to Medical Laboratory Technologists, Medical Students, Postgraduate Medical and Veterinary Officers.

Publications and papers read :

1. Infectivity of salivary glands of rabid dogs Ceylon Association for the Advancement of ScienceA—nnual Sessions Dec. 1966.

2. Neutralising antibody response the different schedules of antirabies treatment in exposed persons.

Ceylon Association for the Advancement of Science Annual Sessions Dec. 1969.

3. Determination of the Wild Life reservoir of rabies in Sri Lanka.

Ceylon Association for the Advancement of Science. Annual Sessions Dec. 1971.

4. The fluorescent antibody test in the diagnosis of rabies in Sri Lanka.

Ceylon J. Medical Scl. (1973) 22 (No. 2 Dec.) pp. 32—36.

5. Rabies some important facts.

The Prescrsiber. Dec. 1978, Vol. 6 No. 4 pp. 1-12

6. Sathasivam A, and Semmel M.

Institution of Rous Sarcoma Virus (Oncogenic Virus) Induced transformation by pre infection in the Rhabdoviruses (non. oncogenic virus).

J. gen. Viral (1983) 64, 275—284.

TABLE—I

Year	*No. of Specimens Examined*	*No. positive*	*% Positive*
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%

SEROLOGY DEPARTMENT

Introduction

The staff consists of Dr. T. J. P. Ratnayake, M. B. B. S. (Cey.), D. Baect. (Toronto), Consultant and Head of Section, three Medical Laboratory Technologists and two Laboratory Orderlies.

Bacteriologist in charge of the Bacteriology Department also supervises this Department. Most of the specimens are received from Institutions outside Colombo. This is due to the fact that the established laboratories have no experienced personnel to perform the tests or that some Institutions have no laboratory facilities to perform the serological tests. It is observed that more than 25% of the specimens received are contaminated, decomposed or haemolysed.

All these specimens are received by post. Very little information is given on request forms. Large number of requests are made on small pieces of paper, torn from a fever chart, O. P. D. ticket or some other form.

Serology

2.1 Preparation of A.S.O. Weil Felix and S. A. T. antigen.

2.2 Tests done and number of specimens

Latex Flocculation ..	.. 276
Brucella Agglutination ..	.. 127
Paul Bunnel ..	.. 293
Anti streptolysin '0' titre	.. 3477
Standard agglutination ..	.. 3581
Weil Felix ..	.. 50
Total..	7808

2.3 Samples from the Private Sector

A. S. O. T. ..	19
Brucells ..	13
LFT ..	10
Paul Bunnel ..	16
S. A. T. ..	24
Weil Felix ..	3
TOTAL	85

2.4 Antigens prepared

S. A. T. (Some despatched to outstation labs.).	101,700 ml.
Weil Felix	300 ml.
A. S. O.	1,800 ml.

3. Training Provided :

M.L.TT. students are trained in serological techniques.

DEPARTMENT OF VACCINES

Consultant and Head of Department : **Dr. P. Ariyawansa Jayasinghe,** M.B.B.S.(Ceylon) Dip. Bact.(Manch.), M.Sc. Virol.(Manch.)

The Department of Vaccines comprises of two Sub Departments with two different functions namely 1. Production of viral vaccines 2. Production of bacterial vaccines, sterility testing of Pharmaceutical products and Reconstitution and ampouling of tuberculin. The Medical Laboratory Technologists attached to these two sub departments are, 3 for viral vaccine production and 3 for bacterial vaccine production including a Japanese Volunteer. The technologists attached to the two units work independently as they have received separate training in their respective functions. There are 5 laboratory orderlies and 2 casual workers attached to both units.

2. Work carried out in 1985.

	Production	Consumption
Antirables vaccine	160,736 doses	146,221 doses
Anti typhoid vaccine	84, 855 ml.	101,358 ml.
Anti cholera Vaccine	14,765 ml.	27,111 ml.
Reconstitution of Tuberculin	3 batches	
Pharmaceutical sterility testing	184 samples	

3. In addition to the above work the following activities have been undertaken in 1985.

(1) Active participation of the Consultative Meeting on the National Programme for eradication of rabies in Sri Lanka

(2) Conducting Lectures to Master Teachers at Curriculum Development Centre Colombo and Maharagama Training School on Viral Infection with special reference to rabies,

(3) Consultative services were provided in 3 radio broadcasts under 'Waidya Handa' on Immunisation organised by Winthrops Ltd.

(4) Consultative Services were provided in 3 Rupavahini Programmes conducted by Sri Lanka Medical Association on Immunisation.

(5) Teaching of Medical Students.

4. Comments on routine work

The anti rabies vaccine used for the post exposure treatment of patients in all Government Hospitals and private sector of the entire country is manufactured at the viral vaccine unit. This is a betapropiolactone inactivated 5% goat brain tissue vaccine. Considering the nature of adverse neurological reactions with brain tissue vaccine steps have already been taken to replace with a suitable tissue culture vaccine. It is envisaged this would be effected before the end of the year. Since this vaccine is going to cost the Government ten times more than the present vaccine and the post exposure treatment schedule comprises of only 6 injections on days 0,3,7,14,28 and 90, it is hoped to have treatment centres established only at Main Provincial Hospitals and some of the base hospitals.

The anti typhoid and anti cholera vaccines are heat killed vaccines. Anti typhoid vaccineis mainly used in prophylactic immunisation during epidemic situations and school, immunisation programmes, whilst anti cholera vaccine is used only for travel purposes.

Tuberculine used locally is reconstituted and ampouled in the bacterial vaccine production unit. Another function of this sub department is the sterility testing of all pharmaceutical products manufactured at the Medical Research Institute.

5. **Bibliography of publications for the last 10 years**

(1) Fluorescent antibody responses to adenoviruses in humans. J. Clin. Path. 1976 29,411—416.

(2) Group associated with para influenza type 1 virus : two sub populations. BMJ. 16 June 1979 1, 1604.

(3) Manufacture of Stable and Potent Freeze Dried anti rabies vaccine J. Comm. Disc. 9,21,102—106, 1977

(4) Laboratory Diagnosis of Rabies and Vaccine production for post exposure treatment of human rabies : Paper read at Consultative Meeting on the National Programme for Eradication of Rabies in Sri Lanka.. 23—24 July 1985.

DEPARTMENT OF VIROLOGY—I

1. Introduction

The Staff consists of the following :—

Dr. U.T. Vitarana, M.B.B.S.(Ceylon), D. Bact (Lond.), M. D.(Cey.), Ph.D.(Lond.), Virologist Consultant, Head of Section.

Dr. N. Withane, Consultant Virologist in Charge of the Laboratory, Colombo South Hospital (see separate report) and one Medical Officer.

A Medical Officer, Research Officer, Public Health Inspector, Public Health Nurse and an Orderly, employed in the WHO/DHF and CLD Projects are also attached to the Section.

The M.L.T. Staff consists of seven members and a Japanese Volunteer. There are three 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 A (RIA) RIA tests limited.
(as the WHO national reference Laboratory it is hoped to start ELISA as the routine 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. Future developments include FAT for antigens of respiratory viruses, ELISA for rotavirus in stools and ELISA and Western Blok for AIDS antibody.

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

Note.—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. 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. Work Carried out in 1985

	Test	*No. Tested*	*No. +ve*
1. Routine Investigations			
(a) Serology			
1.1 Arboviruses	HI	1248	35
(Haemagglutination Inhibition Test (HI) for Chikungunya, Sindbis, Dengue and Japanese encephalitis and mac ELISA for JE).	Mac ELISA	407	115
1.2 Hepatitis B Immunodiffusion (ID)			
HBsAg	ID	1752	263
Anti HBs	ID	1752	1
In chronic liver disease cases and some HBsAg ID negative cases of acute viral hepatitis/RIA HBsAg testing was done by Radioimmunoassay (RIA).	RIA	408	65
1.3 Rubella (includes syndrome, pregnancy and others) ..	HI	217	8

1.4 Moasles (includes neurological cases and rashes)	..	CF	89	15
1.5 Herpes simplex (buccal, genital and Neurological)	..	CF	32	9
1.6 Mumps	..	..	..	CF	—	—
1.7 Adenovirus	..	..	..	CF	41	3
1.8 CMV ..	..	..	..	CF	48	12
1.9 Psittacosis	..	..	..	CF	22	0
1.10 R. Burnetli	..	..	..	CF	22	0
1.11 M. Pneumoniae	..	..	..	CF	22	0
1.12 Varleella Zoster	..	..	..	CF	6	0

(*b*) **Isolation**.—Arbovirus Isolation using baby mice and the mosquito Innoculation technique were done in a few instances. Most of the Isolations, using cell culture, were done at the Colombo South Virus Laboratory.

(*c*) **Outbreaks**.—There was a minor outbreak of Japanese Encephalitis at the beginning of the year and again at the end and this led to a considerable increase in the work load. There was also a minor outbreak of respiratory illness among the medical staff at the Kandy Hospital.

Research Activities (1981-85).

1. Chronic Liver Disease Study (WHO)

This study which commenced in 1980 was completed in 1985. Of a total of 681 cases, 181 were biopsied and one third responded to recall. A surprising finding has been that alchol rather than hepatitis B is the major etiological factor in cirrhosis. The association of hepatitis B with active chronic hepatitis and hepatocellular carcinoma is less than in the rest of Asia.

Dr. Vitarana was the Coordinator of this study.

2. Etiology of Acute Viral Hepatitis(IAEA)

Specimens received from cases of Acute viral hepatitis at the MRI (specially from IDH Angoda) have been studied by RIA since 1982. The results show that non-A non-B (NANB) hepatitis is present in Sri Lanka and varies from year to year. Hepatitis A and hepatitis B are still the major causes but the age distribution of the two are different.

3. Dengue haemorrhagic Fever Study (WHO)

This study which commenced in September 1980, with Dr. Vitarana as Project Director, was continued in 1985. The study involved the following four aspects:

(*a*) All fever cases with haemorrhage admitted to the Children's Hospital.

(*b*) Fever cases treated at selected Municipal Clinics and General Practitioner Surgeries in the North Centre and South of Colombo.

(*c*) The six-monthly bleeding of a school cohort of about 2500 children from all parts of the city and

(*d*) The related entomological studies.

There was a slight upward trend in the incidence of dengue haemorrhagic fever (DHF) but there were only two confirmed deaths. There does not appear to be a significant association of DHF with secondary Type 2 infections. The incidence of dengue has increased in the South of Colombo and decreased in the north. The annual infection rate has ranged between 10 and 20%.

4. Study of Mosquito-borne in some new irrigation Schemes in Sri Lanka (Mahaveli and Kirindioya) - (WHO/SACEP/PEEM).

This is a collaboration study with the departments of Entomology of the MRI., the Anti Malaria and Anti filariasis Campaigns. The first phase was completed at the end of 1984 and the results are still being analysed. The preliminary indications are that—

(*a*) Japanese Encephalitis (JE) virus has caused sporadic infections in both Mahaveli System C2 and in Kirindi Oya and the current level of activity is low,

(*b*) That a few people have had Dengue and Chikungunlya infections in the Mahaveli System C2, but these may have occurred outside the study areas.

(c) That pigs in a farm at Tissamaharama have a high level of JE Infection.

5. Study of Maternal Rubella and the Rubella Syndrome.—

This study aimed at assessing the magnititude of the problem of materno-foetal rubella has been continued for the last eight years, In 1985 the study was extended to anti natal mothers from a clinic at the DMH where 345 blood samples were collected and are being tested for rubella HI antibody. In addition 81 babies and 14 mothers with a rubella contact history were investigated in 1985. Only one baby and two mothers appeared to be positive.

6. Study of Encephalitis with special emphasis on Japanese Encephalitis (*JE*).

This study which was commenced in 1972 has established that JE is the number one cause of encephalitis in Sri Lanka, while measles is second in importance. A minor outbreak of JE occurred in Anuradhapura District in January/February 1985 (31 cases). This was followed by a major outbreak in both Anuradhapura and Chilaw from November, An Intensive study of the affected areas has been commenced with WHO funds.

On the basis of Island wide studies it has been possible to map the JE endemic areas. Attempts are being made to isolate the virus from the potential vectors and transmission studies are planned.

7. Sub acute sclerosing Panencephalitis (*SSPE*)

This study which has been going on for over 10 years was also continued in 1985. There ware four suspected cases and two were positive for measles.

8. Kawasaki's disease :

A study was commenced in 1985 with Dr. Harendra de Silva (Galle Campus) of the first cases of Kawasaki's disease detected in Sri Lanka.

9. Study of Cardiac Cases :

In the five years from 1981 to 1985 there have been 372 cases of Myocarditis and Cardiomyopathy. While 225 of them had Arbovirus antibodies, 35 had a titre of 640 or more suggesting a recent past infection. Of these seven had a titre of 2560 or greater suggesting a recent infection. The other viral studies eg. Coxsackie are still proceeding.

TEACHING—(by Dr. U. T. Vitarana).

Lectures—M. D. Pathology and M. D. Community Medicine.

Visiting Lecturer—University of Ruhunu.

Visiting Lecturer—N.I.H., Kalutara.

Chairman—Advisory Committee of the M.L.T.T School and Lecturer in Virology.

Services to other Organizations :

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

2. Served on Peer Review Committee on Diarrhoeal Diseases WHO, New Delhi.

3. Temporary Advisor to RD, WHO at Meeting on Non A Non B Hepatitis. Rangoon, Burma.

4. Member Board of Studies in Microbiology, PGIM.

5. Secretary Standing Committee on Health and Medical Research.

Publications (1985).

1. Infectious Diarrhoea in children in Sri Lanka (1985). Infectious Diarrhoea in the young (S. Tziporied). Excerpta Medica. New York. pp. 92—94.

2. Sri Lanka. Epidemiology and Presention of Rabies. Poliomyelitis, Measles and Rubella (1985 Virus vaccines in Asian Countries (K. Fukai ed). University of Tokyo Press pp. 43—49.

Bibiliography Past 10 years.

1. Some aspects of HbAg in Hepatitis in Sri Lanka (1975) Trop. Georg. Med. 27, 177—180.

2. Prevalance of Arbovirus Infections in Sri Lanka. Results of a 1976 survey compared with that of 1966. (1976) Proc. Sri Lanka Ass. Adv. Sci. 32, 7

3. Viruses, humans and some questions of philosophy (1977) Ibid. 33, 45—79.

4. Arbovirus Infections in Sri Lanka (1977). Ibid. 33, 6.

5. Dengue Haemorrhagic Fever with special reference to Sri Lanka. (1977). (Cey. Jour. Child Health 10, 33—40.

6. A sero epidemiological study of hepatitis A and Hepatitis B Infection in Sri Lanka (1978). Asian Journal of Infectious Diseases 2, 247—252.

7. Viral Diseases in Sri Lanka (1982).

Viral Diseases in South East Asia and the Western Pacific, (John S. Mackenzie ed.) pp. 198—204 Academic Press, Sydney.

8. Hepatitis B in Sri Lanka presents unusual features for a tropical country (1982).

Viral Diseases in South East Asia and the Western Pacific (John S. Mackenzie ed). pp. 371—374. Academic Press, Sydney.

9. A study of Dengue in a low DHF area : Sri Lanka (1983). Proceedings of the International Conference on Degue/Dengue Ha) morrhagic Fever (T. Pang. R. Pathmanathan ed. Feculty of Medicine, University of Malaya. Kuala Lumpur. pp. 103—109.

10. Infectious Diarrhoea in children in Sri Lanka (1983). Infectious Diarrhoea in the young (S. Tziport ed.) Excerpts Medica New York pp. 92—94).

11. Sri Lanka Epidemiology and Prevention of Rabies, Poliomyelitis, Measles and Rubella (1985). Virus Vaccines in Asian Countries (K. Fubai ed.) pp. 43—49.

DEPARTMENT VIROLOGY—II
Colombo South Virus Laboratory

Consultant : **Dr. Nalini Withane**, M.B.B.S., D. Bact., M.Sc.

Colombo South Virus Laboratory is the virus isolation unit of the M.R.I. There are 3 technologists, 2 animal supervisors and 5 orderlies, the work is supervised by a fulltime virologist. Routine work of the laboratory deals with entero, influenza and herpes groups of viruses but isolation of other agents viz : adenoviruses, Cytomegalovirus and Chlamydia is carried out on request. This laboratory also acts as the W.H.O. National Centre for Influenza.

This year we had the priviledge of having a W.H.O. short term consultant Dr. K. H. Dave (Director. Enterovirus Research Centre-Bombay) with us for 1 month. He not only assisted us to establish the potency testing of oral pollomyelitis vaccine and rcT40 marker test for the differentiation of wild and vaccine strains, but also gave us valuable advice to improve the diagnostic capabilities of the laboratory.

Work Output :

1 *Tissue Culture :*

(*a*) **Primary**—Nine pairs of human embryo kidneys (HEK) and 4 pairs of monkey kidneys were processed and used during the current year.

(*b*) **Established cell lines.**—We maintain a cel bank. the following cells lines are available HEL, LLCMK$_2$, Vero, RK$_{13}$, C$_6$/$_{36}$ and HEP$_2$ (Cincinnati). Vero cells were used for our routine work when primary cells were not available.

2 **Enteroviruses :**

(*a*) Eighty one stool samples were received for virus isolation. Polloviruses were isolated from 5 : 4 were wild strains and 1 was a vaccine strain (type 1-3) type 2-1, type 3-1 (vaccine). No coxsackie and Echo viruses were isolated this year..

(*b*) **Serology.**—Out of 15 samples of blood (single) received for pollo serology, 2 had no antibodies, 7 showed very high titres for Pollo 3 only, others showed the presence of antibodies to all 3 types.

9 paired and 31 single blood samples were received for coxsackie B antibodies : 4 showed evidence of recent infection ie.—4 fold rise (CB$_2$-1 ; CB. 3-3)

3. *Influenza-1985.*

		J	F	M	A	M	J	J	A	S	O	N	D	Total
Virus Isolations attempted In 7	Egg ..	8	7	4	26	10	8	18	13	13	3	5	3	118
	TC ..	8	7	4	26	10	8	18	13	13	3	5	3	118
No. positive ..		—	—	—	4°	—	—	—	—	—	—	—	—	4
No. of paired sera tested ..		5	5	4	—	10	—	1	—	1	—	—	—	26
No. showing — 4 told rise ..		—	—	—	—	5*	—	—	—	—	—	—	—	5
No. of single sera tested ..		5	5	—	30	14	7	14	8	10	2	—	—	95
No. showing antibody to 7	Inf. A ..	2	1	—	11	10	4	3	2	4	—	—	—	37
	Inf. B ..	—	—	—	—	2	—	1	—	—	—	—	—	3

° lost during passages in eggs.

* A/phil/2/82 (H_3N_2)

(4) *Herpes Simplex Viruses :*

No. of genital swabs received	..	882
No. positive for HSV	..	209

(5) *Conjunctival swabs :*

No. of conjunctival swabs received	..	42
No. positive for adenovirus type 7	..	8

(6) AnimalHouse— 1153 mice, 596 smelling mice and 549 rats have been issued during this year.

Research Activities :

(a)Investigation of an influenza outbreak-1985

There was an increase in the incidence of an influenza like illness in Colombo as well as in most parts of the country during the first week of April and reached a peak during the Sinhalese and Hindu New Year Festival time. Patients complained of high fever, headache, body pain and anorexia. About 75% developed a cough after the 3rd day but only a few had to be treated with antibiotics. Although a haemagglutinating virus was isolated in HEK cells from 4 specimens, they were lost during subsequent passage in eggs. However paired sera showed =4 fold rise in antibodies against 4/phil/2/82 (H_3N_3).

(b) Investigation of an epidemic of acute Haemorrhagic keratoconjunctivitis caused by Adenovirus type

An outbreak of acute haemorrhagic kerato conjunctivitis occured in the latter half of May and lasted for about 1½ months. Out of 42-conjunctival swabs collected from the eye hospital Colombo and the eye clinic at Kalubowila 8 were positive for adenovirus type 7. virus isolation and neutralisation test were carried out on primary HEK cell cultures.

(c) Sensitivities of Herpes simplex virus isolates to acycloguanosine (acyclovir^R)

Herpes simplex viruses isolated from genital and oral swabs are being tested against acyclovir in order to get the normal sensitivity pattern of the local isolates. This data will help to detect strain resistant to acyclovir.

Training Provided :

Students following the M.L.T. course spend 1 week in our laboratory learning the working and sterilization procedures, preparation of cell cultures-both primary and established cell liner, basic virus isolation techniques (in T.C., eggs, animals) and serological tests carried out in tissue culture.

Services to other organisations and Institutions.

To Anti V.D. Campaign.—Central V.D. Clinic and Speicial Clinic at Kalubowila.

Genital swabs collected from patients attending in Central V.D. Clinic are sent to M.R.I. daily and are stored at –70%. The specimens are sent to our laboratory once a week. If HSV is isolated from a specimen, it is reported immediately. Negative reports are sent out only after incubating the cultures for 7 days.

Teaching.—M.D. (Community Medicine)

M.L.T. Students.

JAPANESE ENCEPHALITIS: A PROBLEM IN SRI LANKA

Tissa Vitarana

Introduction

According to the World Health Organization (1) Japanese Encephalitis (JE) is a serious public health problem with significant mortality in children and old people in many countries of Asia. In recent years the epidemiological patterns have changed. The incidence too shows changes with the high incidence in Japan, South Korea and to a lesser extent China being brought down mainly through vaccination. But at the same time JE has been increasing and spreading over parts of Bangaladesh, Burma, India, Nepal, Thailand and Viet Nam. Since the beginning of 1985 in Sri Lanka too there has been a similar increase.

It is evident that in Sri Lanka also the pattern of JE is undergoing a change. From a largely endemic disease to one showing a tendency towards larger outbreaks or even epidemics. Japanese Encephalitis is an infection due to an arbovirus belonging to the Flavi-virus genus which mainlyinvolves an animal reservoir and is transmitted to man by particular mosquitoes. Though many animals and birds can be infected the main amplifier hosts are the pig and probably the heron. Migratory birds may play a part in the spread of the infection. Culicine mosquitoes, notably Culex tritaeniorhynchus, Culex vishnui, Culex gelidus and Culex fuscocephala, along with some anophelines have been incriminated to be the vectors of Japanese Encephalitles. Of these, Culex tritaeniorhynchus and Culex vishnui are important in most countries but in Sri Lanka Culex gelidus appears to be more important than Culex vishnui specially in the Western Coastal belt and in the suburban areas, where they breed in shallow ditches and pools[2]. The other vector mosquitoes breed in irrigated fields and Culex tritaeniorhynchus is the most important of these in Sri Lanka[2].

Female mosquitoes feed mainly on verterbrate hosts like pigs, cattle and horses and once infected are able to infect other hosts after a 9-12 day incubation period. The spill over of the infection to man occurs when the absolute number, density and longevity of infected mosquitoes increases and there is adequate man-mosquito contact. Thus waterlogging of rice fields and pools (specially after rains) and close proximity of these mosquito breeding sites to animal reservoirs and human dwellings promote the transmission to man. JE is therefore primarily a rural disease though it can occur in the outskirts of towns close to rice fields or pools.

The JE virus, with the exception of horses (encephalitis) and pigs (abortion in pregnant females), does not produce any illness in the animal reservoir. Among humans too a large majority of infections do not produce any illness. It is estimated that the ratio of overt disease to inapparent infection varies from 1 : 300 to 1 : 1000 or more, and this was found to be the case in the recent Anuradhapura outbreak.

Pathological and Clinical Features

In cases of encephalitis there is damage to nerve cells principally in the mid brain (substantia nigra, thalamus, basal nuclei), cerebral cortex and cerebellum. The anterior horns of the spinal cord may also be affected. Vascular congestion with occasional heamorrhage, and inflammatory infiltration of the brain and meninges also occurs.

The incubation period in man, following mosquito bite, is believed to vary from 5-15 days. There is a prodromal stage of one-six days during which fever with or without rigors, headache, general malaise, nausea and vomiting may occur.

In many the illness does not progress beyond this point and may be taken to be any viral fever. In a few it proceeds beyond this point to the *acute encephalitis* stage. The fever continues to be high with a relatively slower pulse. The face may take on a Parkinsonian look (dull, staring, musk-like) with thick retarded speech. Neck stiffness is common and muscular rigidity may occur. Altered sensorium (clouding of consciousness, excitement, confusion, disorientation, stupor and coma) generally occurs. Tremors and involuntary movements of various types and incoordination are common. Convulsions too are common specially in children. Paralysis occurs and may take various forms, in Anuradhapura weakness of neck muscles was seen in some cases. Changes in reflexes or in the eyes are not prominent. Sensory changes are difficult to demonstrate because of altered sensorium.

Involvement of other systems, such as the myocardium of the heart can occur.

The case fatality usually ranges between 20 and 40% but in some epidemics has exceeded 60%. In the recent (1985/86) Anuradhapura and Chilaw outbreaks it was less than 20%. Death usually occurs within 10 days of the onset of illness.

Late stage and Sequelae

While some patients make a complete recovery, between 50—75% show residual disabilities of various degrees. Some of these may reduce or clear up in the next few years but many persist for life. They may vary from minor emotional or psychiatric disturbances to intellectual deterioration and even complete paralysis and dementia.

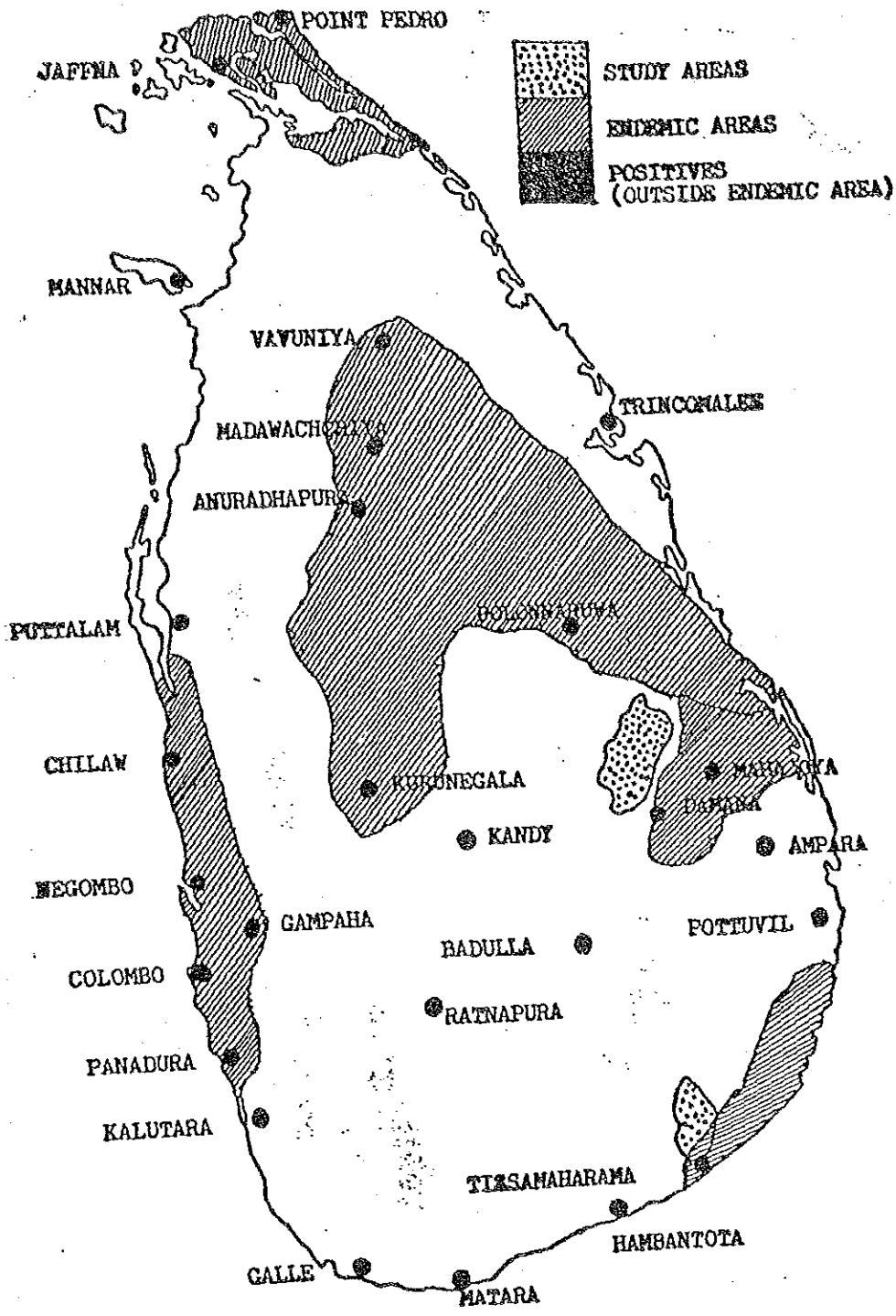
History of Japanese Encephalitis in Sri Lanka.

The virus was first isolated in Sri Lanka from a human patient by Hermon et al at the Medical Research Institute in 1968 [3]. But its presence was suspected earlier when a child died of encephalitis at the School for the Blind at Mahawewa in June, 1960. One of the serum samples sent to the Virus Research Centre at Poona, India was positive for group B arbovirus, probably Japanese Encephalitis.

While encephalitis occurred sporadically throughout the year in most parts of the country the first major outbreak occurred in the Kurunegale district in 1971. This mainly affected children and in the course of that year 76 cases were admitted to the Paediatric Ward at Kurunegala Hospital. There was a high case fatality of 66 deaths and of the 10 who survived 5 had residual neurological deficits. Unfortunately by the time the Medical Research Institute was informed it was too late to establish the cause of the outbreak [5]. In 1971 a study was made of encephalitis cases admitted to the Childrens' Hospital, Colombo and District Hospital, Gampaha. Of the 31 cases admitted to DH Gampaha, 6 were serologically investigated at the MRI and one was found positive for JE. Out of 50 cases at the Childrens' Hospital 4 were serologically investigated but there were no positives [6].

Thereafter cases occurred sporadically throughout the island and for the 10 year period 1971 to 1980 there was an average of 1,030 hospital admissions each year for encephalitis with an average case fatality rate of 38% (range of 25%—45%). During this period etiological studies done at the MRI on a limited number showed that Japanese Encephalitis is the leading cause, accounting for 43.3% [7].

A serological survey done in 1976 and 1977 in various parts of Sri Lanka indicated that Japanese Encephalitis occurred mainly in certain parts of the country (See Map). There were [1] the Western coastal belt extending from Kalutara in the South upto Puttalam in the north and extending inland for about 10—15 miles to include Gampaha. Domestic pig raring is common in this area and 83% of pigs tested had quite high


POINT PEDRO
JAFFNA
STUDY AREAS
ENDEMIC AREAS
POSITIVES
(OUTSIDE ENDEMIC AREA)
MANNAR
VAVUNIYA
TRINCOMALEE
MADAWACHCHIYA
ANURADHAPURA
PUTTALAM
POLONNARUWA
CHILAW
KURUNEGALA
KANDY
AMPARA
NEGOMBO
GAMPAHA
BADULLA
POTTUVIL
COLOMBO
RATNAPURA
PANADURA
KALUTARA
TISSAMAHARAMA
HAMBANTOTA
GALLE
MATARA

levels of HI and NT antibodies against JE. [2] the other areas affected were those with large rice fields and where wild pigs occur such as the districts of Kurunegala, Anuradhapura, Batticaloa and Tissamaharama. There was some JE activity in the Northern province as well. There was little or no JE in the hill country.

JE Outbreaks

At the beginning of 1985 (January and February) 32 cases of encephalitis were warded at the Anuradhpaura Hospital. Of these 13 were positive for JE by the newly introduced MAC ELISA test for JE specific IgM in the CSF. Two of these were also positive by Haemagglutination (HI) and neutralization (NT) Tests.

Commencing in November 1985 and extending to February 1986 there was a major outbreak of JE involving the Anurdhapura and Chilaw districts. In Anuradhapura there were 406 cases of encephalitis with 76 deaths. An unusual feature of this outbreak was that about 50% of cases occurred in the age group 20—50 years and there was a preponderance of male patients. In Chilaw there were 106 cases with 17 deaths. This followed the classical pattern and mainly affected children.

On the basis of ongoing field research studies it would appear that the factors contributing to the Anuradhapura outbreak were :

(1) The increased area of rice cultivation and the excess rain which led to pooling and an increase of vector mosquito breeding ;

(2) Encouragement and increase of pig breeding in the area ; and

(3) An increase of non-immune people for example through migration from areas, such as the hill country, where the JE virus is less active.

In the Chilaw area the main contributory factors appears to be the increase of vector mosquitoes, due to the excessive rains, and a build up of susceptible children.

Impact of Irrigation Schemes such as the Mahaweli

In the Anuradhapura district most cases during the last outbreak occurred in the 'H' area of the Mahaweli Scheme. Studies done in 1985 by a team from the MRI. AMC and AFC 9 showed that there is past and present JE activity in the Mahaweli System 'C' and in the Lunugamvehera Scheme at Tissamaharama. However the level of JE activity was much lower than in the 'H' area of the Mahaweli.

There is clearly a need to carefully monitor JE virus activity and vector mosquito densities in these irrigation schemes.

Future JE Control Measures

The introduction of an immunization programme for humans, even if confined to the irrigated rice cultivation areas, is very ((almost prohibitively) expensive. But the MRI is proceeding with the virological studies required to decide on a suitable vaccine if the need really arises. Professor Akira Oya from Japan too was of the opinion that a vaccination programme was not indicated at present.

It has therefore been decided to minimize the role of the amplifier host, the pig, as fas as possible. While pig breeding is being discouraged in the (Mahaweli area, the housing of pigs in mosquito proof pens is being encouraged and studies are being undertaken to decide on the need for vaccinating pigs.

The MRI has also suggested that studies be done to assess the efficacy of various measures to minimise mosquito breeding in rice fields. These included the weekly lowering of the water level in the fields and the use of suitable pesticides and weedicides.

Whenever the vector mosquito density builds up spraying with malathion around houses and pig pens will be carried out. Studies are also planned to select other animals (eg. goats, poultry) as suitable alternatives for animal

husbandary which may also act as bait for vector mosquitoes but without playing the amplifier role of the pig(zoo — prophylaxis). A health education programme is also planned to help to reduce human exposure to vector mosquito bites. It is hoped that through these measures it will be possible to control Japanese encepha lities in Sri Lanka without major outbreaks.

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A REVIEW OF THE FOUR MAJOR NUTRITIONAL DEFICIENCY DISEASES IN SRI LANKA OVER THE LAST 40 YEARS

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The Department of Nutrition, Medical Research Institute, has from its inception in 1943 has researched into the four major nutritional deficiency diseases namely, Protein Energy Mal nutrition, Nutritional Anemaia, (Iron and folate deficiency) Goitre, (Iodine deficiency) and Xerophathamia (Vitamin A deficiency).

Calorie deficiency and protein deficiency continue to be our main nutritional problem. Over 60 dietary and nutrition surveys carried out by the Department of Nutrition from its inception up to date confirm that it is most prevalent at low income levels.[1] Social custom in Sri Lanka dictates especially at low income levels that women irrespective of whether they are pregnant or lactating always receive the lesser portions of the family diet. [2] On this basis it is possible to estimate that 10.3% of the pregnant population today are seriously inadequate in calories. The Ministry of Health, M.R.I. and in association with CARE provides a supplementary food Thriposha to almost 120,000 under nourished anaemic pregnant women a year. In Sri Lanka, an average Sri LankanWomen needs an additional 200 calories/ day throughout her pregnancy or about 60,000 extra calories, a pregnancy. This amount is adequately provided by Thriposha if eaten, supplementing her home diet during the last 200 days of her pregnancy. As a result of calories protein inadequacy the pregnant women does not gain enough weight during pregnancy, which results in low birth weight. The incidence of low birth weight was 21% in 1979. It has been reduced to 18.9%. In a representative sample of 37,578 pregnant women receiving Thriposha in 1984, 6,185 babies born with a birth weight less than 2,500g. were from those mothers in the study whose low weight gain in pregnancy ranged from 0—4 Kgs.

Childhood Protein Energy Malnutrition in the form of under nutrition or wasting.[3] in 1980s, were based on weight for height z scores less than 2.0, was highest during the period of weaning at 6 — 24 months age. The earliest studies of the department, in the 1950s and 1960s spotlighted the high prevalence of under nutrition during weaning[4]. The development and formulation of a cheap and acceptable weaning food was considered an urgent priority and work in this direction was carried out with the Ceylon Institute of Scientific and Industrial Research ; the formulation included wheat flour, green gram and 5% NFDM. The M.R.I., FHB, and CARE tried out a supplementary (weaning) food,[5]. Wheat Soya Blend (WSB) in 9 out of the 15 health district in 1971/72 and its success led to the Thriposha Programme being initiated in 1973. In 1978 the formulation of Thriposha was changed to Corn Soya milk with mineral and vitamins added. By 1986, 50% of the product is being produced indigenously, providing a highly acceptable, highly nutritious, pre cooked (complementary) weaning food for almost 70% of growth retarded infants duifng theweaningperiod. Theseinfants are identified by growth monitoring through the use of the child health card, through the Primary Health Care Service of the Health Ministry in conjunction with many voluntary organizations both national and international[6].

The Department of Nutrition devised Height Weight standards for use in School Health Examination twice, first in the 1950's and later

in 1968 and 1972. The last standard devised (1972) for both boys and girls is still being used in schools.

Studies into the extent and prevalence of nutritional anaemia in Sri Lanka has been under taken from 1961 upto date. Using community based studies the prevalence was found to be : 38% in men, 68% in females, 70% in primary school girls, 52% in pre school children and 73.7% in pregnant women, surveyed at antenatal clinics[7].

The high prevalance of anaemia in females contributes significantly to morbidity and mortality during pregnancy. 2794 pregnant women were examined in all health districts of Sri Lanka in the late 1960s and 1970s and 73.7% of their haemoglobin levels (mean Hb 9.54 = 2.09) were found to be less than 11g/dl, below which level, according to WHO criteria, anaemia is considered to exist. The prevalence of severe anaemia below 8g/dl was found to be around 11.6. The percentage varied from as much as 35% in some districts to 6% in others.

The anaemia of pregnancy was found to be chiefly due to iron deficiency according to the M. R. I., WHO studies in the 1970s. Of the 658 pregnant women studied, 47.8 of them had a transferrin saturation % less than 15 which is the WHO criteria of Iron deficient erythropoiesis 47% of folate levels of these pregnant women fell below the level of 3ng/dl, according to WHO, the level below which folate deficiency can be considered to exist. Serum Vitamin B 12 levels in 4.8% of the 352 pregnant women examined were less than 80 pg/dl., giving evidence of vitamin B 12 deficiency too.

It is estimated that in Sri Lanka in 1985, there would be 257,672 anaemic pregnant women in urban rural and estate areas, mainly belonging to the low socio economic group which comprises 50% of the population of 15,750,000[8].

180 tablets per pregnancy of 60 mg. of elemental Iron with 200 mcg of folic acid in a single tablet are provided through the Government Health Service to 68% of the pregnant population. The UNFPA funded this programme for seven years and today it is provided by UNICEF.

To ensure full iron absorption, pregnant mothers are also given a supplementary food Thriposha, which is rich in protein, calcium, Iron and vitamin C together with folic acid and Vitamin B 12.

4 Therapeutic studies, (providing 60 mg. of elemental Iron a day) on pregnant women, unmarried rural girls and pre-school showed a significant improvement in their haemoglobin levels and confirmed that the anaemia was mostly due to iron.

Dietary iron intakes were studied in relation to haemoglobin levels of 23 households in a rural village of Ganthriyagama. The haemoglobin levels of the father, mother and preschool children in the household were significantly related to their dietary Iron intakes. Where the adequacy of Iron was over 100%, animal protein intake over 20g and Iron over 20 mg. caput day the haemoglobin levels of the father, mother, child were normal. Where dietary adequacy of Iron was below 60%, animal protein less than 10g and Iron intake around 12 mg the haemoglobin levels of father, mother and child were significantly below normal.

Studies carried out since 1947 indicate that there is an endemic goitre belt in the south west region extending over the whole of the Western, Sabaragamuwa Central, Southern Provinces and part of the UVA Province constitute the set zone. 70% of the island's population also reside in this area.

The first, an island wide rural incidence survey by Mahadeva[9] showed that 0.2% amongest 20,333 males and 2.2% on 20,972 females were goitrous.

A repeat incidence survey, 15 years later, by Mahadeva[10] using the same technique and nutri-

tion department personnel revealed that the incidence had significantly increased to 1.4% in 3,304 males and 11.4% in 5,268 females.

Since pregnant women are particularly at risk, Mahadeva[9] studied 4,870 pregnant mothers at 17 antenatal clinics in the goitre belt, and found the incidence to be 6.9%. Repeated 20 years later in 1983 by De Mel[11] on the first visit of 1,385 pregnant women at the same antenatal clinic centres, the incidence was found to be significantly increased to 17.7%. The repeat survey in the non goitrous areas continued to show no incidence.

Mahadeva in the 1960s had also, found endemic goitre was not associated with cretinism or deaf mutism to any significant extent. During the repeat survey he observed four deaf mutes and three cretins.

The aetiology of goitre was studied with WHO's advisors[12] Subramaniam and Deo in 1966. A pattern similar to that in the Himalayas was found in Sri Lanka, although less severe. School children in the age group of 8—16 years were examined in specific areas in the endemic zone, in Nuwara Eliya (6100 ft. above mean sea level), Kandy (2,000 ft. above mean sea level), Horana and Galle.

Selected cases of school children in Horana and Galle revealed very high thyroidal uptake of I^{131}, 70.1% to 83.4% in males and 83.5% to 90.1% in females as opposed to 40.8% in males and 47.3% in females in the control areas fo Jaffna. This high uptake of I^{131} and high rate of Thyroidal Iodine clearance (neck/thigh ratio) in the permanent residents of the endemic area, in the absence of any other cause was indicative of environmental iodine deficiency. The finding of low iodine content of water in the endemic areas and of low level of urinary iodine in school children confirmed that endemic goitre in Sri Lanka was one of environmental iodine deficiency. There is no laboratory or epidemiological evidence to suggest the role of a goitrogen in its pathogenesis. The low values of plasma inorganic iodide found in the goitrous persons provides further evidence of iodine deficiency.

The prevalance of IDD in Sri Lanka has been estimated byWHO[13] based on the available data from the Department of Nutrition, of the population of 16,099,000 in 1985, 9 million, 61.3% of the population in the endemic zone are at risk and 3 million suffer from endemic goitre of which 14,000 can be said to suffer from endemic cretinism.

A project report and a position paper on the need to control iodine deficiency in the goitre belt of Sri Lanka was presented to the National Food and Nutrition Committee, Advisors to the Food & Nutrition Policy Planning Unit of the Ministry of Plan Implementation. A Committee was formed with the relevant authorities including the National Salt Corporation and a report submitted.

A project in the first instance for the iodation of all domestic salt in the Kalutara District, considered to be the worst affected district in the goitre belt, was planned for 1987. It is awaiting cabinet approval.

Rural dietary surveys from 1946 showed that vitamin A intakes ranged from 244 to 664 mcg per capita per day. The intake were generally well below the recommended levels especially in the poorer—socio economic groups. Clinical signs of vitamin A deficiency specially grosser manifestation such as keratomalacia were however infrequent.

The incidence of Keratomalacia as a cause of blindness in children in Sri Lanka decreased tremendously from 60% in the early 1930's to 44.06%, 28.6% and 2% in 1940, 1952—53 and 1958 respectively and less than 0.2% in 1967—70[15]. However, 1973—74 during the global and local food shortage, there was a concomitant increase in the occular manifestation of Vitamin A deficiency too. In 1974 together with theWHO

consultant on an assignment on the control of Protein Calorie malnutrition in Sri Lanka, observed in high incidence of Bitot's Spots and Keratomalacia in pre-school children. Remedial action had to be taken. Consequently an MOH/MRI/CARE pre profile pre school survey was carried out in 1975 by 41 medical interns in 9 out of the 15 health districts, showed an average incidence of 2% Bitot's Spots, where previously few cases were seen in this age group. They also observed in 10,000 children 6 with Keratomalacia.

The National Nutrition Pre School Survey by MRI/MOH/CARE/USAID in 1975/76 [16] revealed that only two of the fifteen health district in Sri Lanka, namely Kegalle and Matara had a prevalance of Bitot's Spots exceeding the WHO minimum criteria of 2% warranted a massive dose. Kandy, Ratnapura, Galle, and Batticaloa were also selected, as these areas were found to have a high degree of Protein Energy Malnutrition with borderline Vitamin A deficiency signs.

4 indepths studies in poor disadvantaged villages were carried out in Kegalle, Matara, Kandy, Ratnapura and Batticaloa in 1979 [17]. A random sample of 59 pre school children were examined for serum Vitamin A and Albumin and haemoglobin level. 11.8% of them had vitamin A level 10 or less than 10 μg/dl (mean 8.7$\pm$1.9) low albumin level (mean 2.75$\pm$0.3) and low haemoglobin level(7.8g/dl$\pm$2.5.),40.9% had Vitamin A level above 10 and below 20 μg/dl (mean 15.4$\pm$1.9) albumin,(3.00$\pm$1.90) and haemoglobin level(8.1$\pm$2.25) Only 10.2% of the children had vitamin A level of 30 and above (mean 34.8$\pm$2.7). mean albumin 3.12 g/dl and mean haemoglobin level of 9.05 g/dl$\pm$1.59. 37.3% who had Vitamin A level of 20 and less than 30 (μg/dl. mean Vitamin A 23.9 μg/dl. $\pm$2.6) mean albumin 3.02 g/dl. $\pm$2.95 and heamoglobin 8.5 mg/dl. $\pm$1.4.

An immediate solution to the problem was required and the internationally accepted megadose programme was initiated, with the objective of eliminating all blindness due to Vitamin A deficiency. The Ministry of Health /M.R.I. in association with CARE initiated the programme in January 1977. 581,087 children between the ages of 13—72 months were given the first megadose, 66% of them received the 2nd dose and only 50% the 3rd dose, over a period of 18 months. By this time together with a mass education programme for educating mothers on the correct feeding of children during weaning and illness, the provision of Thriposha, a Vitamin A and Protein fortified pre cooked supplementary Food was made available to all weaning children of the low income urban, rural and estate groups.

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