

# Indian Research Fund Association

Annual Report  
for the Year  
1949

By  
C. G. Pandit, M.B.B.S., Ph.D.,  
D.P.H., D.T.M., F.N.I.,  
Secretary

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Secretary

## GOVEI

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*New Delhi,*

*Dated, the 15th March, 1950.*

**The Hon'ble Rajkumari Amrit Kaur,  
President,  
Governing Body,  
Indian Research Fund Association,  
New Delhi.**

*Madam,*

*I have the honour to submit herewith a general review of the work of the Indian Research Fund Association for the year 1948-49. It is written, as far as possible, in non-technical language. Since many of the research schemes had been initiated in 1948, it was inevitable that in the present report some aspects of research carried out during that year should have been mentioned. The work is reviewed with the background of the Association's previous efforts in the respective fields of medical research.*

**C. G. PANDIT**  
*Secretary.*

## CONTENTS

			Page
1. INTRODUCTION	...	...	9
2. NUTRITION RESEARCH	...	...	10
3. CLINICAL RESEARCH	...	...	18
4. MALARIA	...	...	28
5. PLAGUE	...	...	31
6. CHOLERA	...	...	33
7. FILARIASIS	...	...	38
8. LEPROSY	...	...	41
9. RESEARCH IN INDIGENOUS DRUGS	...	...	45
10. MATERNITY AND CHILD WELFARE	...	...	49
11. INDUSTRIAL HEALTH	...	...	54
12. ASSISTANCE TO INDUSTRIES	...	...	59
13. MICROFILM SERVICE UNIT	...	...	61
14. SCIENTIFIC LIAISON WITH OTHER DEPARTMENTS	...	...	62
15. I.R.F.A. WORKERS ABROAD	...	...	65
16. THE YEAR AHEAD	...	...	67

## Introduction

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**I**N the year under review (1948-49) the Association had received from the Government of India a grant-in-aid of Rs. 12 lakhs for medical research. The expenditure during the year was about Rs. 10 lakhs. The saving effected was mainly due to unforeseen circumstances, particularly late starting of enquiries, lack of trained personnel, and consequent delay in filling up the sanctioned posts on several research projects. Even so, the Association's budget for medical research has shown a progressive increase each year since 1940.

The manner in which the Association has been able to fulfil the objects for which it was established, viz., "to initiate, aid, develop and co-ordinate medical scientific research" in India, is reflected in the resumé of work done, during successive years, as published in the annual reports of the Scientific Advisory Board. It will be apparent from the report of the Board for 1949 that, while the need for promoting fundamental research in medicine and allied sciences has been kept in view, the urgent necessity for directing specific attention to the pressing medical and public health problems which face the country today, particularly in the field of nutrition and communicable diseases, has not been lost sight of. In formulating its research programme, and in determining priorities, the Association continues to receive the expert advice of the Scientific Advisory Board and its several Committees.

# Nutrition Research

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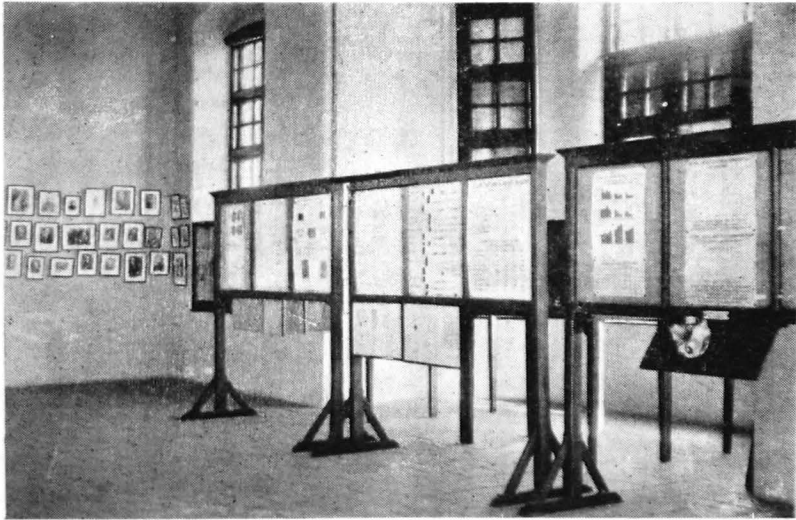
PROBABLY never before in the history of the country has there been such an urgent need for promoting research in the field of nutrition in all its aspects. It is but natural that the Association should allocate a fair proportion of the funds at its disposal towards furtherance of nutrition research in India. A proper understanding of the role of the various dietary factors, their influence on health, the investigations on nutritional disorders, and certain fundamental aspects concerning the occurrence and mode of action of vitamins in the body, are a few of some of the important problems on which studies have been focussed. The work is being carried out in the Association's own Laboratories at Coonoor, by the three nutrition research units at Calcutta, Bombay and Bangalore, and at other research institutes in the country. Although some of the results given below have been achieved during the last two years, it is to be borne in mind that in achieving these, the spade work carried out during the previous years by research workers, either alone or in a team, has contributed a great deal.

## FOOD AND FOOD COMPONENTS

*Food Iron.* It is well known that in spite of a fairly good supply of iron, which an Indian derives from his food, iron deficiency anæmia is of wide occurrence in India. It has also been known that the body can absorb and utilise only a part of the iron which is present in



PLATE I



**A part of the Nutrition Museum at the  
Nutrition Research Laboratories, Coonoor**

food. The availability of this part, which can be called 'available iron', depends upon the physical condition and chemical combination in which it exists in food. Investigations were, therefore, undertaken to study the proportion of available iron in Indian foodstuffs. The iron of egg yolk was found completely available to the body, that from rice, wheat and lentil was, however, available only to the extent of 30 to 60 per cent. This is an illustration of the fact that the whole of the iron in Indian diet is not available for nutrition, and hence the total iron content of the diets, as obtained by chemical analysis, gives no indication of the adequacy of the iron intake. Further work on this problem is in progress at Calcutta, under Dr. B. C. Guha.

*Proteins.* The dietary proteins are the building stones from which tissues are built up. Hence the quantity and quality of protein in the diet is a very important consideration in nutrition. Current opinion among people is that Indian diets are inadequate in both respects. The evidence collected from published researches, and certain researches undertaken at Coonoor, have shown that this view is incorrect. The results have revealed that, with the exception of the diets of very poor people, there is no quantitative deficiency of protein in Indian diets and that the average Indian is capable of digesting vegetable protein mixtures and absorbing from them the necessary amount of protein for normal nutrition to the same extent as from a 50 : 50 mixture of vegetable and animal proteins, which constitutes the European diet. The subject is extremely interesting and further work is in progress.

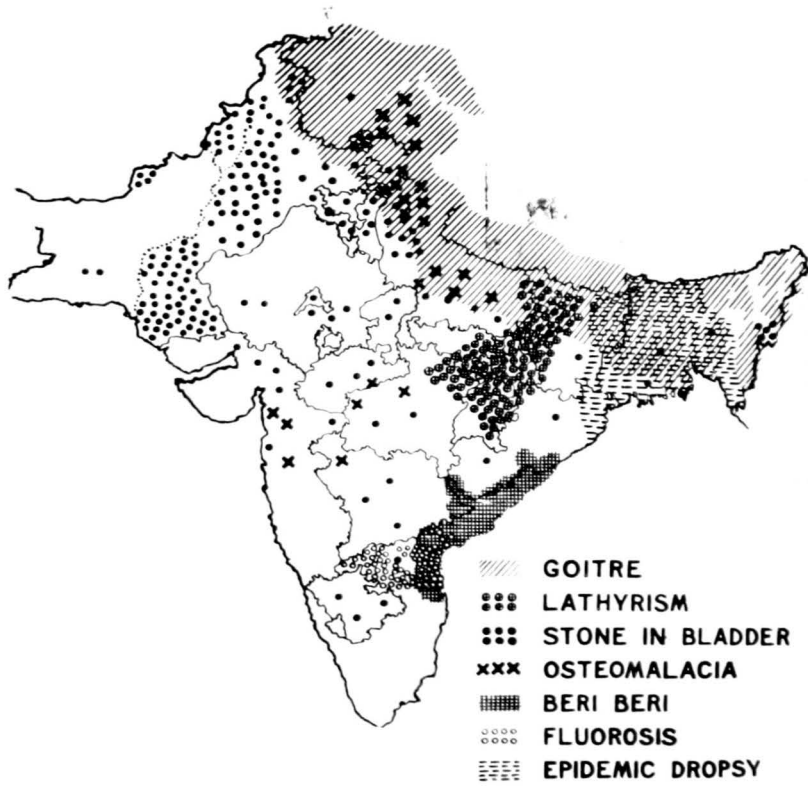
## NUTRITION RESEARCH

Dietary protein has an important role to play in the regeneration of blood. The fact that iron is required for regeneration of blood is well known, but the role of protein in this respect has not been fully appreciated. This subject is of particular importance to India where, for one reason or other, the large bulk of the population depends for its existence on a variety of vegetable proteins, which are usually, although not always correctly, considered as inferior to animal proteins. Attempts are at present in progress to study the comparative roles of vegetable and animal proteins in blood regeneration. As a first approach to the problem, the part which the various amino acids ( the components of proteins) play in the regeneration of blood is being studied, and definite information has already been obtained that amino acids like tryptophane, histidine and isoleucine, are essential for blood formation. Not all the amino acid components of proteins are essential for blood formation. However, only a study extending over the complete range of amino acids known to occur in proteins will give the needed information. Dr. Damodaran at Poona is carrying out investigations on this interesting problem.

*Soya bean milk.* During the last two years an exhaustive study of the nutritive value of soya bean milk has been completed by Dr. V. Subrahmanyam and his colleagues at Bangalore. As a result, it appears certain that soya bean milk can be considered a valuable supplement to poor rice diets.

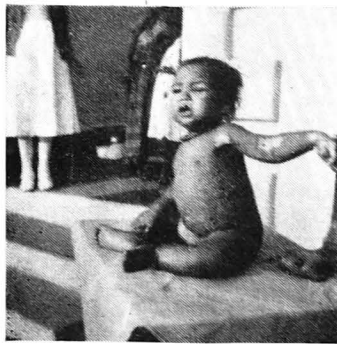
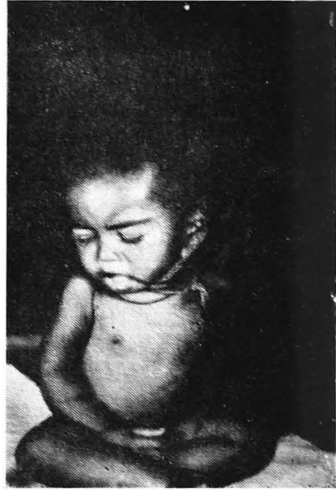
## VITAMINS

Although it is accepted that vitamins are essential



Nutritional Diseases In India

PLATE III



**Malignant Malnutrition**

nutrients and that practically all of them have to be supplied by the diet, there are a few among them which are synthesized by bacteria normally inhabiting the digestive tract of a healthy human being. The composition of the diet profoundly affects the extent of such synthesis. This fact has been demonstrated with a vitamin, riboflavin, which appears to be synthesized to a large extent on low protein and low fat diet rich in carbohydrates.

There are numerous tables, published by authoritative bodies all over the world, prescribing allowances for the daily intake of vitamins. There is a tendency in certain quarters to take these figures as final and to compare the state of nutrition of any population, particularly with respect to the dietary vitamin intake, by comparison with these standards. It must be mentioned that such a procedure is incorrect. Our knowledge with regard to the requirements of vitamins is based as yet on incomplete evidence, and continuous work under different dietary conditions has to be carried out. A recent study at Coonoor on the requirements of vitamin B<sub>1</sub> in Indians has indicated that the level of requirements recommended by the Nutrition Advisory Committee of the Indian Research Fund Association in 1944 for Indian adults appears to be adequate. Similar work with regard to the other vitamins is in progress.

The knowledge about the requirement and the role of vitamins in health can only be obtained by collecting information on their availability from different foodstuffs, their distribution and utilization in, and elimination from the body. Their mode of action is still a well guarded secret of nature. Studies

## NUTRITION RESEARCH

on these problems are extremely important for a final understanding of their role in nutrition. In India such studies are in progress at the Nutrition Research Laboratories, Coonoor, and in more than one institution in Calcutta under Drs. Sankaran, Rajagopal, Guha and Banerji, and in Bombay under Drs. Radhakrishna Rao and Chitre.

## NUTRITIONAL DISORDERS

The wide prevalence of nutritional disorders has provided ample scope for the study of their causation, diagnosis and means of prevention and cure.

The diagnosis of "Burning Feet" depends entirely on an assessment of subjective symptoms. A test has been developed at Coonoor which gives hopes of an objective assessment of the condition for which a cure was also found in the same institution a couple of years ago.

Phrynoderma, an affection of skin resembling toad skin, is a disease commonly met with among poor class children and adolescents in South India. It was considered to be due to vitamin A deficiency. Recent work done at Coonoor, and at Calcutta in the All-India Institute of Hygiene & Public Health, has shown that a deficiency of fat and/or disturbance in fat metabolism are probable causes of this condition.

Chronic malnutrition in parents, particularly mothers, is reflected in their offsprings. Further, the infants after weaning continue to be inadequately fed. Under such circumstances, a fair number of children develop a serious condition which may end in death.

## NUTRITION RESEARCH

Investigators in other countries like South and East Africa and South America have described the condition under the name "Malignant Malnutrition". In India, too, it appears to be on the increase. At Coonoor, a special study is being made to understand the underlying causes and to suggest means of prevention; some interesting results have already been obtained.

During the year under review, the Nutrition Advisory Committee considered the report of the Nutrition Committee of the Food and Agriculture Organisation of the United Nations, held in Baguio, Philppines, in 1948. Some of the recommendations of the Committee were of special importance to India, particularly the one relating to the desirability of ensuring a minimum level of thiamine in rice marketed for consumption. In order to achieve this, the Association considered it desirable to develop a rapid and reliable method of thiamine estimation, which could be used, not merely in laboratory investigations, but also by the milling industry, in improving the process of milling rice. The nutrition workers in India have been requested to initiate researches in this and allied problems according to a co-ordinated plan which the Nutrition Advisory Committee have recommended for adoption.

## DIET SURVEYS

The Association had published some years ago a memorandum containing the results of diet surveys which had been carried out for a number of years



## NUTRITION RESEARCH

under its auspices, as well as by several State Governments. The information contained in the memorandum was not complete, and many surveys carried out in different parts of India had not been included in that report. The Nutrition Advisory Committee is now engaged in bringing this information up-to-date so as to have reliable data on the food habits of people in different States, and to provide a yard stick to measure how the dietary habits of people had shaped themselves in different parts of the country during recent times.

## NUTRITION ASSESSMENT SCHEDULES

One of the main functions of the Nutrition Officers in the States is to conduct nutritional surveys to assist the administration in providing them with data concerning the nutritional states of population groups in their respective areas. In spite of considerable advances which have been made in the science of nutrition in recent years, no single index or set of criteria has been evolved for measuring the state of nutrition of the people with reasonable degree of accuracy. Expressions such as "deficiency states", "mal-nutrition", or "under-nutrition", etc., have been used rather vaguely in scientific literature on the subject. This has necessarily caused a certain amount of confusion in defining precisely what each of these conditions would imply in terms of deviation from normal health. In the absence of such criteria the Nutrition Advisory Committee of the Association have suggested the adoption by nutrition workers of

## PLATE IV



The dots merely indicate the localities (Districts) where surveys have been undertaken. They do not indicate the number of surveys actually carried out. In some places there may have been only one survey and in others twenty or more.

The chart illustrates the fact that dietary habits in several regions of India are still unsurveyed.

### Diet Surveys In India

## NUTRITION RESEARCH

three separate nutrition assessment schedules, the details embodied in which would help to a large extent to secure the information for differentiating and defining these three states:—

- (i) Procedure for a rapid nutritional survey for emergency purposes;
- (ii) Procedure to make routine surveys for a fairly reliable assessment of the nutritional states of the population groups examined; and
- (iii) Procedure for a more intensive type of survey, supported by laboratory investigations, for a full scientific assessment of the nutritional states in any area.

These schedules are now being adopted by nutrition workers throughout the country. There is the obvious need to conduct such surveys regularly, and the information gained would be of utmost value to public health officers, the medical profession, and even the general public, in determining the state of nutrition in the country, and to formulate suitable policies to remedy the defects noticed.

## Clinical Research

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IT can be readily admitted that, "in spite of great wealth of clinical material available in India, very little clinical research of high quality has hitherto been undertaken". Amongst the many factors which have contributed to this state of affairs, lack of leisure to the teaching staff in medical colleges, paucity of funds available for medical research and lack of trained personnel practically in all branches of medical science are, no doubt, the most important. The need for furtherance of medical research in medical colleges has long been recognised by the Association. The Special Committee on medical research appointed by the Governing Body of the Association in 1938, recommended as the first step the institution of research fellowships to be awarded annually to young medical graduates for clinical research. The fellowship programme, however, could not be implemented immediately for various reasons. In 1941, the Governing Body, however, decided to make a beginning in this direction and sanctioned, in the first instance, the award of five research fellowships, each tenable for two years. At their last meeting, the Governing Body have extended this programme to twenty fellowships to be awarded annually, fifteen for medical graduates and five for science graduates, working in several approved research institutes and medical colleges in the country.

Another notable advance was the constitution of the Clinical Research Advisory Committee by the Scientific Advisory Board in 1945. At their first meeting, which was attended by distinguished workers

## CLINICAL RESEARCH

in clinical research in the country, the question of promoting medical research was considered in all its aspects and certain directives were issued for the guidance of workers desiring to obtain grants-in-aid from the Association. The Committee also indicated the several subjects in which researches should be urgently undertaken in India.

The Clinical Research Advisory Committee had also constituted special sub-committees for enunciating research programmes in several important medical and public health fields. A sub-committee on lathyrism was appointed in 1946 to formulate plans for the study of the problem in the Central Provinces and Berar (now Madhya Pradesh). Another sub-committee had drawn out a proforma of work for adoption in investigating such conditions as shock and tetanus. A special committee has been entrusted with the task of co-ordinating research on liver diseases prevalent in the country. The typhus problem in India was reviewed by yet another committee, and recently the Therapeutic Trials sub-committee was constituted to carry out under its auspices clinical trials of several therapeutic remedies introduced in the country.

The budget allotments made by the Association for clinical research during successive years will indicate the progress made in this field. In 1937-38 only 3.5 per cent of its total budget was allotted for research in medical colleges as against 10.0 per cent in 1948-49. The Association had sanctioned during the year under review grants-in-aid totalling Rs. 2,96,740 to twentynine workers, including research fellows, for research in clinical subjects.

In the Medical College, Calcutta, the response of

## CLINICAL RESEARCH

individuals suffering from tuberculosis to graded doses of tuberculin is being investigated under the guidance of Dr. Sen, Physician-in-charge of the Chest Department of the College. The results, when statistically analysed, are likely to prove of some value in the diagnosis and prognosis of pulmonary tuberculosis. Dr. Banerjee, Professor of Clinical Medicine, has initiated studies relating to the variations of gastric secretions in health and disease, under the influence of different drugs and Indian dietaries. This work has an important bearing on the treatment of peptic ulcers, so commonly met with in some parts of India. The study of allergic disorders and the development of immunological methods in the diagnosis and treatment of these conditions has been undertaken by Dr. Ray at the Indian Institute for Medical Research, Calcutta. In the University College of Science & Technology, Calcutta, Dr. Guha is engaged in the preparation of some synthetic compounds, analogous to pteroyl glutamic acid, which might be effective against pernicious anæmia and related anæmias. The subject is important from the point of view of studying the relationship between chemical constitution and physiological activity.

In the Seth G. S. Medical College, Bombay, and its associated hospitals, work is in progress on the study of hookworm anæmia under Dr. Bhende while, in the Madras Medical College, Dr. Achar has initiated studies on chronic diarrhœas of infancy and childhood.

To arrest hæmorrhage in many surgical conditions, hæmostatic agents are usually employed. These are normally obtained from animal sources. Plants have

## CLINICAL RESEARCH

rarely been investigated for the presence of such factors. In the Indian Institute of Science, Bangalore, Dr. Giri is engaged in such work and has isolated a potent substance from castor seeds which has this property. The work of preparing this substance in concentrated form is in progress.

In all these researches, the Association provided the individual workers with research fellows to work under their guidance.

## CIRRHOSIS OF THE LIVER AND ALLIED DISEASES

The patient with one of the many forms of chronic hepatitis may today look forward to a far more favourable life expectancy, comfort and earning capacity than he could a decade ago. While for over fifty years it has been believed that dietary factors might influence the course of liver diseases, the influence of such factors as malaria, dysentery and parasitic infections were considered to be of primary etiologic importance. It is only recently that relation between diet and certain types of hepatic injury has received the attention it deserves. Just over a decade ago, it was discovered that deficient diets could produce lesions in the liver of the experimental animals. Since then considerable attention is being paid to trace the defects in diets which are ultimately responsible for portal cirrhosis in human beings. According to a number of workers, alcohol, which was considered an important etiological agent in Europe and America in producing liver damage, is of comparatively less importance as the cause of the disease in the tropics.

## CLINICAL RESEARCH

The liver cirrhosis sub-committee has now formulated a programme of research on some of these conditions for the guidance of workers in different medical institutions. It is now recognised that cirrhosis of the liver is a preventible disease, if diagnosed in the early stages. With this aim in view, attempts are being made to perfect the diagnostic methods available to the physician. Dr. Wahi, of the Medical College at Agra, has undertaken composite liver function studies in order to provide comparative data on changes observed in different diseases of the liver. The advantage of utilising Partition Chromatography (a technique to detect small amounts of amino-acids excreted in urine) as a diagnostic procedure in liver diseases is being studied by Dr. Wahi at Agra and by Dr. Khanolkar at the Tata Memorial Hospital for Cancer Research in Bombay.

The role of nutritional factors in the production of experimental cirrhosis in laboratory animals is being investigated by Dr. Wahi at Agra, Dr. Radhakrishna Rao at the Haffkine Institute, Bombay, and Dr. Patwardhan at the Nutrition Research Laboratories, Coonoor. Such diets as poor Indian diets, akin to diets taken by cirrhotics in North and South India, a synthetic low protein diet, or a low protein diet with lard or vegetable fat, etc., are utilised in the production of cirrhosis in rats.

There is yet another type of liver disease common in infants and young children which is peculiar to India, viz., infantile billiary cirrhosis. Much work on this subject has been done under the auspices of the Association in the past. Dr. Kutumbiah at the Medical College, Vellore, and Professor Subrahmanyam



## CLINICAL RESEARCH

and Dr. Naidu in the Mysore Medical College are engaged in the study of this condition.

## CANCER RESEARCH

It is generally accepted that one of the striking deficiencies in the country is an organisation for clinical research in different modern hospitals. In other countries such research is a normal activity of the different departments of the teaching hospitals, either with the aid of special funds made available for this purpose by the institutions themselves, or with the assistance of grants-in-aid from public sources.

Many Foundations which seek to promote medical research have stressed the importance of instituting such clinical research units under their auspices. The Association too made a beginning in this direction in 1946, when it established a clinical research unit at the Tata Memorial Hospital, Bombay, under Dr. Khanolkar for a continuous study of the cancer problem. During the year under review this unit has been occupied with a study of the changes which occur in normal cells before they take on a malignant activity. For this purpose elaborate and complicated quantitative chemical investigations have been carried out on the liver tissue before it develops cancer. The results obtained so far are very suggestive and it is necessary to continue this work with a view to detecting the key change (probably enzymatic) which converts a normal cell into a cancerous cell.

Another line of investigation pursued relates to the study of the effects of parasites of Kala-azar and

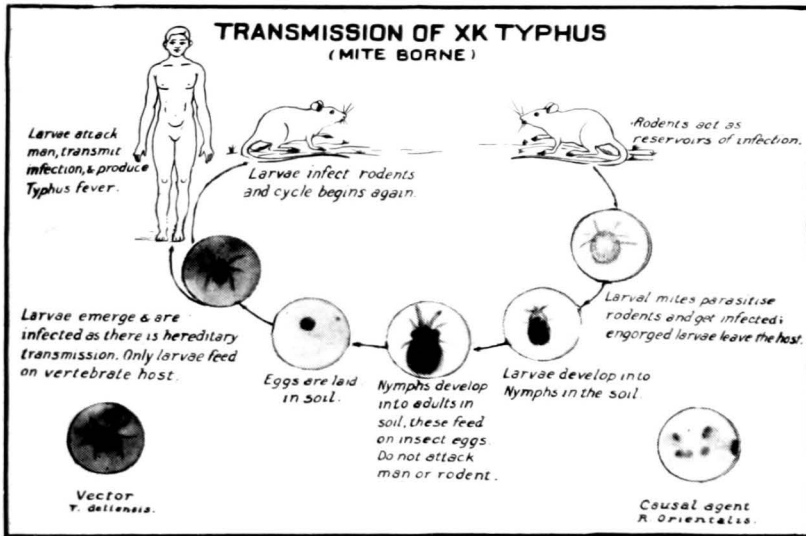
## CLINICAL RESEARCH

Oriental sore on cancer tissue. This is a study similar to that of antibiotics in the case of bacterial infections. It is a complicated technical work and it is too early to forecast its outcome. Two Russian workers have described striking destructive effects on cancer tissues by products of another parasite *Tryp. Cruzi*. This work has not been confirmed in the U.S.A. However, a good deal of systematic work is necessary with a view to exploring the possibilities of the action of parasitic products on tumour cells.

It is an unfortunately common observation that many young women now-a-days show irregularities of menstruation, often accompanied by distressing symptoms. Most of these irregularities are due to disturbed function of the ovaries and it has been difficult so far to detect these cases, where ovarian disturbance is present, by a simple procedure. This year's work has led to a striking improvement in some patients by instituting a line of treatment based on a diagnosis arrived at after examination of vaginal smears. This is an easily applicable technique, and if further work justifies the promise held out already, the method may lead to alleviation of much suffering.

## TYPHUS RESEARCH

The Association had sanctioned an investigation on the typhus problem in Bengal under Dr. Krishnan at the All-India Institute of Hygiene & Public Health, Calcutta. Several aspects of the typhus problem, particularly relating to scrub typhus, were investigated in detail. While the role of mites in the



## CLINICAL RESEARCH

transmission of infection was known, the exact mechanism by which such transmission took place had baffled investigators both in India and abroad. Dr. Krishnan and Dr. Smith, by elaborate and painstaking research, have now elucidated fully this aspect. A successful method for the breeding of trombiculid mites was developed, and the larval mites hatched out in the laboratory, were fed on laboratory infected mice, and through their progeny, infection was successfully transmitted to healthy mice.

On the recommendation of the Typhus Subcommittee, the Association has now made grants to continue further studies on the subject. Attention will now be directed to prepare on a large scale various antigens for the performance of serological tests without which it would not be possible to diagnose the typhus infection correctly and so to determine the extent of prevalence of typhus fevers in the country. The study of the bionomics and life cycle of all species of mites and ticks common in India, which are associated with typhus, will also be undertaken.

## POLIOMYELITIS

In 1949, an increased prevalence of poliomyelitis was noted in many areas, and particularly in Bombay City. In view of the possibility of the disease developing into a serious public health problem in the country, it was considered advisable to initiate researches into several aspects of the disease, with special reference to conditions prevailing in India. Recent researches have brought to light the existence

## CLINICAL RESEARCH

of many viruses which are closely related to the virus of poliomyelitis. These strains differ from each other a great deal. The study of these strains, as they exist in India, is essential, as it would throw much light on the extent to which the virus is present in the community, as well as on many other matters concerning immunity to the disease.

During an epidemic, the virus of poliomyelitis becomes widely distributed in the environment of patients. Since the virus is present in the stools, it can also gain access to water supplies. Transmission of infection by house flies is a definite possibility. The importance of studying the role of these factors in the spread of poliomyelitis will be recognised. Accordingly a research unit has been established at the Grant Medical College, Bombay, to study the several aspects noted above. It was possible to draft the necessary trained staff for the purpose from the Neuropathological Unit which had already been established under the auspices of the Association at the Tata Memorial Hospital, Bombay, and from the Filterable Viruses enquiry at the King Institute, Guindy, Madras.

## EPIDEMIC DROPSY

During the months of November, 1949 to January, 1950, reports were received of an increased prevalence of epidemic dropsy in many States in Northern India, particularly in Uttar Pradesh, Bihar and West Bengal. That the condition is due to adulteration of mustard oil with argemone oil, obtained from the seeds of the

## CLINICAL RESEARCH

plant *Argemone mexicana* has long been established as a result of researches conducted by Dr. Lal in the All-India Institute of Hygiene & Public Health, Calcutta. While the role of argemone oil in the production of epidemic dropsy has been established beyond doubt, it is likely that there are many other factors which might be responsible in its causation. The Scientific Advisory Board at their meeting in November, 1949 decided that the subject should be investigated further and sanctioned sufficient funds to initiate researches into the problem. Attention will now be directed to develop quantitative methods for estimating the argemone oil in mustard oil, methods for the detection of toxic principle of argemone oil (sanguinarine) in tissues, for further studies on its toxic properties, and for its detoxication if present in mustard oil. The whole subject of pathogenesis of epidemic dropsy will be studied in detail, in order to develop a rational and effective line of treatment. These and other matters will be investigated by Dr. Sarkar at the Campbell Medical College and Dr. Chaudhuri and his associates at the School of Tropical Medicine, Calcutta. This research project has just been initiated, but a mention is made in this report in view of its current importance.

# Malaria

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IN 1926, the Indian Research Fund Association had established an organisation, the Malaria Survey of India, to undertake teaching and research in malarology. In 1940, the Government of India established the Malaria Institute of India in Delhi and took over the routine public health duties which the "Survey" was called upon to perform, year after year. The research section of the Institute continued to be financed, however, by the Indian Research Fund Association. Such a division of functions being largely artificial, the Government decided, in 1946, to take over the research section of the Institute also. The Association now supports only special research projects at this Institute, and also gives grants-in-aid for malaria research to other research institutes, as well as to the State Governments in the country.

The research work in progress is mainly devoted towards the evolution of methods for mosquito control and anti-larval methods with the use of insecticides, testing the efficacy of chemotherapeutic compounds in the treatment of malaria, and search for new anti-malarials.

With the discovery of D.D.T. in World War II as an effective insecticide against mosquitoes and many other types of insects, the problem of control, nay even of eradication, of malaria and other insect borne diseases entered a new phase of development. Many other insecticides have also been recently introduced, e.g., gammexane, which has given equally promising results, and search for others is still being continued. It is necessary to evaluate the usefulness of all these

## MALARIA

products under Indian conditions. For, with the many species of anopheline mosquitoes prevalent in the country capable of transmitting malaria infections, with the variations which these species exhibit in their breeding, biting and resting habits, with the differences in the environmental conditions, including housing, in different parts of the country especially in rural areas, the problem of malaria control in India is indeed a complex one. The methods evolved must be both effective and economical.

Colonel Jaswant Singh and his colleagues are engaged in such a study at the Malaria Institute of India. Various concentrates of D.D.T. and gammexane and its preparations, with the use of suitable emulsifiers, are under investigation including methods of application, and their effect tested in selected villages in North and South India. Studies on larvicides, i.e., preparations used to destroy the mosquito larvae in water, were also continued. One important requirement of larvicidal oils is the power to spread well (spreading pressure) when applied to mosquito breeding places. Various oils were tested for their 'spreading pressure', and methods for increasing this power were also investigated. It was found that the addition of 0.1 per cent Triton x 155 or 0.25 per cent Turkey Red Oil (sulphonated Castor Oil) to malarial "B" gave fairly satisfactory results when tested under field conditions.

Dr. R. N. Chaudhuri of the School of Tropical Medicine, Calcutta, is engaged in a study on the evaluation of new antimalarial drugs, such as paludrine, chloroquine and camoquin, in the treatment of malarial infections. Observations were made on



## MALARIA

different regimes of paludrine therapy in order to determine the most economical and convenient method of administering the drug. The results of treatment in different types of malarial infections were also studied. While all the drugs tested were effective in bringing about a clinical cure, chloroquin was found to be quicker in action than others. The experimental work on chemoprophylaxis of malaria in rural areas has given encouraging results.

Dr. P. C. Guha is engaged, with the assistance of a research fellow, in the preparation and study of new synthetic antimalarials, at the Indian Institute of Science, Bangalore. The Malaria Institute of India is co-operating in these studies by providing facilities for the evaluation of such products for their therapeutic activity in experimental animals in the first instance.

# Plague

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THE Association has financed researches in this important subject for many years, and Indian workers have contributed a great deal to our present day knowledge of plague. During the year under review, the work was directed towards the elucidation of the efficacy of new chemotherapeutic compounds in the treatment of plague, towards improvement of techniques for the manufacture of plague vaccines and towards evolving better methods of plague control.

In the Haffkine Institute, Bombay, Major-General Sokhey has continued his efforts in improving the plague vaccine in many directions. The efficacy of casein hydrolysate medium in the production of potent plague vaccine had already been established. The medium has been improved further by treatment with activated charcoal, which serves to remove certain factors which are likely to retard the growth of *B. pestis*. The growth of organisms in the new medium is found to be remarkably constant, thus permitting the manufacture of the vaccine on a large scale and with constant protective power. Studies will be continued to determine the nature of the inhibiting substance and the nutritional requirements of the plague bacillus.

The efficacy of streptomycin in the treatment of plague had been demonstrated as a result of studies carried out in the last two years. During the year two new antibiotics, aureomycin and chloromycetin, were investigated in experimental infections in mice. Aureomycin was found to be as effective as strept-

omycin saving 90 per cent of mice experimentally infected with plague. Chloromycetin was found to be less effective than either streptomycin or aureomycin. The results of clinical trials in human beings are now awaited.

Dr. Francis has continued his studies on the control of plague with D.D.T. In the Nilgris in South India, 90 villages were treated, only once, with D.D.T. and 468 villages were regularly fumigated, once every 3 to 4 months, with cyanogas. While all the villages treated with D.D.T. escaped plague infection, incidence of plague was recorded in 45 villages treated with cyanogas. It was found that residual effect of D.D.T. after a single application lasted for nearly 16 months. The importance of these results can hardly be minimised, and extended observations on this aspect of plague control are in progress.

# Cholera

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WHILE the outlook for the control of malaria and plague has undergone a revolutionary change since the development of potent insecticides and the introduction of new chemotherapeutic compounds for their treatment, that for cholera has remained unchanged, more or less, in spite of extended researches carried out in the subject, in recent years, both in India and abroad. Cholera still remains a major public health problem in India.

In 1948, the Office International d'Hygiene Publique, Paris, and the World Health Organization had constituted a Study Group of experts in this subject, on which a member from India had also served, to take stock of the existing knowledge regarding this disease, and to make specific recommendations for research in those aspects of the problem in which such knowledge was most inadequate. These recommendations related mostly to such aspects as a study of factors governing endemicity of Cholera in any area, precise delimitation of endemic areas in a country, studies on the nature of the cholera vibrio as it is excreted during acute phases of the disease and during convalescence, the influence of sulphonamide treatment on the excretion of cholera vibrios in all stages of the disease, and immunological response in individuals after cholera inoculations, etc.

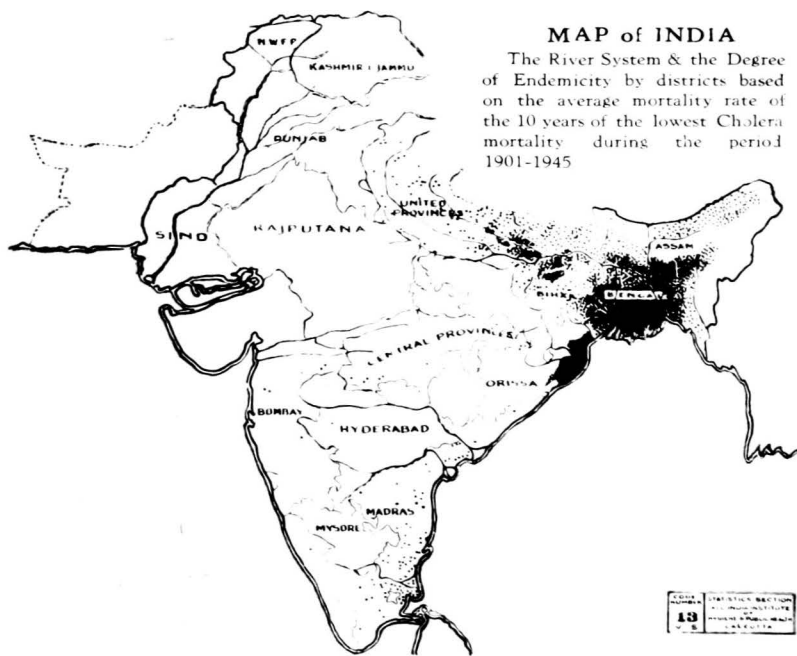
Most of the problems listed above had been investigated, in some measure, by Indian workers through grants-in-aid from the Association. The Cholera Advisory Committee, after due consideration of the report of the Expert Group, recommended that the

## CHOLERA

Association's programme of research in cholera should be re-orientated in the light of previous experience, and results of investigations abroad, particularly in U.S.A. and Egypt, in order to provide definite answers to the questions raised in the report. The Committee also recommended that the work should be apportioned between several workers in different research institutes, and the work co-ordinated by a special committee. The work on these lines has been in progress since April, 1949, and the Scientific Advisory Board has recommended its continuance in 1950-51.

Dr. Satya Swaroop of the All-India Institute of Hygiene & Public Health, Calcutta, has been entrusted with the task of studying the endemicity of cholera in India. The disease does not persist equally throughout the country. Cholera mortality figures for all districts in India for the last 45 years have been collected and certain tracts, which are likely to contain endemic zones, have been demarcated. In each of such zones a detailed study of areas smaller than districts, viz., 'Thanas', is being undertaken. The work will be extended, in due course, to the study of villages singly or group of villages, so that it would be possible to delineate highly endemic zones in the country, and to ascertain their role in the spread of cholera to neighbouring areas.

In studying the factors governing the endemicity of cholera in any area, two questions have to be answered. Where does the infection persist in the inter-epidemic periods? Does the cholera vibrio live quietly in tanks and other waters, only to assume pathogenicity under favourable conditions? Or does it maintain itself in the individual, producing perhaps



**Cholera map of India showing areas of high endemicity**

## CHOLERA

a mild condition, a gastro-intestinal upset, which goes unnoticed? Do such sub-clinical infections constitute a 'link' between two outbreaks of cholera, say in a village? The matter is important, for on a correct understanding of such factors will depend the success or failure of any efforts designed to eradicate cholera from any area. The Association has financed an elaborate research programme in the Cauvery Delta in South India to provide answers to these questions. No doubt, a similar study had been undertaken in the past in an area in Bengal, but the Committee considered it desirable to extend such studies in another area, and in view of further knowledge on the cholera vibrio which is now available.

In the Cauvery Delta, 30 villages with a total population of nearly 60,000 have been chosen for the study. A field laboratory has been established in Trichinopoly town, a convenient site, for day to day examination of samples of stools, collected according to a schedule from residents in the area, and to examine water supplies periodically for the presence of cholera vibrios. The observations will have to be continued for over a year, or even more, depending on the course of cholera epidemics in the area, before a final answer to the questions posed above is found. The unit was organised initially by Dr. Venkatraman, Director of the King Institute, Madras, and is now working under the general supervision of Dr. Subramanyam, Director of Public Health, Madras.

At the All-India Institute of Hygiene & Public Health, Calcutta, Dr. K. V. Krishnan is engaged on (a) a study of agglutinin response to cholera inoculation, in normal and inoculated individuals, and also in

## CHOLERA

persons who have recovered from an attack of cholera, (b) a study of cholera vibrios in natural waters in and around Calcutta, and (c) a study of the mutation of cholera vibrios, and other vibrios, with a view to determine what constitutes a 'cholorigenic' vibrio. These studies are expected to throw further light on the endemicity of cholera, and may lead to the proper selection of strains of vibrios for cholera vaccine manufacture for prophylactic purposes. Some aspects of laboratory diagnosis of cholera are being investigated by Dr. Ghosal at the School of Tropical Medicine, Calcutta. At the Central Research Institute, Kasauli, Colonel Ahuja and his colleagues have initiated studies on the chemical structure of cholera vibrios, and have isolated a polysaccharide fraction which seems to possess a high antigenic value.

In November, 1949, members of the Study Group on cholera had arrived in India to study the cholera situation in the country, and to acquaint themselves with researches at present being carried out under the auspices of the Association. The Cholera Advisory Committee subsequently met the members of the Study Group in a joint session, which was also attended by administrative medical officers and Directors of Public Health of various states in the Indian Union. The discussions were most fruitful in elucidating many aspects of the cholera problem. The Study Group was particularly interested in the programme of research in the Cauvery Delta, since the subject was important from the point of view of international quarantine measures against cholera. At the end of the session, Dr. Gaud, on behalf of the Office International d'Hygiene Publique, Paris, made a handsome



## CHOLERA

contribution of Rs. 40,000 towards meeting part of the expenditure for investigations in the Cauvery Delta.

For the guidance of the International Quarantine authorities, the study group had requested Indian workers to submit a note suggesting a "Standard Technique for the Laboratory Diagnosis of Cholera". The note will be duly considered by the expert committee on International Epidemiology and Quarantine of the World Health Organization.

## Filariasis

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THE Association has financed research in filariasis for many years at the School of Tropical Medicine, Calcutta. Efforts were mainly directed to the study of the geographical distribution of the disease in India, the study of insect vectors capable of transmitting the disease, and in the study of clinical manifestations of the disease in human beings. No satisfactory method of treatment was evolved, and the disease continues to be the cause of much ill-health in the States of Bengal, Orissa, Madras, Uttar Pradesh, Saurashtra, and to a certain extent in Bombay.

In filariasis, as in malaria, man acts as a reservoir of infection, facilitating the ready transmission of infection from one to another, through the agency of the mosquito. Recognising the need for a satisfactory treatment of the disease, by means of which suitable control measures could be introduced, the Association had sanctioned in 1947, a research project aimed at finding out a suitable chemotherapeutic compound for the purpose. The approach was to alter the physical properties of drugs by 'wetting agents'. This investigation is being continued by Dr. Venkatraman in the Institute of Chemical Technology in Bombay, in collaboration with Dr. Dikshit at the B. J. Medical College, Poona.

A new drug, Hetrazan, synthesised by the Lederle Laboratories, U.S.A., is now available for the treatment of filariasis. Oral administration of the drug, in suitable doses, causes the disappearance of microfilariae from the peripheral blood in majority of cases receiving treatment. Utilising this finding, which was also

## FILARIASIS

confirmed by trials undertaken in Madras, the Association has sanctioned an investigation, by the Malaria Institute of India, to ascertain whether mass treatment of population with this drug would prove a suitable measure for filariasis control. The experiment is undertaken in the province of Orissa, and the Orissa Government have agreed to meet half the cost of this investigation, in addition to providing many additional facilities for the purpose. A few villages have been surveyed to determine the extent of filarial infection: In some, mass treatment of affected persons with Hetrazan will be undertaken, while in others orthodox procedures for mosquito control will be adopted. The results are awaited with interest. The requisite amount of the drug has been made available to the unit, free of cost, by the manufacturers.

At certain stages of the disease, the diagnosis of filariasis occasionally presents some difficulties. In the King Institute, Guindy, Dr. Pandit and Dr. Venkatraman had initiated researches to develop an immunological test, using as antigen, an extract of the 'filarid worm' '*conspiculum guindiensis*', a parasite of garden lizards. The results seem to indicate that positive immunological response can be elicited in early cases of filariasis without the presence of microfilariae in blood. After Hetrazan treatment the test was negative in a few cases studied. A limited supply of antigen would now be made available to workers in this field, and particularly to the unit working in Orissa. The Filariasis Advisory Committee have, however, suggested that other research institutes should also conduct surveys, to ascertain the extent of infection in garden lizards with this species of parasite.

## FILARIASIS

to provide for an additional source of material for the production of the antigen on a large scale.

At the School of Tropical Medicine, Calcutta, Dr. Mukherjee has continued the screening tests on compounds submitted by Dr. Venkatraman of the Institute of Chemical Technology, Bombay, and by some foreign firms, to determine their action on microfilariae *in vitro*. The programme of work in this unit has been extended to the study of many other problems connected with the disease.

At the Malaria Institute of India, Dr. Raghavan studied the development of the malaria parasite and filarial infection in the same species of mosquitoes when infected simultaneously. No antagonism was noted between the two, and full development of each was noted according to their respective time schedules.

# Leprosy

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THE Indian Research Fund Association has interested itself in leprosy research for many years. The investigations were necessarily directed towards the clinical study of the disease in all its aspects, the study of its epidemiology by surveys in selected areas and, latterly, towards evaluation of new drugs in the treatment of leprosy.

Till recently the only satisfactory line of treatment of leprosy consisted of the use of the age-long remedy, the hydnocarpus oil, or its preparations. The hydnocarpus treatment has its values, but has marked limitations, as it is not effective in very advanced cases. During recent years the introduction of the sulphone drugs has marked a great advance in the treatment of this disease. This group of drugs includes diaminodiphenyl sulphone and its derivatives, such as promin, diasone, sulphetrone, tibatin, etc. For various reasons the most widely used of them have been diasone and sulphetrone, both given by mouth.

The sulphone treatment has been used in India on a very limited scale, mainly because of the high cost of the drug. The treatment has to be given for long periods before satisfactory clinical response can be seen in persons treated. Accordingly, during the year under review, Dr. Dharmendra at the School of Tropical Medicine, Calcutta and Dr. Cochrane at the Lady Willingdon Leprosy Sanatorium, Chingleput, have engaged themselves in evolving economical methods of treatment with these drugs, suitable for conditions in India, so that the drugs could be made available to a large number of patients in the country. These

## LEPROSY

researches have been directed mainly to making preparations of the drugs suitable for parenteral administration, i.e., by injections. The main object of the treatment is to maintain adequate levels of the drug in blood. This factor cannot be controlled adequately when the drug is given by mouth, since part of it is excreted in fæces and only part of it is absorbed. If constipation or any gastro-intestinal upset supervenes during the course of treatment, the absorption of the drug is interfered with, leading occasionally to high concentration of the drug in the blood and thereby to toxic symptoms. With the parenteral administration of the drug, it is hoped that the blood levels would be maintained adequately and at a constant level. Various vehicles for dissolving the drug have been used in order to find out the most suitable preparation from the aspects mentioned above. In addition to this, both the workers are also investigating the use of diamino-diphenyl sulphone, the parent substance, in small doses. Though this substance is much less expensive than its derivatives, it is much more toxic if higher dosage is employed in the treatment. Small doses of the drug are reported to have given encouraging results in Nigeria.

The results obtained during the year have been most encouraging, and it is now possible to reduce the cost of the treatment considerably. Many extended observations will have to be made, however, before a satisfactory regime of treatment is evolved.

The problem of leprosy has interested many pathologists for the last 100 years. An understanding of the evolution of leprosy is beset with many difficulties, as it has not been possible to transmit the

## LEPROSY

disease to experimental animals, or to grow the disease producing germ in artificial media for any length of time. Many contradictory and sometimes fantastic ideas have prevailed regarding the nature, spread and the resistance to the disease. This uncertainty has also affected the prophylactic measures to be adopted and therapy of leprosy. The work at the Acworth Leper Home in Bombay had shown that about a quarter of the contacts of leprosy patients, on careful examination, show clinical and bacteriological evidence of leprosy. It was still more surprising to find that some perfectly healthy and normal looking contacts harbour bacilli in their skin. A histopathological study of these normal looking contacts containing bacilli, of very early lepromatous macules, and maculo-anæsthetic patches has been undertaken by Dr. Khanolkar at the Tata Memorial Hospital for Cancer Research in Bombay. Already it has thrown some light on the probable mode of infection, spread of micro-organisms in the skin, and the different types of reaction by the human body to the presence of bacilli. The work is in progress and will take many years of intensive study to clarify these problems.

The orthodox approach to the control of leprosy has been hitherto the establishment of special sanatoria for the isolation and treatment of leprosy patients. The method has its disadvantages. There are over a million leprosy cases in India which by some authorities is considered a conservative estimate. If sanatoria are to be established for the isolation of all such patients, a very large number of them will be required for the purpose—a project which hardly seems to be within the financial resources of the country. In view

## LEPROSY

of the discovery of the sulphone remedies, however, the time has now come for re-orientation of policies in the matter of control of leprosy. The Leprosy Advisory Committee considered a note submitted by Dr. Pandit, in which a plea was made for "the treatment of leprosy patients in their own homes as an approach to the problem of control of leprosy in endemic areas." The Leprosy Advisory Committee have accepted in general the principles contained in the note, and have suggested that it should be brought to the notice of several State Governments in the country where leprosy is a major public health problem.

The Committee also recommended that the scheme as suggested in the note should be worked in the first instance in association with the existing and well established leprosy clinics and sanatoria. The Advisory Committee also emphasised the need for the manufacture of some of these drugs in India, at least on a pilot plan basis, for the purpose of securing at a reasonable cost sufficient supplies of the drugs to influence the prevalence of leprosy.



## Research in Indigenous Drugs

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EVER since 1926 the Association has financed research in indigenous drugs, particularly at the School of Tropical Medicine, Calcutta. The Association has continued its interest in this important field of medical research, and has given grants-in-aid to Lt.-Colonel Dr. Ram Nath Chopra for his studies at the Drugs Research Laboratory, Jammu (Kashmir), as well as to Dr. J. C. Gupta for his studies at the School of Tropical Medicine, Calcutta.

Dr. Chopra has initiated studies on the essential oil bearing plants grown in the state with a view to find out those that would contain a high percentage of essential oils, and those which could be improved in this respect. The development of these plants would be useful in supplying the necessary essential oils for perfumery and soaps manufacture in India. In addition many indigenous drugs have been investigated for their reputed therapeutic value. A few of the drugs studied during the year are mentioned :-

### SARCOCOCCA PRUNIFORMIS LINDL. (*Vern.*: 'Sangli')

This drug has been extensively used in Kashmir by local inhabitants as a febrifuge, and in the treatment of rheumatic affections. An alkaloid has been isolated and the hydrochloride of the base has been utilised in the pharmacological experiments.

### *Ajuga bracteosa* Wall. (*Vern.*: 'Jan-i-adam', 'Nilkanthi')

This drug is used by the local inhabitants to kill

lice, and as a blood purifier. A bitter substance has been isolated and its pharmacological action is being studied.

*Ergot* is the first body of a fungus (*claviceps purpurea*) which develops in the ovary of the rye, *Secale cereale* Linn. Samples of ergot growing on different grasses have been analysed, but none of them showed the presence of the specific ergot alkaloid.

*Male-fern*. Male-fern is a well known drug particularly useful against intestinal tapeworms. The extract of male-fern is being imported in considerable quantities from abroad. Different varieties of male-fern growing in Kashmir were analysed. It was found that the extract from local species comes up to the official standard and can form a good substitute for the official drug.

The following drugs were investigated at the School of Tropical Medicine, Calcutta.

*Daemia extensa* Linn (Bengalee : 'Chagalbuti' ; Hindi : 'Utran' ; Sanskrit : 'Falakantak')

In the indigenous system of medicine, this drug is reputed to be a good uterine tonic and sedative, and is recommended for the treatment of gynaecological conditions. This drug has been investigated on scientific lines and an active principle, a glucoside, has been isolated and its mode of action studied. In many respects this active fraction behaves like Ergot and Pituitrin, though it seems to differ from them in its mode of action. It has beneficial action on the atonic condition of the intestine, e.g., paralytic ileus.

Clinical trials with this glucoside are being undertaken in different hospitals, and the results obtained

## RESEARCH IN INDIGENOUS DRUGS

so far seem to show its usefulness in such conditions as menorrhagia (excessive bleeding), metrorrhagia (excessive bleeding with pain), and sub-involution of the uterus. Administered after the third stage of labour, it appears to hasten the process of normal involution. Pharmacological studies on the drug are being continued.

*Cissampelos Pareira*: Linn. (Bengalee and Hindi: 'Nirbisi'; Sanskrit: 'Patha')

The drug is recommended for use in the alleviation of pain. The active constituent of the drug, an alkaloid, has been isolated, which possibly has a cholinergic action, i.e., formation of acetyl cholin in the system which produces a fall in blood pressure. The pharmacology of the alkaloid is under investigation.

*Rauwolfia Serpentina*. (Sanskrit: 'Sarpagnidha'; Hindi: 'Chotachand'; Bengalee: 'Chandra')

This drug is used extensively in the treatment of high blood pressure, and maniacal type of insanity. A method has been devised for the estimation of the total alkaloids of this drug in urine. It appears that there is some relation between urinary excretion of these alkaloids and their hypotensive effect. The several alkaloids will now be separated and a study of excretion of each will be made.

*Vitex Peduncularis*. (Bengalee: 'Goda'; Hindi: 'Nagbail'; Assamese: 'Ahoi')

This drug is being very widely used in the treatment of black water fever in Bengal and Assam, and it appears to exert a beneficial action on this condition.

#### RESEARCH IN INDIGENOUS DRUGS

So far no active principles of the drug have been isolated. The research in progress has indicated a possible method for the purpose. Antihaemolytic properties of the drug have already been studied and a rational explanation for its action has been found.

*Holarrhena anti-dysenterica.* (Bengalee: 'Kurchi':

Hindi: 'Karchi'; Sanskrit: 'Kutaja')

Years ago the efficacy of this drug in the treatment of dysenteric conditions has been demonstrated. During the year further studies had been undertaken in order to determine the variation in the alkaloid content of the plant, with special reference to soil, age, and meteorological conditions.

## Maternity and Child Welfare

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THE wealth of a community depends on the health of its individuals. In the last analysis, attempts to improve the health of the individual should start at the most formative period of his life, i.e., when he is in his mother's womb. In this period, since his needs are to be met through the expectant mother, his health would depend on her health. The mother's health in turn is dependent on what may be termed her "reproductive pattern," i.e., the frequency and the number of children she has. This pattern is influenced considerably by the socio-economic conditions, education and environment, etc., of the women. The basic knowledge with regard to the influence of these various factors is essential for planning the public health services, especially in the field of maternity and child welfare and, incidently, perhaps for controlling the increase in population. Recognising the need for such a study, the Association had financed a research project on the "Reproductive pattern of Bengalee women" under Dr. Chandrasekaran and Dr. Muktha Sen at the All-India Institute of Hygiene and Public Health, Calcutta. The enquiry was completed early in 1949, and the data collected are under statistical scrutiny, but a few facts of interest are recorded here. Four communities, with varying socio-economic and other conditions, were selected and all the women between the ages of 12-50 living in these areas were surveyed. On an average, about 2,100 women were included in each group. One of these areas was rural and three were urban.

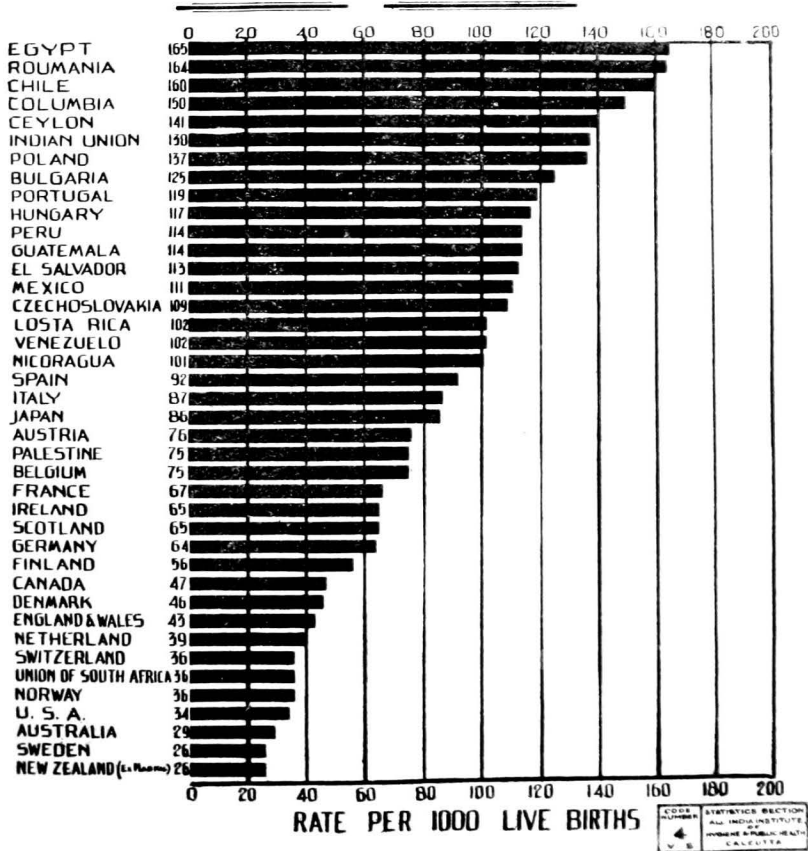
Of the whole group of women between the ages of

12-50 years in the rural area, 9·7% were unmarried and 10·2% were widows at the time of the enquiry. In one of the urban areas, which has a large number of upper middle class community, the number of unmarried women was 32·3% and widowed 5·8%. In the rural area, in the age group 12-14 years, 36·6% were already married, and there were no unmarried women in the age group from 19 onwards. In the urban area in the age group 12-14, only 0·1% were married. It was interesting to note that the average age at marriage, both in the urban and rural areas, has increased within the past 20 years. In the former it has risen from 13·3 to 19·3 years, and in the latter from 10·3 to 13·7 years, showing a definite reduction in the number of child marriages. With regard to education, in the rural field 41·5% of the husbands and 91·6% of the wives were illiterate and in the urban only 0·1% of the husbands and 5·1% of the wives were illiterate. Occupation of the 72·7% of the husbands of rural women was agriculture. Economic condition, judged by per capita income, was less than Rs. 20/- per month in 71·9% of the people in the rural area, while it was only 4·8% in the urban. It was illuminating to note that, though the average age at marriage is higher by nearly 6 years in the urban, the number of terminations of pregnancy in the age group below 19 years, was 0·6% for the rural, and 0·5% for the urban areas, showing that though the rural girl is married earlier, the number of children she has, at the highest teenage, is not much different from her urban sister.

Attempts made for limiting the family by these different groups was the other factor that was considered. In the rural area, only 0·3% were observing

# INFANT MORTALITY RATES IN 40 COUNTRIES (1946)

[RATES ARE THE NUMBER OF DEATHS REPORTED UNDER 1 YEAR OF AGE PER 1000 LIVE BIRTHS]



## MATERNITY AND CHILD WELFARE

some birth control methods in one form or another, while in the urban population it was 34%. Attitude towards the size of the family was 'rational' in 13.2% of the population in the rural area, as compared with 68.6% in the urban area. It was, however, interesting to note that 55.9% of the women in urban areas and 12.4% of the women in rural area were willing to use methods for contraception if facilities could be provided. One cannot help realising that this planning of the family is very much influenced by many factors like education, economic status, etc., which make them more conscious of their responsibility towards their children. It is this feeling of responsibility that makes them adopt some means of limiting the family without any special propaganda for this purpose, or any external influence.

There are, indeed, other factors that have influenced the pattern of reproduction in the areas studied. These will be discussed in the report which will be published shortly.

Along with this picture of the conceptions and deliveries in our communities, it is necessary to know what is happening to those that are born alive. Out of every 1000 children born in our country in a year, only 840 see their first birthday and the rest die during infancy. In Australia, 972 children see this happy day. It is of importance to know the causes of this high death rate in order to plan measures for reducing the number of deaths. The enquiry on the "Vital Losses of Pregnancy and Infancy" which is being conducted under Dr. Mukta Sen and Mr. Mathen at the All-India Institute of Hygiene & Public Health, Calcutta, is expected to give this answer for rural



## MATERNITY AND CHILD WELFARE

Bengal. The enquiry is in progress, and a few facts that can be given at present are of interest. It was found that among the live births only 0·4 per cent of the deliveries needed medical interference. The still-birth rate was 5%. Rural people prefer home delivery, in spite of adequate provision made for institutional care. Prematurity is the most important cause of infant deaths, contributing nearly 44% of the total.

Prematurity plays an important role in the causation of infant deaths both in urban and rural areas. The problem was studied by Dr. Das Gupta in Bombay City by his inquiry into the bearing of premature and immature births on infant mortality. Immature births are those which show under-weight according to an accepted standard of birth-weight, though born after 10 months of pregnancy. In Dr. Das Gupta's enquiry maximum weight for immatures and prematures was 4 lbs. 15 ozs. He also found that 50·5% of under-weight children were born full-term, in spite of the fact that 70% of the expectant mothers had received ante-natal care in some form or other, though late in pregnancy. The health of the mothers was poor, and 50% of them were anæmic.

Anæmia of pregnancy is one of the most important causes of ill-health and death among women during child birth. Hence the Association has encouraged researches on this subject for a considerable period. The enquiry carried by Dr. Dhayagude in Bombay is a recent one. He examined the blood of 96 anæmic pregnant mothers, and also investigated the various factors that might have caused anæmia. Apparently chronic-malaria is not a pre-disposing factor in the causation of anæmia in the city of Bombay. On the

## MATERNITY AND CHILD WELFARE

other hand, hook-worm infection was present in 17% of the women examined, and syphilis in 10%. The diet of the mothers was defective, specially in the total protein consumed. Hypo-proteinæmia was seen in 57 out of the 79 cases studied. Only in 9 cases iron deficiency was suspected as a cause of anæmia.

Maternity and child welfare service is still in its infancy in the country, though recently several provinces have taken an active interest in this branch of public health. In 1948, the Association had published a summary of investigations, conducted under its auspices, into the causes of maternal mortality in India. The Maternity and Child Welfare Advisory Committee of the Association have issued recently a "memorandum on the conduct of an enquiry into infant mortality" for the guidance of several agencies concerned, so that the work on this subject may be co-ordinated in a satisfactory manner, and comparative data for the whole of India are made available.

# Industrial Health

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THE importance of maintaining the health and efficiency of industrial workers in the country has been recognised only recently both by State Governments and the industries. While the industrially advanced countries spend annually large sums of money for industrial health activities, the efforts in India in this direction, so far, have been negligible. In order to focus the attention on this vital problem, the Association had set up in 1945 a special committee, the Industrial Health Advisory Committee, to consider the question in all its aspects, and to formulate schemes of research in the special sphere of industrial health. At its first meeting the Committee adopted a programme of work covering such fields as :—

- (i) the study of diseases peculiar to industry which might be briefly termed occupational diseases ;
- (ii) the study of conditions especially liable to develop in industrial workers ;
- (iii) the study of environmental conditions in mines, factories and other industries, with special reference to light, ventilation, safety factors for workers, etc.,
- (iv) the health of women in industry, and
- (v) maintenance of health and sickness records.

The Committee rightly stressed that the starting point for research in industrial health was to ensure that adequate health and sickness records were maintained in each industry. The study of such records would help the industries and the Governments,

## INDUSTRIAL HEALTH

to assay their health problems, and to institute suitable measures accordingly. The need for maintaining such records on a 'standard basis', which would give comparable data for various industries, was also recognised. The Committee, therefore, formulated in 1946 a standard schedule which could be adopted by several industries in the country. This schedule has been brought to the notice of the concerned Ministries of the Government of India, and the Medical and Public Health Administrations of several States in the Union.

It was felt, however, that industrial health research would not proceed apace if it was left entirely to individual workers. The absence of trained workers in this field was also recognised. To meet this deficiency, the Association set up in 1947 an Industrial Health Research Unit at the All-India Institute of Hygiene & Public Health, Calcutta. To provide for a co-ordinated investigation into this specialised field, provision was made in the unit for the employment of a medical officer, a chemist, a psychologist, a physiologist and also a physicist. It is expected that this unit, like the Industrial Health Research Board of Great Britain, would be a centre of applied research on urgent and day to day problems that face the industries in India.

In the field of occupational diseases, Dr. Rao and his colleagues in the unit have investigated the problem of acute lead poisoning in the printing industry in Bengal. Observations made included both clinical and biochemical examinations of selected workers. The amount of lead floating in the air in these premises was also estimated. These studies have

revealed that, while acute lead poisoning as it is seen in other countries is not so common in India, nearly 40 per cent of the workers were absorbing pathological amounts of lead in their system, indicating the high prevalence of sub-clinical lead poisoning. The work has now been extended to observations in the Paint industry and storage battery factories.

The effects of inhaling toxic dust, fumes and gases in industries are being investigated. Petrographic, chemical and pathological studies are being conducted simultaneously to assess the degree of toxicity of industrial dusts collected from different parts of India. The other activities of the Industrial Health Research Unit related to the investigation of the influence of environmental factors on the health and efficiency of workers. The effects of excess noise on the efficiency of weavers in the jute industry has been studied and preventive measures to be adopted for those who are affected by it have been suggested.

The conditions under which industrial labour works in factories have been criticised as unsatisfactory by many people. However, the actual conditions have not been studied over a long period. They are bound to vary in different industries, in factories of different sizes, and in different sections of the same factory. A fact finding survey of such conditions has been undertaken by Dr. Subrahmanyam, at the All-India Institute of Hygiene and Public Health, Calcutta. Its object is to record the actual conditions of lighting, heat, ventilation, etc., in different sections of factories, week after week, for a whole year, in a few industries in and around Calcutta. It will give a continuous picture and will reveal the weak spots that deserve attention. It

## INDUSTRIAL HEALTH

will provide actual data about a few typical factories in place of the generalisations so often resorted to. The results are awaited with interest.

In Madura, South India, Dr. Adisubrahmaniam is investigating the influence of dust in textile mills in the production of 'Byssinosis'. This condition is essentially the same as chronic bronchitis and asthma. The condition has also been observed in British textile industry. The present enquiry is in the nature of a sample survey to ascertain the extent of the disease in cotton mills in India.

The investigation into sickness absenteeism due to accidents was conducted at the Bata Shoe Factory by Dr. Rao, while Mr. Bose at the University College of Science and Technology, Calcutta, was engaged on the problem of traffic accidents and accident-prone personnel, amongst bus and tram drivers in Calcutta. This enquiry promises to furnish data for evolving suitable tests for screening accident-prone individuals, which could be adopted in case of personnel in other industries also.

Industrial health research is in its infancy in India today. This is mainly due to the paucity of suitably trained workers in this field. The Industrial Health Advisory Committee have rightly stressed that, in view of the industrial expansion now taking place in the country, it was most essential to have adequately trained medical personnel in the field of industrial hygiene, if health standards were to be maintained in the mills, factories and mines in the country. To meet this need, the Committee strongly supported the proposal for instituting a diploma course in industrial health at the All-India Institute of Hygiene and Public

## INDUSTRIAL HEALTH

Health, Calcutta. The role of a doctor in industry is envisaged by Lord Moran as follows:—

\* “He would probably have to begin ..... with the casualties, and find out why they (the workers) failed to adapt themselves to their environment. He might take absenteeism when it is not due to illness, and trace how far boredom, discontent and loss of interest undermined their capacity to work. And when he knew what was at the bottom of this lack of harmony, he would go on to search for the reason why some men find satisfaction in their work where others wait through the long day for the siren to sound the time for their release. He will not find it in wages alone. It may be that the secret of a contented mind is to do a job well. That pride in craftsmanship and happiness are not unconnected ..... If the worker is once healthy in mind and body, then he is content, and contentment leads to efficient production which is at the root of social security.”

The proceedings of the Ninth International Congress on Industrial Medicine, London, 1949, Page 2.

## Assistance to Industries

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**I**N addition to the setting up of an Industrial Health Research Unit in Calcutta, as mentioned before, the Association made a new departure in 1948 in establishing a Therapeutic Trials Committee, to encourage and aid research on medicinal agents, and to promote therapeutics by a thorough investigation of the usefulness and limitations of new drugs, either imported from abroad or manufactured in the country. The Committee have formulated rules and regulations governing the conduct of such trials. These were drafted more or less on the same lines as those adopted by the Medical Research Council in England. In this way it is hoped that facilities will be made available to the industries to have their drugs tested on scientific lines.

At the same time, the Therapeutic Trials Committee recommended the establishment of hæmatological units for the standardization of liver extracts manufactured in India. Nutritional anæmias, anæmias of pregnancy, and other types of anæmias are prevalent in India to a much greater extent than in any other country in the world. The only effective method of treatment of these conditions, so far, is the administration of liver extracts. Till the outbreak of the second World War, liver extracts used in this country were of foreign origin. It is usually mentioned by the manufacturers of these extracts that every single batch of the liver extracts is tested before it is placed on the market. Owing to lack of regular supplies from abroad during the war, the manufacture of liver extracts was started and developed extensively by several firms in India. Till recently, however, no facilities were available to



## ASSISTANCE TO INDUSTRIES

such firms to have their extracts standardized before being put on the market, and hence they suffered in some measure in competition with those of foreign manufacture. The only method of standardisation of liver extracts manufactured in this country is by clinical trials on suitable cases of anæmias.

The Association accepted the recommendation of its Scientific Advisory Board to form special units for the purpose of carrying out of these trials. Two such units have now been set up, one at the Seth G. S. Medical College and the K.E.M. Hospital, Bombay, and the other at the School of Tropical Medicine, Calcutta. The units have started functioning, and already some firms have sent their products for being evaluated before putting them into the market. A small charge is made for this service. Side by side with the testing of such products, the units will also be engaged in the study of blood diseases.

## Microfilm Service Unit

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ONLY a limited number of medical and scientific journals are received in several medical libraries in India, and the library facilities in some of the medical colleges are hardly adequate. Research workers are greatly handicapped for want of facilities to refer to current articles published abroad in their respective fields. Obviously, it is not possible for every medical institution to subscribe to all the journals. In the U.S.A. and U.K. many libraries and science organisations have provided facilities for making copies of printed material from books or periodicals on films, for distribution to research workers. A 100 feet roll of cine-film, that can slip into an ordinary coat pocket, can copy the contents of about 1600 pages of material from books or periodicals. These films can be projected on a compact ground glass screen by a special instrument, the "Reader", and the articles read conveniently.

To assist Indian research workers, the Association has instituted a microfilm service at their Library at the Central Research Institute, Kasauli. Fiftysix institutions in the country are at present taking advantage of this service, for which only a very moderate charge is being made. To serve the needs of the workers and institutes, who are not in a position to take advantage of the microfilm service, the Association has decided to set up a photostat unit at the Central Research Institute, Kasauli, so that photographed copies of articles required may be made available to them.

## Scientific Liaison With Other Departments

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THE Association has not worked in isolation, but has always co-operated with other departments and research organisations of the Government of India on matters of common interest.

The Vanaspati Research Planning Committee of the Technical Panel, Ministry of Food, Government of India, were interested in the nutritive value of hydrogenated oils. The Association agreed to participate in a co-ordinated plan of investigation in this subject, and human metabolism experiments were undertaken in the Association's Nutrition Research Laboratories at Coonoor.

When the Labour Bureau of the Government of India undertook an enquiry into the family budgets of labour in Tea, Coffee and Rubber Plantations in the country, the Nutrition Research Laboratories, Coonoor, co-operated with the Bureau in assessing the state of nutrition of labourers and their families in those plantations, and in evaluating their diets. The Laboratories also collaborated with the Labour Bureau in carrying out a dietary survey of the plantation labour in South India.

At the request of the Ministry of Agriculture, the possibility of undertaking nutritional research on Palm Gur at the Nutrition Research Laboratories, Coonoor, is under consideration. The Association has also submitted a comprehensive scheme for the investigation of lathyrism to the Indian Council of Agricultural Research.

At the suggestion of the Department of Scientific Research, a joint meeting of the Vanaspati Research

#### SCIENTIFIC LIAISON WITH OTHER DEPARTMENTS

Advisory Committee of the Council of Scientific and Industrial Research and the Nutrition Advisory committee of the Association was held to consider the question of colourisation of Vanaspati. A sub-committee was also formed for the purpose of (a) obtaining and collecting information from the available literature on the use of edible oils, and the effect of processing on them, (b) to keep a watch on public opinion with respect to these foodstuffs, and (c) to keep abreast of world developments in all its aspects in respect of hydrogenated fats and oils. These two organisations, interested in medical and industrial research, would take steps to keep the Government of India fully and correctly informed on these and other cognate matters. The sub-committee has been asked recently to suggest steps for the prevention of adulteration of vegetable oils with mineral oils, a matter which seriously affects the health of the people of the country.

The Nutrition Research Laboratories, Coonoor, have agreed to undertake investigation on the injurious effects, if any, of the tobacco seed oil on the human system, at the instance of the Indian Central Oil Seeds Committee.

For the first time, intimate scientific liaison has been established with the medical organisation of the Armed Forces. In modern times civil population may be more affected by enemy action than an organised defence force. It is very important that our scientists and research workers should keep defence also in view, for defence of the country is not the liability of the Armed Forces only. An increasing trend of close collaboration and interest in Defence Science by all

#### SCIENTIFIC LIAISON WITH OTHER DEPARTMENTS

concerned has been a noticeable feature during the last two years. The Armed Forces also made their contribution in the way of training pathologists, neuropathologists, specialists in blood transfusion and resuscitation and other minor matters. When it was considered desirable to establish some stations in India for the bacteriological diagnosis of influenza, and for the isolation of virus strains, the Armed Forces Medical Organisation readily co-operated by establishing one such unit under their auspices. The Indian Research Fund Association has always given expert advice and guidance in planning and prosecution of research in the Armed Forces, and occasionally has loaned to them necessary equipment for the purpose. Many enquiries have been integrated in order to achieve the maximum advantages with minimum of expenditure of energy, e.g., typhus. Individual scientific workers have always been willing to undertake any problem that directly or indirectly concerns defence.

The need for the exchange of information regarding the latest advances in research has always been felt by all research organisations. Accordingly, the Government of India established in 1945 an Indian Medical Research Liaison Committee in London, of which Lieut.-Colonel C. L. Pasricha, Medical Adviser to the High Commissioner for India, is the Secretary. The liaison work done by Colonel Pasricha has been considerable, and the reports of investigations in progress in other countries and on technical developments in the matter of scientific apparatus and equipment received from him from time to time, have been most useful to research workers working under the auspices of the Association.

## I.R.F.A. Workers Abroad

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THE research work carried out by the workers of the Association has received due recognition from authorities sponsoring scientific and medical research both in India and abroad. Several workers of the Association have been awarded fellowships by the Government of India, as well as by other scientific organisations in the U.K. and U.S.A. for higher studies and specialised training for which facilities are not available at present in India. The Division of Research Grants and Fellowships, National Cancer Institute, Bethesda, Maryland, U.S.A., has awarded a post-doctorate fellowship to Dr. V. S. Waravdekar, Assistant Research Officer, Clinical Research Unit Bombay. Drs. A. R. Sundarajan and P. K. Vijayaraghavan, Assistant Research Officers, Nutrition Research Laboratories, Coonoor, have been awarded special fellowships by the Watumull Foundation, Los Angeles, California, and the Institute of International Education, New York, respectively. The Government of India have awarded overseas fellowships to Dr. V. Ramalingaswamy, Assistant Research Officer, Nutrition Research Laboratories, Coonoor, for higher training in Nutrition Pathology at the Wellcome Laboratory of Human Nutrition, Oxford, and to Mr. M. C. Malakar for advanced studies in fermentation at the Pasteur Institute, Paris.

Drs. P. S. Sarma, C. Gopalan, K. L. Shourie, D. D. Banker, S. C. Roy, H. P. Nath and (Miss) P. Devi have returned to India after undergoing specialised training abroad in various fields and have been usefully employed under the Association or elsewhere, where

#### I.R.F.A. WORKERS ABROAD

full advantage is being taken of their specialised training.

In many cases, however, the financial assistance received by workers proceeding abroad has not been adequate, especially in meeting the passage and other expenses. The Association has now made provision for giving some financial assistance to these workers under certain conditions.

## The Year Ahead

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THE Association receives many requests for grants-in-aid, but many of them, though important, have to be turned down, year after year, for want of funds. The situation will be even more critical next year, for owing to an impelling need for economy the Government grant-in-aid to the Association for the year 1950-51 has been reduced by 10 per cent. Yet, the need for research, as well as the need for training research personnel, is growing daily. In similar circumstances in early thirties, the Association had, at least, a substantial capital of its own to fall back upon. The capital fund of the Association this year is almost negligible, and stands at the level of only Rs. 13 lakhs. There are many fields of research, particularly in nutrition, malaria, leprosy and other communicable diseases, which have to be explored before preventive measures can be developed which would be within the economy of the country. Recent happenings on the food front have brought to light many problems in the nutritional field, which will have to be investigated without the least possible delay. The World Health Organisation is actively participating in the country's disease prevention programme in many ways. As the schemes progress, the necessity for undertaking researches in special problems brought out by these efforts will be apparent. To implement these programmes, trained personnel will be required, for, to quote the President of the Rockefeller Foundation, 'You cannot grow orchids in a greenhouse that lacks coal.'

The Association will soon have to consider



#### THE YEAR AHEAD

whether the fellowship programme can be reorientated in a manner which will provide for an increasing number of trained personnel, and young recruits, for medical research. To assist such a development, indeed, it may be necessary to establish research units, on a permanent basis, in some of the existing medical colleges and in connection with their upgraded departments. The under-graduate medical students would then be taught the art and practice of medicine in an atmosphere of research. Such a procedure has already been followed by other countries abroad, notably by the U.K., U.S.A. and South Africa.

The Association enters a new era this year, when it has decided to call itself the 'Indian Council of Medical Research'. The change in name will also, it is hoped, coincide with the extension of its activities in several fields of medical research.

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