LEAGUE OF NATIONS

Health Organisation

INTERGOVERNMENTAL CONFERENCE OF FAR-EASTERN COUNTRIES ON RURAL HYGIENE

REPORT

BY THE

PREPARATORY COMMITTEE

GENEVA, 1937

European Conference on Rural Hygiene

(June 29th-July 7th, 1931.)

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INTERGOVERNMENTAL CONFERENCE OF FAR-EASTERN COUNTRIES ON RURAL HYGIENE

(*Bandoeng* (*Java*), *August 3rd to 13th*, 1937.)

REPORT BY THE PREPARATORY COMMITTEE.

INTRODUCTION.

At the thirteenth session of the Assembly (1932), *the representative of India, supported by the representative of China, expressed the hope that, as soon as funds permitted, the Health Organisation would hold a Rural Hygiene Conference for the Far East, on the lines of that held for Europe in* 1931.

This proposal was repeated by the same Governments at the fifteenth Assembly (1934), *when the desire was expressed that the Conference should meet in the not too distant future.*

As early as 1932, *the Health Committee asked its Bureau to make a preliminary study of the question; the Bureau referred it to the Advisory Council of the Eastern Bureau, which declared in favour of holding such a conference.*

In view of the interest aroused in the East by the prospect of a Rural Hygiene Conference, the Health Committee decided, in October 1935, *that it should meet in* 1937, *and asked its Bureau to undertake the preparatory work.*

For that purpose, a preparatory committee consisting of:

Mr. A. S. HAYNES, *formerly Colonial Secretary of the Federated Malay States*, Chairman;

Professor C. D. DE LANGEN, *formerly Dean of the Faculty of Medicine of Batavia; and*

Dr. E. J. PAMPANA, *of the Health Section of the League of Nations Secretariat, Secretary of the Malaria Commission;*

made a tour, lasting from April to August 1936, *around India, Burma, Siam, Malaya, Indo-China, the Philippines, the Netherlands East Indies and Ceylon.*

In its report, which follows, the Committee has endeavoured to state, on the basis of a mass of facts, observations and experiences, the fundamental terms to which the problem of rural medicine and health can be reduced in the conditions in which it presents itself in the Far East.

Accordingly, this report is not to be looked upon as a descriptive study (which will be provided by the reports of Health Departments on their respective countries), but as presenting the essentials of an analysis, which, in order that it may be well grounded, has in some cases adduced examples.

Before entering upon the main body of its report, the Committee desires to express its extreme gratitude to the Government representatives in the countries which it visited, and to the Directors of medical and public health departments, who spared no pains to lighten its task. Its thanks are also due to the many people who, officially or privately, gave it invaluable assistance.

I. MEDICAL AND PUBLIC HEALTH SERVICES.

A. General Principles.

Administrative Structure.

For historical reasons, the countries of the Far East vary considerably in their political organisation. Some are sovereign States—empires, republics or kingdoms—while others are more or less closely linked with a mother country as dominions, colonies, federated or unfederated States, protectorates or mandated territories. This variety of systems of government naturally influences the structure of the administration, which takes varying forms. The place and rank occupied within that structure by the department in charge of public health largely condition the extent of its autonomy, its chances of co-operating on an equal footing with other departments, its financial status and the rank held by its officials in the administrative scale.

The structure of the State, therefore, is not without importance from the standpoint of medicine and public health. In the East, the question has been dealt with in various ways. Here we find a Health Ministry or a " Ministry of Education, Health, and Agriculture " ; elsewhere, the medical and public health services are attached to some other authority, such as the Ministry of the Interior. Elsewhere, again, no Ministry is concerned, but there is a department under a governor, a prince or a board. It would be idle to attempt to decide which of these arrangements is the most favourable to the harmonious development of curative and preventive medicine ; for, if, having been adopted, they are still maintained, the reason is that, despite their variety, they have been found satisfactory. At the same time, it is a little surprising that, in a field so new in certain respects as the Far East, no uniform solution has prevailed.

Variety likewise reigns lower down in the administrative scale—in the machinery of the medical and public health services.

There are two prevalent systems : the unitary system, under which medicine and public health are combined in a single administrative unit, the whole of whose personnel is, so to speak, bivalent ; and the dual system, under which medicine and public health form two parallel but separate branches.

Before seeking to decide the respective merits of these two systems, it is essential to realise the enormous expansion of the scope of public health during the past twenty years. At the present day, it embraces :

The control of infectious and social diseases ;
Maternal, infant and child welfare ;
Nutritional and housing hygiene ;
Enforcement of sanitary regulations and quarantine ;
Sanitation generally.

The time is not far ahead when this list will be enlarged by the addition of heart and rheumatic diseases, just as the campaign against cancer has for some years past been brought within the scope of social preventive medicine.

So vast a programme seems at first sight to call imperiously for a seperate department which will deal with nothing else.

It is true that, if the medical and public health departments are entirely separate, the latter—given a qualified staff and adequate funds—can carry out a modern public health programme in full. In most Eastern countries, however, these two conditions are not fulfilled, and hence the efficiency of the public health department may be so impaired that its results will become comparable to those obtained in countries where the dual system is not followed.

In the Straits Settlements, the two departments are entirely separate, though under a single head, and are highly efficient. The population is concentrated in a relatively small area, and the Government has ample funds at its disposal. For about one million people there are—apart from the director and the assistant director, who are in charge of both departments—eight health officers and a very large auxiliary staff. For the financial year 1934, the expenditure on the medical and public health services of the territories and municipalities amounted

to $4.35 per head of population. The amount spent on public health alone was $1.57 per head.

On the other hand, the dual system produces quite different results in countries with much smaller budgets than that of the Straits Settlements. In one vast Indian province, for instance, the expenditure on public health for the financial year 1936/37 is less than half an anna per head, which means that the personnel is wholly inadequate.

As a general rule, where the two departments are separate and the budget a small one, the medical side is considerably more highly developed than the public health side. In another great Indian province, which is divided into twenty-one districts, only two districts have a resident health officer, whereas not merely every district but every " thaluka " has its doctor.

When a public health department does not possess sufficient personnel and funds, it is obliged in practice to confine itself to preventive work against the major epidemic diseases. In India, for example, each district has a population of about one million, and contains so many villages that, even if every district had its own health officer, he would have to spend his whole time in touring the villages, in order to visit each of them were it but once a year. Under such conditions, the district health officer obviously cannot hope to get into touch with the people in his charge, and can only concentrate his activities on areas in which epidemics threaten.

In the vast majority of cases, he has only two types of assistant staff—sanitary inspectors and vaccinators. The sanitary inspector can help the health officer to discover and investigate infectious cases ; he can assist him in the health supervision of his district ; but he is not qualified, for example, to do any useful maternal and child welfare work. As for the vaccinator, he is almost wholly untrained, and can do even less.

In countries like Indo-China and Siam, which have adopted the unitary system, public health work is in no sense less successful than in some of the countries where the health department is separate. The medical and public health organisation of Cochin-China, the most representative territory in Indo-China, is such that there is not a single full-time health

officer on the official medical staff.[1] All the doctors in the department are engaged in curative as well as preventive medicine—even the attendants in charge of rural dispensaries. None the less, preventive medicine has not been neglected : in 1935, among a population of 4½ millions, there were over one million vaccinations against smallpox, 771,328 against cholera, and 18,665 against plague. In addition, 31,933 BCG inoculations were carried out, which, shows that the birth registration, maternal welfare and public health authorities are in close touch.

It may be mentioned that, in 1930, a proposal was made to set up two separate departments under a single head in Indo-China. During the past seven years, however, this idea has not merely failed to make headway, but has been entirely abandoned, which seems to indicate that the existing organisation is found quite satisfatory.

Indo-China and the Indian Provinces illustrate the two extremes in the organisation of medical and public health services ; but most of the other countries visited by the Committee have established some intermediate system. In the majority of cases, the two departments are under the same direction, so that unity of policy is secured.

As for the lower grades, the health authorities in Ceylon contemplate choosing as their provincial medical officers men who possess, not only wide medical experience, but also a public health diploma, and have done a certain amount of practical public health work, and these officers will be put in charge of both branches.

In the Philippines, too, there is a single direction for both branches, and they are separate only at the level of the district health officer, whose work in any case is mainly administrative and statistical. Under him are the medical officers who deal directly with the public, and are known as presidents of public health areas, each area consisting of from one to four municipalities. Their work is both curative and preventive.

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[1] It should be mentioned that Cochin-China has advisory public health bodies—a local health board and provincial health commissions.

They treat patients at the dispensaries, but are also allowed to take private patients; and at the same time they are responsible for the supervision of the water-supply and of sewage and refuse disposal, the inspection of foodstuffs, infectious disease control, the school medical service and the supervision of child welfare centres. Here, then, we have a case in which the two services are merged together both at the top and at the bottom—*i.e.*, in the directing staff and in the person of the doctor, who comes into immediate contact with the people.

The system in Java is somewhat like that in the Philippines, except that only public health inspectors and residency medical officers can be said to be specialists in public health. The residency medical officers, who represent the director of the medical and public health department wherever they are stationed, are entitled to inspect hospitals and dispensaries, although their functions do not include curative medicine. The medical officers under them, each of whom is responsible for a small group of municipalities, engage in both preventive and curative work.

Even in countries which have no separate public health department, however, specialisation is generally found in the lowest ranks—vaccinators, mosquito inspectors, members of malaria squads, quinine distributors and sanitary inspectors.

The dangers of over-specialisation should, however, be emphasised. When, for example, the whole personnel of the department has to be mobilised to fight an epidemic, the medical staff ought to be capable of assisting in preventive work. For this reason, the sub-assistant surgeons in charge of rural dispensaries in India receive instructions regarding preventive measures from the Public Health Department when an epidemic breaks out. In some provinces, indeed, there is a tendency, even in ordinary times, to put the rural dispensaries under this Department, the object being to extend their therapeutic field (the public health services being always more mobile than the medical services) and to make them responsible for certain specified public health work. The same is the case in Malaya, so far as travelling dispensaries are concerned.

The conclusion seems to be that both the dual and the unitary system in the organisation and working of medical and public health services may be satisfactory.

The dual system may be the ideal, but in some cases it is an ideal that could not be attained without great difficulty and expense.

It should not be forgotten that there is at present a very marked tendency, especially in Africa, to break down the sometimes fairly watertight partition between the two halves of the medical and public health service ; as witness the following sentence from the report of the Rural Hygiene Committee [1] of the First African Health Conference, held at Cape Town in 1932 under the ægis of the Health Organisation : " The experience of all members of the Committee definitely points to the inadvisability of separating preventive and curative functions in the rural areas of most of the countries under consideration ". It is being realised that such a separation was, after all, somewhat artificial, and under pressure of circumstances—budgetary restrictions and shortage of staff—attemps are being made to simplify the administrative machinery and save money by having polyvalent personnel.

It would be desirable to ascertain whether a like process can be carried out in Asia, where some of the health administrations are traditionally organised according to the dual system.

Free Medical Care.

The fact that the least advanced populations in the East —and the rural population is among them—do not themselves demand medical treatment is an argument in favour of free medical provision. The doctor or attendant, in the hospital or dispensary, sometimes has to argue with the patient to persuade him to submit to free treatment. Imagine what would happen if the patient were asked to make a payment ! There is, however, this argument—against the principle of free treatment—that people rarely appreciate what they can get for nothing.

[1] The Committee comprised delegates of South Africa, Angola, Bechuanaland, the Gold Coast, British India, Kenya and Mozambique.

Clearly the rural population would, as a rule, be unable to meet the full cost of treatment. At most, they might be asked for a token payment. In some countries, however, such as Cambodia, this procedure, which had been adopted, has had to be abandoned.

It would seem that different aspects of the problem might well be dealt with separately. No payment should be demanded for medicines which, although not sought by the natives, improve their health and output—for example, quinine and the remedies used in the treatment of ankylostomiasis.

There appears, on the other hand, to be no reason why the population should not make some payment, however small, for treatment which they themselves demand, recognising its beneficial effects. Cases in point are the medical treatment of yaws, amœbic dysentery, etc. Nevertheless, when a disease assumes epidemic proportions, the question of payment will not even arise.

Curative Medicine as a Vehicle for the Spread of Hygiene.

Any attempt to carry out a public health programme implies a pre-existent medical service.

The first representative of preventive medicine to become known to tropical populations was the vaccinator, whose ministrations, except in the case of epidemics, are not likely to strike the individual's imagination, quite apart from the fact that they imply a coercive element. Then came the sanitary inspector, the anti-mosquito squad and, lastly, the medical officers of health. These, from the population's point of view, do not possess the merit of easing suffering ; whereas they demand something in exchange for benefits which are often too remote to be properly understood. If, then, a friendly attitude towards public health is to be induced in rural districts, it would seem necessary to begin by making provision for medical care, which would enable the population to benefit, by, and to appreciate, the advantages of certain forms of treatment. This is a very simple matter, since diseases such as yaws or ankylostomiasis yield rapidly to medical treatment. It is, indeed, regrettable that certain large-scale treatment

campaigns should not have been turned to account, once the confidence of the public had been won, for the development of public health propaganda, as has been done in the rural districts in several European countries, such as Spain, where anti-malarial dispensaries have often formed the nucleus of health centres.

Administrative Decentralisation.

Increased output, greater elasticity, close contact with the population—these would appear to be the advantages attaching to the decentralisation of the medical and health services.

The point to which decentralisation can be carried will depend upon the administrative structure. It is important, however, to see that the directorate of the medical and health service shall always be in a position to exercise supervision over the peripheral agencies.

Decentralisation will enable public health activities to be adapted to local requirements, of which the central authorities are often ill-informed. It will make it possible also to recruit staff on the spot ; they will therefore be familiar with the language and customs of the population and will be able to enter into contact more readily with their chiefs and with officials of the other departments, if the latter are also working under decentralised arrangements.

Collaboration between Various Departments.

Whatever the type of organisation, the medical and health services must keep in close touch with the civil administration. Such co-operation is even more necessary in Eastern countries than in Europe, since the civil administration in these countries is more complex and has much more numerous and extensive ramifications than any medical and public health organisation ; on these branches, then, devolves the task of getting into touch with the masses. Friendly collaboration on the part of the civil authorities is thus indispensable for any form of public health activity. In the villages, the inhabitants generally follow the advice and example of the headman ; if the latter

is not convinced of the desirability of a certain measure or innovation, it is sometimes better not to include his village in the propaganda programme, rather than to court almost certain failure.

In Java, mass anti-plague inoculation, which was carried out on two millions of individuals in 1935 and which will be carried out on one million inhabitants again this year, would hardly have been possible if the regents and " Wedanas " had not been convinced of the usefulness of this measure and had not summoned all the village headmen and proclaimed to the populations their faith in the prophylactic.

In Indo-China, certain mandarins have also helped to raise public health and social standards by their own personal influence. The district of Handong in Tongking is a striking example.

As will be shown later in this report, [1] it is equally important for the medical and health services to secure the collaboration of other departments : Education, Public Works, Agriculture, Forests and Waterways Service, Veterinary Service.

Reference may be made to the resolutions to this effect—*i.e.*, the interrelation between the various departments of Governments—adopted by the Pan-African Health Conference, which met in November 1935 at Johannesburg, under the auspices of the League of Nations Health Organisation. [2]

Collaboration with Private Organisations.

The solution of certain public health problems requires a specialised organisation so costly to extend throughout a territory that few Eastern countries are in a position to contemplate such a measure.

The most outstanding examples are anti-leprosy and anti-tuberculosis work and, in a different sphere, maternal and child welfare. This is where private initiative can step in. In more than one country, the anti-leprosy campaign is chiefly in the

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[1] See chapter " Rural Reconstruction " page 39.

[2] *Quarterly Bulletin of the Health Organisation*, Pan-African Health Conference. VIII. Rural Hygiene and Medical Services in Africa . . . 2. Resolutions adopted by the Conference, para. 3. 1936 5, 199.

hands of lay and religious voluntary organisations. In others, maternal and child welfare is left entirely to the Red Cross or to charitable committees. When these various forms of private assistance have become very extensive, an arrangement is often made between the institutions concerned and the public health administration ; in return for a grant, these private organisations agree to accept technical and administrative supervision. This is directed towards the judicious use of funds and the prevention of overlapping.

The Punjab may be quoted by way of example ; there, all the maternal welfare centres in the province, now numbering seventy-six, are under the supervision of the Public Health Department, although thirty of them were organised by the Red Cross, ten by municipalities and ten by charitable organisations.

Drawing-up of a Plan of Action.

The plan of action of every public health administration must be carefully thought out, in order that available funds and staff may be made to yield the maximum return obtainable in the circumstances. This observation is not so unnecessary as might appear at first sight. The Commission, indeed, has noticed that this principle has been departed from on a number of occasions. The East often seeks to imitate the West ; and the public health official thinks that he should keep as closely as possible to the models which he has studied in Europe or America, sometimes without realising that the order of priority of public health problems is not invariable and that the degree of importance of each problem can only be assessed by comparison with the others. Imitation untempered by critical judgment should, therefore, be shunned.

B. Training of Doctors and Auxiliary Medical Personnel.

Doctors.

The question whether the training doctors receive to-day will meet the demands of the society of to-morrow is attracting universal attention. Nearly everywhere changes of varying

importance are being introduced in university methods, all of them tending to make the training better adapted to social conditions, which have changed so radically. But we are still at the experimental stage. On the one hand, it is desired to lighten the overloaded curriculum and, on the other, to raise the standard of qualifications. Society is making new demands ; people are no longer satisfied with knowing how to cure an illness, they want advice on how to prevent infectious and parasitic, constitutional or even hereditary diseases. There is a desire to know how to ensure the best possible development of the coming generation.

These and many other problems arise as soon as we approach the question of how to train doctors and their assistants in Asia. Moreover, it should be borne in mind that, of the 1,150 million inhabitants of that continent, some 90% are rural inhabitants and the other 10% still live under conditions which are more comparable to those of the countryside of Europe than to its cities.

The burning question is whether, having regard to the desires of Asiatic society, one or more than one type of doctor should be trained. In other words, should there be only one body of fully trained medical men or should there also be schools for the rapid and hence incomplete training of students ?

The medical treatment of the majority of patients has hitherto been, and continues to be, provided by local village healers according to the age-long practice traditional in rural districts throughout the East. They cannot be regarded as charlatans in the Europeans sense of the word ; in most countries, theirs is a hereditary calling in which the experience acquired by the father is handed down to the son. Such treatment is based, not only on religion and magic, but also on centuries of practical experience.

It has sometimes been asked whether these primitive village healers could be incorporated in the official medical organisation. Usually, however, this solution is beset by too many difficulties, but it would be worth investigating how far such healers might be allowed to attend courses where they would acquire some elementary knowledge, and thus attain a somewhat higher efficiency.

It may, however, be asked whether, on the contrary, treatment by western-trained doctors should not be insisted upon even in the villages. The economic structure of the village in all Eastern countries is extremely rudimentary and provision for treatment by a fully trained doctor is out of the question, at the moment, for financial reasons.

In several countries, attempts have been made to pay doctors settling in villages a minimum salary to which they can add by taking private patients. This system does not, however, appear to have met with much success, for the reason that this minimum salary was not adequately supplemented by their private earnings. (In the Punjab, for instance, out of 359 doctors in charge of the rural dispensaries, only two received grants of this kind. In Annam, this system worked successfully in only four cases.) Moreover, the difficulties of inducing a doctor to settle in a village are not only financial but individual as well. A man whose whole youth has been spent in a town, who has studied at a university or followed the courses of a medical school, will be reluctant to spend the greater part of his life in a village where the houses are built on piles or have mud walls, amidst a population that is so ignorant that it does not even desire his presence.

The question therefore arose whether these economic and social objections could not be met by the training of " semi-qualified " doctors—that is to say, young men who had undergone a short four-year course and would be content to work for lower fees in the village community. It was thought that this kind of doctor would be able to work in much closer contact with the people. This principle has been applied in some countries, most intensively in British India.

In Japan, a beginning was made by setting up a relatively large number of simple medical schools, but these were very soon converted into medical faculties giving a full course. At first sight, it seems very natural and desirable to develop this system of assistant doctors, but the objections and difficulties should be considered.

For this form of training, young people are required who have not had a complete secondary education, otherwise they would expect too much. They should be given a very short

medical course of three or four years at most. First, they should go right through the elementary school, which they will leave at 12 or 13. Then they should enter a secondary school having a simpler curriculum than the present schools. It should not, however, be too elementary, as wide general knowledge is needed to derive benefit from a medical course. This cannot always be given to the future practitioner in his native idiom, and a knowledge of at least one foreign language is accordingly essential.

With such a preliminary education, followed by the simplest possible medical course lasting three or four years, the student would begin, at the age of 18 or 19, to practise—though admittedly as an assistant doctor. It is very improbable that at this age he could shoulder all the responsibilities entailed by the practice of medicine. It would, of course, be possible to postpone the time at which he enters upon his medical duties, by interpolating a few years' practical work. During this period, he might familiarise himself with simple technical, agricultural and veterinary problems, but, in that case, he would subsequently command higher remuneration. The purpose of the whole scheme—*i.e.*, to provide young people with a simple and inexpensive form of medical training—would thus be defeated.

This scheme would produce practitioners having the title of doctor, speaking a foreign language, and having in the course of their medical training become familiar with many technical problems. Is it likely that they would be content to work for a very small fee, and would remain socially in close touch with the population ? This is no mere theoretical consideration, for in British India, where a large number of semi-qualified doctors are trained, experience shows that they do not go to the rural districts, but prefer to practice in the large towns. For the village community, even this type of doctor is too costly, and he does not render the service expected of him.

It is a well-known fact that even a doctor with a European training relapses only too easily into very primitive ways of medical thought and treatment. The Eastern doctor runs the risk of an even more rapid deterioration of his professional

standard and sinking to the level of a " doekoen "—though the moral worth of the latter is greater than that of the European quack. To train a large number of semi-qualified doctors certain to apply the principles of European medical science unsatisfactorily, is to expose the latter to the risk of discredit. In order to create an organisation capable of providing the essential minimum of care and treatment for the sick, requirements must be set somewhat lower and staff must be trained who are not members of the medical profession, but are graded as auxiliary medical staff. These persons would assist in giving medical treatment but would not hold a medical degree nor have any independent medical standing, being organised instead into a body of medical and technical auxiliary staff working under skilled supervision. If efficiently supervised by doctors trained on European lines, such a body could be used in the various countries as the basis of an effective organisation.

What steps should be taken with a view to the rapid organisation of preventive and collective medicine on modern lines ? Preventive medicine plays a much more important part in Asia than in Europe and America. This new branch of our medical science is the one of which the precepts are most readily accepted by the inhabitants, for it does not conflict with the traditional ideas of their medical art. For preventive medicine to come fully into its own, it must not be confined to a few lectures on hygiene and public health, but must, as was advocated by BURNET in his article entitled " Medical Education and the Reform of Medical Studies ",[1] permeate all medical instruction.

Preventive medicine leads to social medicine, which will also require much more attention than it has hitherto received. Whereas, in Europe, the old private and individual medical assistance has gradually been displaced by medical services on collective lines, in Asia, the latter must be aimed at from the outset. It is the only possible system in these countries that

[1] *Quarterly Bulletin of the Health Organisation*, 1933, Vol. II, page 620.

are still poor, and yet hitherto most Eastern universities have practically ignored this problem. What is important is, not that social medicine should be taught as a separate subject in the curriculum, but that it should permeate all clinical instruction. Without the assistance of the clinician, social medicine can never be a live subject.

The establishment of a close connection between clinical work on the one hand and preventive and social medicine on the other will help to do away with the antagonism between medical practitioners and public health services, which is at present fairly common. This antagonism has greatly weakened the doctor's social status, and many Governments have made use of it when they did not wish to follow the advice tendered. A united medical profession is an immensely strong factor socially, but so far little has been achieved in this direction in Asia. The aim of higher medical education should be to improve this state of affairs.

European medical science is everywhere invading Asia, where it encounters what has remained of the old medical lore of Hindu medicine, the Arabian school and the old Chinese institutions, all of them based upon traditional empiricism. The importance of all this should not be underestimated, and official medical science, over-confident of its own infallibility and of the inferiority of this ancient popular medicine, has made the mistake of scorning it. Yet many an old precept can be found which accords with our own views, even though put in a somewhat different form. Thus, frequently we strongly oppose the use of the medicinal herbs and other substances of popular Eastern medicine, forgetting that our own pharmaceutical industry has produced, in addition to sound and valuable medicines, much that it would have been better never to administer to any sufferer.

The study of these ancient medical cultures and of their remaining vestiges would be of value. They should have a place in the training, so that the young doctor may have at least an elementary knowledge of these questions when he begins practising. Such knowledge is essential if he is to adapt himself to his social environment.

Lastly, it would be desirable honestly to consider how far these old medical traditions can be reconciled with our own principles, instead of rejecting them in a body as useless and obsolete. This, too, is a subject on which an exchange of views would be desirable ; it has incidentally been broached already by a Commission appointed by the League Health Committee, and might with advantage be taken up again.

Auxiliary Personnel.

In the training of the auxiliary medical personnel so greatly needed in Asia, the following requirements should be observed :

(1) Their training should be as simple and practical as possible ;

(2) Care should be taken to ensure that this training does not make them lose touch with the people ;

(3) Instruction should, as far as possible, be given in the native idiom ;

(4) Remuneration should be adjusted to the economic conditions prevailing in the country districts ;

(5) They should not take up their practice at too early an age ;

(6) More importance should be attached to character (sense of duty, self-reliance) than to superficial erudition.

So far as possible, the details of the curriculum should be settled on a national, and even a local, basis. Methods of training must be adapted, as far as possible, to the type of country and people concerned.

For the individual treatment of patients, the first step must obviously be the creation of an efficient body of male and female nurses. In nearly every country, a beginning has already been made, and the results are encouraging. The principles of the training provided in all countries agree more than they differ. The closest concordance is reached where the six points enumerated above have been chosen as a working basis.

From this body of male and female nurses, the best should be selected and given a simple supplementary course, concerned essentially with the social diseases and their treatment. The

hospital and dispensary are clearly the appropriate training agencies for this purpose. After taking such a course, this personnel can then be entrusted with the management of ordinary or travelling dispensaries and can attend to patients in their homes, the best of them can take charge of an auxiliary hospital. They must be so distributed over a territory that their work can be supervised by a responsible doctor.

In some countries, nurses, after taking their certificate, follow a midwife's course. Elsewhere, midwives receive entirely separate training. Here, again, it is essential that the six points mentioned above should be observed.

In the whole training, it must be borne in mind that the persons concerned are intended to fit into schemes of medical provision organised on co-operative lines.

What has been said here in regard to personnel in charge of medical treatment applies still more strongly to those who are to devote themselves to preventive medicine. In this body of assistants, sub-division and some specialisation will also be necessary. Sanitary inspectors, laboratory assistants, visiting nurses, dietitians, draughtsmen and statisticians will be required. It will be possible to recruit part of them from the nursing organisation, but some will have to be trained separately from the very beginning.

We have confined ourselves to giving a general outline. The working out of the details is a matter for the Conference, and must be ultimately settled by each country, with due regard to its special circumstances.

C. Curative and Preventive Action.

Hospitals.

The first hospitals were built in Asia a few centuries ago, shortly after the introduction of European medicine in the East. During the last century or so, hospitals of all kinds have sprung up in the towns, but few exist in the country districts. The credit for having first introduced hospital treatment on European lines in country districts is due to the missions. Governments

have sometimes followed, on a smaller scale, the example set by private initiative. Certain undertakings also have opened hospitals for their staff. But the number of hospital beds available for the agricultural population is still very small.

Travellers in Asia are often proudly shown magnificent hospitals, but are as a rule given no information concerning the cost of building or administration, which far exceeds the financial capacity of the population. These hospitals, attached to the universities or founded in memory of prominent persons, occupy a place apart and cannot be taken as models for any general hospital organisation.

In countries where economic development has been slow and where European therapeutic methods are not yet very widespread, the hospitals have to meet only simple requirements. At present, the functions of the hospital in an Eastern country are in many respects quite different from those of a Western hospital. In the absence of any methodical plan of sanitation work, it is of little avail to build numbers of hospitals, whilst unhygienic conditions conducive to the indefinite spread and recurrence of the same diseases continue to prevail elsewhere. The large sums spent on the hospital treatment of the sick are partly wasted until something can be done to improve the environment to which patients are returned on discharge. The logical conclusion is that the building of hospitals must be accompanied by judicious public health measures.

It is impossible, however, to dispense with hospitals if provision is to be made for the treatment of the sick in country districts. For many reasons, chiefly economic, treatment at home is out of the question as an immediate measure, and many years will elapse before this practice can come within the sphere of practical possibilities in Asia.

The dispensary can only deal with mild cases, and persons suffering from serious diseases—the very persons most in need of care—might not be able to obtain treatment of any description. The hospital is thus an essential adjunct of the dispensary. The two institutions should be in close touch with one another.

Now, granting that the hospital is not able to achieve its purpose unless parallel efforts are made in the sphere of

preventive medicine, it remains to consider whether the latter, on its side, has absolute need of the hospital.

Public health measures cannot be expected to produce their full effect unless attention is also given to the treatment of the sick and until both forms of activity develop harmoniously on parallel lines. It is an old-established fact that, if a somewhat primitive population is to be prevailed upon to take advantage of preventive medicine, the first step is to win its confidence. It is however, far more logical that the population should be made to see the connection between treatment and prevention than that it should simply be trained in the principles of hygiene without being given the medical help which is its first requirement.

Many young doctors working in the field of preventive medicine complain of the mortification they feel, when, after lecturing on public health problems, they have to turn away those of their hearers who approach them with tales of their physical ailments.

The propaganda value of hospitals in favour of preventive medicine is still a vexed question. Those who have occasion to be in daily touch with patients and members of their families attribute considerable importance to the hospital in this connection. On the other hand, those who are engaged only in public health work do not place the hospital's propaganda value very high. Probably the truth lies somewhere midway between these two views.

The public health specialist cannot fail to be struck by the danger of his neglecting the imponderabilia that are essential to a full understanding of the social aspects and deeper nature of sickness and health. He would thereby be dissevered from the art of medicine and would lose all contact with it. It is, however, this art rather than the science of medicine that determines the conception of the doctor in the public mind. From time immemorial, the doctor has been held to possess a certain magical power, and it would be wrong to destroy this aura of mystery and to replace it by cold and sharply defined notions. This consideration, which arises in the case of the European, is even more pertinent in that of Asiatic populations, quite apart from the fact that it is abhorrent to our medical

convictions, intimately bound up as they are with our training and vocation to suggest that everything should be done to protect the healthy, while the sick may be utterly disregarded.

How can the hospital best fulfil its double purpose ?

A survey of the various countries reveals in this connection the existence of different systems. In one place, the attention given to preventive medicine is nil ; this is the case in the majority of mission hospitals. In another, a beginning is made with hospital building ; polyclinics are established, the nursing staff is trained and the confidence of the population is won in this way. The doctor then finds that his hospital can be used to promote the work of public health. Conditions are even better when control of the work in this direction is entrusted to a public health specialist, collaborating with the hospital and thus ensuring the perfect " symbiosis " of the two services. This solution has already produced excellent results.

Elsewhere, the policy has been to establish central hospitals with a qualified staff and surround them with a network of smaller hospitals staffed with subordinate medical personnel itself under the direction and close supervision of the doctors attached to the central institution. These auxiliary hospitals can suffice for very simple requirements, while surgical cases and other more serious cases are sent to the central hospital. Maternal and infant welfare services organised on very simple lines can be attached to the auxiliary hospitals. This system, if properly developed, enables adequate provision to be made for the population of a large area. It has the advantage of being inexpensive, since only a small number of qualified medical men is required and most of the work can be done by sick attendants. Wherever an organisation of this kind already exists, its activities can easily be pressed into the service of preventive medicine, since the confidence of the population has been won and contact established. This form of organisation has a further advantage : preventive medicine need not be divorced from curative medicine and useful collaboration between the two is ensured.

Each country will have to determine the details of its hospital organisation according to the means at its disposal. The following principles might usefully be followed : a central

hospital should be established in the most suitable locality, with a highly qualified staff, including, in fact, a number of specialists. This hospital, built on quite simple lines, should, however, be perfectly equipped and fitted up. Then, in the district served by it, a number of dispensaries should be opened, which would deal with routine cases and send on more serious cases to the central hospital. These dispensaries should be in charge of a sick attendant who could always apply to the central hospital for help and advice and whose work would be regularly supervised by a doctor. When this stage has been reached, a small ward could be opened at the dispensary, with from four to six beds to begin with, and finally as many as twenty if required. There, hospital treatment could be provided for patients who cannot be treated by the travelling dispensaries owing to the nature of the illness or the distance at which they live but who are not ill enough to be taken to the central hospital. These dispensaries, with their simple wards, may also form suitable centres for maternal and infant welfare work.

This form of organisation offers many possibilities, since the dispensaries, which keep in touch with the population, can provide the groundwork for a sickness insurance system and for the establishment of a complete medical service on " friendly society " lines. The population will thus have the possibility of contributing towards the cost of the upkeep and staff of the dispensaries, or at all events the cost of treatment, while the community will still be provisionally responsible for preventive work. If funds permitted later, the dispensary might be placed in charge of a doctor and thus extend its activities.

Travelling Dispensaries.

Travelling dispensaries are often used to provide medical treatment in rural districts. This institution, which is very popular with certain administrations but regarded as too costly by others, can undoubtedly render great services if the programme of work is intelligently adapted to local conditions.

Mobile squads of sick attendants under the direction of Indo-Chinese doctors were organised in Tongking in 1920. The number of such squads was increased in 1925 and, instead

of coming under the Public Health Department, they were placed under the authority of the provinces, so as to bring them into direct touch with the provincial authorities. The population is always told beforehand when such a unit is expected.

It may be worth while stressing the great efficiency of these travelling dispensaries in the Malay State of Kelantan, which has only three doctors for a population of 385,000 inhabitants, so that it has been obliged to rely on sick attendants to administer treatment. With a scattered population, the travelling dispensary appeared to be the best means of providing the necessary medical care for the majority of the inhabitants. The Government has two motor-driven dispensaries, one floating dispensary and two dispensaries carried by bearers.

The two motor-driven dispensaries, in charge of very capable hospital assistants, treated 13,700 patients in a single month. During that same month, the five dispensaries treated 20,100 cases in all. This figure, taken as an average, yields an annual total of 241,200 cases treated—*i.e.*, about two-thirds of the total population of the State. A great deal of the popularity of the travelling dispensaries is, of course, due to the excellent results obtained in the treatment of yaws. Reference may also be made to the public health work that is carried out by these dispensaries. In the Straits Settlements, they are financed out of the public health as distinct from the medical service budget. When they arrive at a village, the child welfare visiting nurse brings along any children requiring treatment and the schoolmaster any pupils reported to him by the school doctor.

In this connection, a word may also be said as to the usefulness of the medicine chests with which village authorities, schoolmasters and police posts are provided. Seven thousand of these chests have been distributed in the United Provinces of India, the medicines being prepared from native drugs ; the contribution of Western medicine consists only of a thermometer, quinine, tincture of iodine, a pair of scissors and dressings.

Supply and Supervision of Medicines.

This is a difficult problem in Asia and one to which little attention has hitherto been paid.

European remedies are expensive, far too expensive, indeed, for Eastern populations to be able to purchase them in the near future.

Why are Western drugs so dear ?

In Western countries, the manufacture and sale of medicines is entirely in the hands of large firms, which make considerable profits and spend millions on vast publicity campaigns. These are in the form of advertisements in the important medical periodicals and even of pamphlets on clinical subjects which are sent to students, and which they are apt to accept as impartial documentary material. This form of advertisement has to be paid for in the last resort by the patients and adds to the cost of medical treatment. The simple-minded Oriental will believe in all the promises held out even more readily than the European, but there is the danger that he may be rapidly disillusioned. Some system of collaboration is required between the Asiatic countries to ensure a cheap supply of medicines. A study should also be made of plants and remedies employed in ancient medical lore, to determine how far they can still be utilised. Pharmacological research, the methodical cultivation of medicinal herbs and the systematic study of ancient empirical methods should make it possible to supply the masses with remedies at prices not disproportionate to their means. A number of countries have, during recent years, already made some progress in this direction ; collaboration should be established between all those who are concerned with such questions.

Another question to be gone into is that of sale. In most Eastern countries, a number of pharmaceutical products are sold without any control whatever. Few of these medicines, however, are entirely innocuous. Some of them, in addition to their curative properties, have a more or less manifest and rapid toxic action. The sale of such medicines should be placed under official control ; it may be wondered, indeed, whether it should not become a State monopoly.

Health Centres.

The system of health centres has now emerged from the experimental stage and offers the most up-to-date solution of the problem of public health improvement in rural districts.

The following is the definition of a rural health centre given by the European Conference on Rural Hygiene in 1931 :

" The rural health centre may be defined as an institution for the promotion of the health and welfare of the people in a given area, which seeks to achieve its purpose by grouping under one roof or co-ordinating in some other manner, under the direction of the health officer, all the health work of that area, together with such welfare and relief organisations as may be related to the general public health work.

" In rural districts where such public health work has been organised for some time, it may be difficult to group all health activities under one roof or in the same organisation. Nevertheless, an attempt should be made to *co-ordinate the work of existing agencies* in the most effective way.

" On the other hand, where a modern public health organisation is to be created in new territory,[1] the health centre, as defined above, is the best method of attaining the desired result."

Although forming an integral part of the general health organisation and designed mainly for purposes of social preventive medecine, the centre will nevertheless have to undertake curative treatment in districts in which there are not enough doctors to give the population the necessary attention.

The system of rural health centres, which is a very attractive one for the East, has already been applied there in a number of countries, and this is only the beginning.

In Ceylon, for example, the system of health centres has been introduced in eight out of sixty-three districts, and it is hoped to extend it to the whole of the country. The difficulty lies in the training of staff, since the visiting nurse is the mainspring of the whole organisation. But very few girls in the country districts are sufficiently well educated to be trained in these duties, quite apart from caste prejudices, which are also a factor.

The programmes of the health centres which the Committee visited are all on much the same lines : there is a tendency to

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[1] The term " new territory ", as employed here, implies that an effective *health service* in the modern sense does not exist.

concentrate efforts on a few points in the programme rather than to spread them over the programme as a whole. Thoroughness of method is the principle adopted.

At the Poerwokerto centre (Java), for example, instead of carrying out the whole programme, which is extremely well planned, [1] efforts are concentrated on maternal and child welfare, the education of the population in matters of hygiene, the training of public health visitors (mentris), refuse disposal as an integral part of the campaign against intestinal infections, and, lastly, the campaign against yaws.

The choice of the site for opening a health centre requires careful consideration; the district should be sufficiently representative of the economic and pathological conditions of the country, should already have a medical organisation and should possess certain facilities in respect of means of communication.

Most of the health centres whose organisation is now complete serve an average population of 40,000 inhabitants. The staff consists of a doctor, who is a hygienist, sometimes with an assistant, and a sufficient number of sanitary inspectors, midwives, public health visiting nurses, a clerk and coolies.

In the United Provinces of India, the success of the Partabghar centre induced the Public Health Department to set up other units of this kind; the lack of funds set limits to this development, however.

It was, perhaps, the example of this thorough method of work at the health centres that led the health authorities in a number

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[1] This programme includes the following items :

I. General administration.
II. General survey.
III. Statistics.
IV. Epidemiology and campaign against epidemic and endemic diseases.
V. Education in hygiene.
VI. Measures to prevent the pollution of the soil and of water.
VII. Hygiene of the infant, the child and the mother.
VIII. School hygiene.
IX. Laboratory examinations and tests.
X. Drinking water.
XI. Sewage and refuse disposal.
XII. Housing.
XIII. Hygiene of food.

of countries to concentrate their efforts more especially upon certain portions of their territory.

This tendency is noticeable in Java, where a few districts have been taken specially in hand and possess full-time health officers. In the Madras Presidency, again, efforts are focused upon four districts. Here, the method of procedure is as follows : first, the local authorities have to be persuaded of the value of such an undertaking, in order to ensure their financial co-operation ; then the public health staff is increased, as far as possible, by engaging woman doctors to supervise the midwives and take charge of maternal and child welfare; lastly, more frequent tours of inspection are carried out in these districts by a competent staff.

In Ceylon, in the Negombo district, there are 220,000 inhabitants, upwards of 550 villages and 210 schools. There are only nineteen sanitary inspectors, so that each of them would have to look after some thirty villages. The tendency just noted, to proceed on intensive lines, has brought about the concentration of their activities more particularly on school hygiene—in certain specified schools—and on measures against ankylostomiasis.

Maternal and Child Welfare.

There are very few countries in the East where obstetrical care can be given by a qualified staff throughout the territory. With a birth rate of 35 per 1,000, the midwife could presumably cope satisfactorily with a population of 4,000 to 8,000 ; but a further factor to be taken into account is means of communication between villages. Where there is no qualified staff, the native-trained midwife rules. The mere fact that there is a word in the various Eastern languages to describe these midwives is an indication of their ancient standing and importance (they are known in India as " *dhai* ", in the Malay States as " *bidang* ", in Indo-China as " *ba-mu* " and in the Philippines as " *hilot* "). In Tongking in 1935, 656 " ba-mu " effected 86,158 deliveries at rural maternity homes or in the patient's own home. This figure may be compared with the number of births attended by certificated midwives, which numbered only 20,478 during that same year.

As a general rule, when these uncertificated midwives have followed a course of elementary hygiene, their work appears to be satisfactory. In countries where, for years to come, obstetrical assistance in rural districts will have to be obtained from these women, they should obviously be registered, so as to exclude any who have not followed an elementary course. In several of the Indian provinces, the " dhais " are encouraged to attend courses and demonstrations, by giving them a few annas as an attendance fee and, at the end of the course, giving them a certificate and a midwifery case, often bearing the words " certified dhai ", of which they are very proud. The activities of these women, even when " guaranteed ", must, of course, be supervised by the doctor or a public health visiting nurse, or at all events a trained midwife. Registration will facilitate supervision. The " dhai " often receives for each birth which she has attended and reported to the district authorities a sum almost equal to the fee paid her by the family ; this sum is sometimes paid by the health centre or by the maternal and infant welfare centre.

Considering what rural dwellings are like, it would be well if provision could be made for small maternity homes under the control of midwives or of native-trained women with an elementary knowledge of hygiene. They should be accommodated in the simplest type of building, allowing, however, of proper disinfection, ventilation and cleanliness. Supervision should be in the hands of a competent staff, as is the case in Cochin-China.

The admission of pregnant women to village maternity homes does not seem likely to encounter opposition on the part of the people. In most Far-Eastern countries, parturition is regarded as impure, and anything that has been in contact with the mother is generally burned ; it would thus be in the family's interest to take her to the maternity home.

The midwife in a rural district, whether or not attached to a maternity home, should also be responsible for pre-natal care and infant hygiene if there is no public health visiting nurse to attend to this. She should have received some elementary training for the purpose.

In the Far East, it will be quite an exception for healthy infants to be brought to an infant welfare centre. In the majority of

cases, only sick children will be brought, especially when the centre is first opened ; the mothers will not realise at first that healthy children ought also to be brought. The health officer will thus be obliged to engage in curative medicine also.

The Committee found that mothers who brought their sick children to a welfare centre were sometimes referred to a distant hospital, where it was practically impossible for them to go, while other children who did not seem to require attention were carefully examined and given cod-liver oil, for example, which seemed to them a cruel injustice. It seems desirable, accordingly, in the majority of rural districts, that, when a maternal and infant welfare centre is opened, the staff appointed should be qualified to give treatment as well as to take preventive measures.

School Hygiene.

A child which has reached school age and has escaped the dangers which diseases has strewn in its path during the early years of its life is already, as it were, a " survivor ". More than the newborn infant, it constitutes social capital ; every effort should be made to preserve it in view of its present and future value. It is logical to conclude that a country should, if possible, carry out a complete programme of child welfare, but that, if it has to choose, its efforts should be concentrated on school medicine and hygiene. That is why school-child welfare is of outstanding importance in Eastern countries. But if school hygiene is to produce satisfactory results, the school doctor who inspects the children must be in a position to provide without difficulty for their treatment, or, failing that, to treat them himself.

In Europe, the school doctor need only inform the school authorities, or indirectly the child's parents, of the trouble to be corrected or the disease to be treated, and the visiting nurse will see that everything necessary is done. In the East, it is not possible to count on the parents, and the responsibility for treatment will rest with the school doctor.

The Committee found, however, that school inspection is sometimes limited to an inspection of the premises and the classification of the children according to their physical condition, and the forwarding of a list of those in need of treatment to the

higher authorities, who send it back through the various departmental channels to the dispensary nearest to the school. This long bureaucratic procedure is bound to delay the administration of treatment to all the children who are in need of it.

Schools in rural districts in Eastern countries need not necessarily be built of brick ; it might perhaps be better to adopt the style of the houses in the district, modified to meet the elementary requirements of hygiene. Old pupils would perhaps bear this in mind when the time comes to build their own houses.

In the matter of dental care, reference may be made to the good results obtained in the Philippine Islands by the Junior Red Cross. This association had, in 1935, a membership of 175,215 and an annual subscription income of 255,290 pesos, the subscription for school-children being fixed at 30 cents. 500,000 school-children were attended to, 40% of them receiving a complete course of treatment. The association employs 119 dentists, most of whom are provided with equipment that can be taken from school to school.

Vital Statistics.

In the majority of Eastern countries, registration of causes of death is entrusted to officials who have no medical knowledge ; hence the only reliable details are to be found in hospital records. Information concerning rural areas is clearly not to be had, and the inevitable conclusion is that we do not know what people die of in the villages.

The Committee found, indeed, on several occasions, that health authorities had only the vaguest ideas as to the mortality due to certain diseases, such as malaria, the enteric fevers and dysentery. Surveys and sampling investigations carried out by medical men on the spot would be most useful for ascertaining the part played by these diseases in rural mortality.

The bare registration of births and deaths, even by an untrained staff, can yield trustworthy figures. Unfortunately, they are not always reliable in regard to children dying in infancy, some of whom are recorded neither at birth nor at death.

This lacuna would explain certain infant mortality rates which appear, comparatively speaking, very low, if we remember the conditions in which new-born infants are often brought up. Proof of the caution required in studying vital statistics is afforded by the report of the Public Health Authority of the Madras Presidency. In one district, the birth rate for the last quarter of 1934 amounted to 35.30 per 1,000, and the death rate to 23 per 1,000, whereas in the corresponding quarter of the ensuing year (after the coming into operation of the Health Centre) the rates were 46.49 and 35.69 per 1,000 respectively.

In Burma, a measure has been adopted which, we understand, has contributed greatly to prevent non-notification of births; the birth certificate is given to the parents in the form of an illuminated scroll, which they frame and of which they are very proud.

Health Education.

The problem differs according to whether the education is intended for adults or for children.

It would seem appropriate to begin by inculcating good habits into children, and only to add certain elementary health precepts later. Yet, where the vast majority of children only have two years' elementary schooling, little will remain permanently of what they may have gleaned during this period. Consequently, a large part of the educational influence of the school must perforce ultimately be wasted. Another point to consider is the teacher's ability to deal adequately with health education, which is generally somewhat doubtful, since most of them have only just completed their elementary education themselves; the number of those who have attended a teachers' training college is insignificant.

It goes without saying that, if children can attend school for several years, and the teachers can be given a good grounding in the interpretation of health text-books, success will be assured. In the Philippine Islands, where these conditions obtain, the Committee found health education in schools extremely well organised and giving excellent results.

As for health propaganda among the general public, it is far from easy to estimate the degree of efficacy of the various means

employed, such as broad-sheets and pamphlets, travelling displays, posters, cinema films and broadcasting. Radio propaganda is doubtless destined to flourish greatly. It is already in use among the rural population in certain Indian and Javanese provinces ; talks are given on health, agriculture, stockbreeding, etc. For the present, there can be no question of providing each household with a wireless receiver ; the best available solution is to instal a loudspeaker in a suitable spot, at the expense of the community. Where there is no electric current, storage batteries must be used, the upkeep of which requires skill. But a method still more effective than broadcasting is that of conversation between the villagers and one of their number who enjoys some degree of popularity. This is the method used in Java, where the health " Mantri " sits on the bed with the members of the family round him, explains pictures which he brings with him, and reads a debate that sometimes ends in a kind of examination, in which all the members of the family take part.

Some health authorities have a full-fledged propaganda department ; others arrange for displays with the aid of portable exhibits. " Baby-weeks " have, especially in India, become regular events in village life. Where health centres have been set up, we find, not only an active development of adult education by means of lectures given by doctors, but efforts to educate the teachers themselves, whose value as agents in health education is thereby greatly enhanced. Thus it is found that, in districts possessing health centres, elementary-school teachers eagerly undertake to supervise the hygienic habits of their pupils by questionnaires to be filled in each day, promote emulation in the matter of personal cleanliness, help the children to produce sketches on that theme, induce them to organise scout troops, to join the Junior Red Cross and to assist in cleaning the village.

D. Budgets.

After a careful examination of the question of budgets, the European Conference on Rural Hygiene, 1931, reached the following conclusion :

"In view of the wide variations in health programmes in the different countries and the considerable differences in local conditions, it is not possible at present to recommend a model budget for a rural health district, or to state what should be the *per capita* expenditure for health purposes. It is also impossible to decide on the percentages of the budgets of States, provinces, districts and communes which should be allocated to the health services."

This conclusion is equally applicable to Eastern countries, which differ among themselves in important respects : economic and cultural development, type of civilisation, extension of means of communication, and attitude towards Western medical science. On the last point in particular, differences are gradually disappearing, and in many countries European medicine, curative and preventive alike, is acknowledged and valued. Popular support of health measures is largely a question of education and illustration. The efforts undertaken in this direction must be pursued unremittingly, so that the population may be brought both to a full appreciation of the advantages to be derived, and to a readiness to make personal sacrifices to obtain them. No Government, indeed, can undertake the task of watching over the health of an entire population unless the latter contributes something in its turn. When the notion that health is good business for the individual and for the nation has been thoroughly understood, it becomes easier to secure the funds required to finance the health services, and to win the support of those who are to benefit from such measures.

The official revenue of rural health services is derived in varying proportions from the State, the province, the district and the latter's sub-divisions. In the beginning, as also in the case of poor districts, the State has to supply the larger part of the funds ; nevertheless it is advisable, so far as possible, to preserve the principle of local contributions, which should gradually increase.

In some cases, the Government, or the Power concerned, supplies funds earmarked for special purposes. Thus, the United Kingdom has set up a fund for colonial development amounting approximately to £1,000,000 annually. The fund

is used to provide subsidies or loans to territories under the jurisdiction of the Colonial Office, and it is by this means that the investigations into nutrition and kindred health subjects have been financed.

The reduction of expenditure in times of economic depression has been more detrimental to rural than to urban health services, for the former are already so limited that any financial cut involves the risk of their total disappearance.

At the same time, the health of its rural population ought, generally speaking, to be one of the chief concerns of any Government, and money for the purpose should be made available. It can, in our opinion be truthfully said that this factor has not been sufficiently allowed for in the drawing-up of budgets by Governments. Should the Conference agree with this view, it will have a unique opportunity of urging Governments—with all the weight that its unanimous opinion would carry—to adopt a more generous policy in this respect.

The question of the percentage to be allotted to medical and health services in the total budget deserves to be taken up afresh. For our part, we have found it impossible to extract any absolute figures from published budgets, since expenditure on health services and kindred special activities appears either scattered under several heads, corresponding to the various Government departments, or in provincial and local budgets which are quite separate from that of the central authority. It is equally difficult to distinguish between expenditure relating to rural and to urban districts. The departments concerned are, of course, aware of the precise purpose of each appropriation and of its allocation as between country and town. It would be extremely desirable for the various countries represented at the conference to give information on this subject.

II. RURAL RECONSTRUCTION.

A. General Survey.

There is no more familiar cry in the newspapers of every Far-Eastern country than rural reconstruction. It is also a cardinal point in the policy of Governments and in the activities of voluntary bodies and charitable associations of all kinds.

This is particularly the case in India. The recent Royal Commission on Agriculture in that country reported :

> " If the inertia of centuries is to be overcome, it is essential that all the resources at the disposal of the State should be brought to bear on the problem of rural uplift. What is required is an organised and sustained effort by all those departments whose activities touch the lives and the surroundings of the rural population. "

Later pronouncements by the Viceroy have declared that this is the policy of the Government. It is clear, too, that the policy of the other countries visited by the Commission is actuated by a similar view.

It is perhaps somewhat strange that this concentration of interest in the rural problem should occur simultaneously in all these countries and that it should be so recent and so comparatively sudden. But it is indisputable that a reorientation of governmental policies is taking place and that the needs of the distant and inarticulate peasant are being weighed in the council chambers where hitherto his voice has been little heard.

Rural reconstruction involves the normal activities of many departments of the administration ; but, in addition to them, some administrations have created special offices *ad hoc*, whose main duty is the co-ordination of the work of the departments of Government which are engaged in promoting the welfare of the rural population. A Manual of Rural Development issued in the United Provinces of India defines the activities broadly speaking as three-fold—namely, increase of wealth or resources by enhancing income and reduction of waste ; improvement of health ; and, lastly, promotion of happiness. But no remedy or plan of work however well conceived or well intentioned can effect the desired changes and improvements for the well-being and happiness of the rural population unless there is genuine desire on the part of the people in the rural areas to accept them and voluntarily work for them. No legislation, no efforts can help those who are not determined to help themselves. The problem becomes thus fundamentally psychological. The following quotation from an authority

possessing an intimate knowledge of the rural population expresses this point effectually :

> " It may be affirmed with confidence that the welfare and prosperity of the rural population will not come by technical advances alone. If it is true that better living can be secured only by a combination of better farming and better business, it is equally true that the will to live better must furnish the driving power that is required. At the heart of the problem lies the development of desire for a higher standard of living . . . A vague aspiration now exists, and, I suspect, always has existed, but it is rendered ineffective by an inhibition, which is to be broken up before large-scale progress is possible. In other words, the central problem is now psychological, not technical. "

The funds allotted to the work of rural reconstruction may be either general, as those allotted for the expenditure of standing departments, or special, as, for instance, the allotment in 1935 by the Government of India of ten million rupees to provincial Governments as an addition to their own expenditure voted for this service.

The unselfish labours of non-official agencies [1] are of the greatest value. They supply that diversity of treatment which

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[1] A very interesting experiment in rural reconstruction has been undertaken in China by the Association for Popular Education. The Secretary-General of this body was with Chinese workers in France during the war, and he returned convinced of the necessity of raising the level of education in China as a preliminary to any prospect of real improvement in rural conditions. He accordingly started a campaign of propaganda, and founded societies to promote popular education. He had support from his compatriots as also from foreign foundations, such as the Milbank Fund and the Rockefeller Foundation. His first experiments were made at Ting-Hsien, a district in the province of Hu-Peh, with a population of 400,000. A large number of country schools were organised, in which a simplified alphabet with only 1,300 characters was used. It was soon, however, found that, in order to raise the standard of living in the countryside, it was necessary to do more than create improved educational facilities. Agriculture also had to be improved as well as public health and co-operative organisation. The first steps taken at Ting-Hsien have been considerably developed in recent years, and popular education on these lines has been introduced in other parts of China.

As regards public health, a rural health service has been organised with a health centre in each district, rural centres and health workers in the

is required by diversity of peoples and conditions, and their small units are elastic and capable of rapid adjustments where found necessary in a way which is not possible to a less flexible State organisation functioning over a vast area. It would be invidious for the members of the Commission to select for mention any one of those they saw at work. An exception may, however, be made in the case of that worldwide organisation, the Boy Scouts.

Amongst the means adopted by the different agencies, district rural development associations, village improvement committees and similar bodies have proved a successful method of approach. They embody the principle of enrolling the local people themselves to co-operate in the task of their own improvement. A recent report on the work of a circle of such village committees records surprising progress in six months under the following headings : agricultural improvement, health and sanitation, cultural improvements, propaganda, fruit-growing, well-boring and irrigation, inter-village communications, settlement of village disputes, co-operative marketing.

In the domain of education, the Bureau for Popular Literature at Batavia is a remarkable achievement with an organisation extending over the whole of the Netherlands Indies. Its object is to supply good reading-matter in the native languages to the people over all this large area. It distributes the best popular works of native literature, and translations and adaptations from other Eastern and from European languages, including literary and popular scientific works. It supplies also technical books, such as manuals for masons and carpenters, and others on agriculture and cattle-breeding, and a weekly summary of articles in the native Press. There are two kinds of libraries : first, native, attached to every native school of the second class, and, secondly, Dutch, attached to Dutch-native schools.

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villages. The latter give first aid and vaccination and introduce elementary sanitation. That is the primary stage. In the secondary centres there is a doctor and nurses who deal with infectious diseases. District health centres have a hospital and out-patient service. They exercise general supervision, especially over school hygiene and health propaganda. Experience has shown that, with an expenditure of ten Chinese cents per head of the population per annum, it is possible to organise a service capable of protecting the population against the major infectious diseases and organising propaganda in favour of school hygiene.

Libraries are also attached to soldiers' barracks, native hospitals and other large institutions.

An interesting example of the revival of rural industries was seen in the Province of Hadong in Tongking. The whole countryside seemed to have interested itself in native arts and crafts of all kinds, such as silk work, embroideries, weaving, carving, metal work and the making of lace, tablecloths and walking-sticks. There was much enthusiasm in what they all felt was a great forward movement. Some of their products —*e.g.*, bronze figures—were exported. The population in these parts is all agricultural ; what they earn by their arts and crafts is a considerable addition to the family budgets.

In the Punjab, the Commissioner for Rural Reconstruction, as one of his many activities, has had prepared models of an Indian village. In one set of models the village is shown in unregenerate shape, while in the other set the same village is shown cleaned, replanned, sanitary and attractive. These models are taken round the countryside and demonstrated with appropriate explanations and exhortations.

In many parts, weekly village fairs have proved influential factors for the benefit of the people. The advantages are both economic and social ; the assembled villagers can be instructed in agriculture and encouraged to discuss matters of common concern.

Reafforestation in some regions is a most essential element in improving conditions in the countryside. Erosion carries away the most valuable part of the soil and silts up rivers and other channels of drainage ; rocky bare land diminishes the rainfall, promotes dry scorching winds and alters the climate ; and a whole region is denuded of crops, pasturage, firewood and timber. There is, therefore, in tropical lands the need for a strong and highly qualified Waterways and Forest Department to administer the present and safeguard the future.

The indebtedness of the rural population is a most serious problem in all Eastern countries ; co-operative methods are probably the best means of providing the remedy. The subject is discussed later.

On the subject of rural education, the view is common that it is not well related to the lives of the pupils or to their

environment. Rural education should be so that attendance at school will not only drive the lad on to the land instead of, as at present, off it, but will stimulate him to put things right in his home and village. But no improvements in male education alone will effect the desired improvement in the home. It is, therefore, female education which must be extended. The young girl needs domestic training to fit her for her future duties as wife, mother and keeper of the home. And the staff of teachers to give her this training must themselves have had the right training. One of the great needs is, therefore, the provision of training institutes for female teachers.

Among large sections of the rural population in these lands there is occurring a gradual awakening. With the perception of the possibility of improved conditions of life is growing the desire to attain them. The progress of education is having its effect. Interest is being shown in the improvement of health, in economic problems and in all matters which affect the maintenance of a reasonable standard of living. The dulness of village life is being dissipated by the dawn of rural reconstruction. No longer does all the peasantry live, as in the words of the Malay proverb, like a frog under a coconut-shell, in a tiny world of its own.

B. Co-operative Movement.

British India was one of the first Eastern countries to start co-operation as a Government activity. Historically, the beginning in that country was an exhaustive study of the system made on behalf of the Madras Government (1895-1897). In 1904, the first Co-operative Societies Act was passed, and along these lines the movement progressed until, in 1926/27, there were in British India some 67,000 agricultural primary societies with over two and a quarter million members with a total working capital of nearly 250 million rupees. In 1934, in one Indian province alone (Bengal), there were nearly 25,000 societies with a membership of 824,000 and a working capital of 178 million rupees.

Again the greatest difficulty to be overcome is the apathetic attitude of the pesant himself. A Cochin-China report states :

" The peasants adjust their incomes to their infinitely small needs. The more remunerative their work, the less they do ".

Another difficulty is the provision of an adequate staff of competent officers possessing the special technical training required.

The report of the Royal Commission on Agriculture in India, dated 1928, states :

> " If the rural community is to be contented, happy and prosperous, local Governments must regard the co-operative movement as deserving of all the encouragement which it lies within their powers to give."

As regards the pesant himself, it is necessary to have abundant faith in him. The recent visit of the Commission to Eastern countries convinced them that faith in the peasant is fully justified. Railways, roads, motor transport, broadcasting, the increase of literacy and a progressive reorientation of governmental policies which makes the villager of more account are evidence of changed times and changed outlook. On the subject of economics, it is often easier to find dissent than agreement. But none will disagree with a policy which tries to free the peasant from his burden of debt, procure for him a better product and a better price, quicken him to self-exertion, and, by education and organisation, enable him to stand more firmly on his own feet. Co-operative methods are a potent means towards carrying out this policy.

The societies already formed in the various countries under consideration touch almost every aspect of the economic and social life of the villagers. They embrace such subjects as credit, stores and supply, artisans' work, fishermen, weavers, silk, zamindary, house-building, insurance, anti-malarial measures, public health and sanitation, better living and agricultural credit. There are also a number of banks and unions, belonging to a higher type of co-operative organisation.

Some of the most valuable co-operative societies are those which grant loans to their members for agricultural purposes, helping them in the production and sale of their produce,

and in the purchase of necessities, such as implements, manure and seeds, and also financing them at the season of planting until the harvest time comes round.

There are also societies for irrigation and drainage, co-operative milk unions and co-operative rice mills. Almost every report on the agriculture or the economic condition in the countries under consideration stresses the vital importance of the rice crop. The peasant is being helped by selected seed, better cultural methods, control of pests and diseases, and by irrigation and drainage to obtain a larger crop ; but there are many other problems involved, such as milling, storage, nomenclature and standardisation of the types of rice and degree of polishing, distribution and sale. The peasant borrows when rice is most expensive at planting and repays when rice is cheapest at harvest time.

In the Netherlands Indies, small village banks and " rice banks ", amounting to many thousands in number, help the cultivator towards saving, borrowing and paying interest in kind they strive to counteract the corrupting influence of usury. During the time of scarcity, padi (unhusked rice) is borrowed, sold against a good price, and the borrowed quantity is repaid with cheap padi in the period of abundance after the harvest.

The greatest benefit would be conferred on the peasant if, by some kind of organisation, he were able to do his own milling and sell rice instead of padi. In Siam, Indo-China, the Philippines and Malaya, to mention only four instances, the native of the country grows the crop, but the rice-milling industry is in the hands of middlemen, who, by advancing money at planting time, by superior business ability and in some places by combination, keep down the price of padi paid to the grower and make rice cultivation less profitable than it should be. In Malaya, this had to be corrected in an emergency by the erection of Government rice mills and by the Government guaranteeing in the locality to buy padi at a fixed price higher than that offered by the rice-milling combine. In Bengal, a similar difficulty has been met by co-operative rice mills which broke the monopoly and prevented the dictation of a price which the unorganised growers were forced to accept.

It will undoubtedly be a long step to organise the rice-growers so that they themselves can own rice mills on a co-operative basis ; but the view is put forward that this is the proper and most lasting solution of the difficulty, and that there is no other step in those regions where the difficulty exists which would more effectually benefit the mass of the peasantry and create for them stability in a commodity which supplies their own means of existence and constitutes one of the most important trades of the East.

In connection with the rice problem, we may be permitted to indicate certain anomalies noticed in some of the countries visited by the Commission that could be remedied. The first is the difficulty consumers sometimes have in obtaining unpolished rice, whereas present-day nutritional policy is to bring this into general use. The second is the practice of feeding pupils of Government schools on polished rice, when they are taught in the native schools not to eat rice in this form.

It would also seem that there is some inconsistency in eliminating essential constituents from the staple food of the rural population, by measures which increase its price, and then recommending the addition of the same constituents to the diet.

The organisations responsible for the official supervision of foodstuffs—the principle of which is generally conceded—might do valuable work in this connection, in regard, not only to the supervision of rice, but also to placing on the market the qualities which have been found most appropriate.

These questions, it will be remembered, were raised and discussed at length by the Far-Eastern Association of Tropical Medicine at several of its congresses (Batavia 1921, Singapore 1923, Tokio 1925).

Milk-supply societies and milk unions are particularly valuable. The Calcutta Co-operative Milk Union offers its members the following advantages : an assured sale for their milk at a known price (fixed for six months), correct measures, proper accounts, loans without interest for purchase of cows, free service of stud bulls, veterinary service with periodical inspection of

cows free of charge, welfare work—*e.g.*, financial help towards the education of sons of members and towards the establishment of nineteen primary and secondary schools, provision of a dispensary and of 250 tube wells, and arrangements for lectures on sanitation, anti-malarial and educational work.

Consumers have the substantial benefit of a reliable supply of pasteurised milk at a fair price.

Fragmentation of holdings is another important subject being dealt with on co-operative lines. Natural increase of population with increasing density, distribution of estates of deceased persons and other factors cause sub-division of holdings until the area becomes too small to be economic. In the Punjab, where fragmentation was so excessive that 5 % of the holdings remained useless for agricultural operations and 1 % was absorbed by boundaries, a great work has been accomplished by co-operative methods in consolidating the holdings, more than 600,000 acres having been consolidated up to date. This consolidation, in addition to straightening boundaries and improving holdings from an uneconomic to an economic size, has also made it possible to provide land for schools, recreation grounds, roads and manure-pits, so that by this means model villages spring up out of the previous waste and confusion. Beyond this, there is a direct advantage to the Government in increased land revenue.

Better-living societies are accomplishing much and have immense possibilities. One authority is convinced that they are the best agency for the expansion and enforcement of permanent measures for rural reconstruction.

A frequent cause of rural indebtedness is excessive expenditure on over-elaborate celebration of weddings, funerals and other social customs in general. There seemed no escape from the thraldom of public opinion in this matter ; but better-living societies have carved a way. Social customs are being reformed and unreasonable expenditure reduced.

Co-operation in Malaya is based on Indian methods, an officer of the Civil Service being specially selected to make a study of the system as applied in British India. It would seem obvious from the nature of the task that progress must be slow ; such herculean tasks as the reform of social customs amongst rural

folk, not easily moved in any country and still less so in the unchanging East, and the creation of business aptitude amongst such a people, apathetic, largely illiterate and ruled by immemorial custom, required faith and enthusiasm. Besides the encouragement of thrift and self-help, interest is stimulated in health, because disease causes economic loss, and an unhealthy village is unresponsive to economic propaganda.

Lectures are given in the villages by the health officers and their staff ; the planting of vegetables, fish-rearing and egg-producing are encouraged.

At the weekly village fairs (markets), co-operative societies do savings-bank business ; the peasants, instead of immediately spending the cash received for sale of produce, pay a small sum weekly into the bank, which issues to each one a pass-book in the vernacular language.

Some of the most sucessful societies, already numerous and growing rapidly in numbers, are those for immigrant Indian labourers on the large plantations.

Perhaps the greatest need at the present moment is increased staff properly trained. There is need for more inspectors, inspectresses and audit personnel ; and it is essential that the men and women selected for such vital work should be of the highest quality and ability.

III. SANITATION.

The question of sanitation has purposely been treated briefly. The technical aspects of the question will find their place in the different national reports and in the comments of the Rapporteurs at the Conference.

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Modern hygienic habits are often difficult to inculcate in the East because of customs of long standing. Thus, peasants may be driven by compulsion to construct latrines, to make openings in their dwellings, or to protect their wells ; but, unless they can be convinced that these measures are useful, or at any rate shown evidence that they have been adopted

with satisfactory results by their neighbours, the latrines they have constructed will frequently remain unused, the openings will be blocked up, and, despite the fact that a hygienic well it available, water will continue to be drawn from the river. Consequently, statistics of sanitary improvements should be interpreted cautiously.

The work of persuasion, which postulates for its success close contact with the population, can advantageously be left to health centres.

A. Housing.

Of the very varied types of rural houses in the East there is none which would entirely satisfy the hygienist ; at the same time, some of these designs, while suited to the climate and the nature and customs of certain peoples, leave very little to be desired, and could even be made quite satisfactory if a few changes were introduced.

Where this is not the case, it is no doubt not always possible to do away with the existing type of dwelling. But the example of Java shows that, under pressure of circumstances, it is practicable to reconstruct the villages of a whole area almost entirely. The successful achievement of this remarkable piece of work is due to close collaboration between the civil administration, the public health authorities and the population, the last-named providing the labour and financing a great part of the expenditure incurred.

The case of Java, however, must be regarded as exceptional. Elsewhere, all that can be done is to remedy defects in the existing buildings. In dwellings made of cob or dried mud, air and light must be allowed to penetrate ; a flue must be built in and steps must be taken to deal with damp or dust, as the case may be. Buildings in bamboo should be made rat-proof either by plugging the ends of the reeds or by the use of split bamboo. In other cases, stabling must be contrived for the domestic animals ; in others, the construction of grain-stores at a distance from the dwelling will be necessary. These improvements can be carried out by the people themselves. On the other hand, where rebuilding on a large scale has to be undertaken, the assistance of the Public Works Department

will be necessary in order to provide the population with standardised frames, requiring no technical skill to assemble, and produced at the lowest possible cost price.

It would appear obvious that the architects and engineers should work in close conjunction with the health specialists and consult the latter as to the desirability of the work they propose and as to possible effects on public health. Such essential co-operation is not, however, secured in all cases. It is but necessary to instance the case of irrigation works, which produced numberless mosquito-breeding sites. Another case which came under our observation may serve to strengthen the argument. The schools in a certain tropical area were housed in buildings of the local type, well lit, clean, ventilated and, above all, economical. The Public Works Department, having decided to replace them by masonry buildings, erected structures ten times as expensive, where the light was dazzling and the temperature high, while the sanitary installations were done cheaply, and the wells were not even sanitary.

The problem of housing and village improvements in the East is not insoluble. A visit to the Punjab, or to Java, will convince the most sceptical.

Much will depend in this connection on the influence of example. The Health Organisation, with the support of the French Government, has organised an exhibition of rural housing in Europe for the Paris Exhibition in 1937. Similar action has been taken in the East, and a rural housing exhibition will be opened at Bandoeng at the same time as the Conference. It may be hoped that a large number of health administrations will be prepared to show models of the rural houses, and plans for village improvements which they advocate.

B. Drinking-water Supply.

Orientals take their drinking water from wells and rivers. Except in certain villages in Siam, rainwater is not collected.

Efforts have been made to improve the wells and fit them with curbs and platforms ; but that is only a half-solution of the problem, so long as users of the well draw the water in buckets of dubious cleanliness. The real solution would be to

put a cover on the well and fit it with a pump. But the purchase of a pump involves expenditure which the peasant will often not be able—or prepared—to afford, not being convinced of the need for pure water.

The educative influence of the health centre should overcome the opposition of ignorant house-owners, while village co-operatives can provide facilities for the purchase of the pump.

The number of rural communities which have a drinking-water supply system is still very small. The Commission had an opportunity, however, of seeing some interesting plants of this kind in Cochin-China.

Water from rivers or irrigation canals is first treated with lime and sulphate of alumina in the inlet pipe ; it then passes through a circulatory system, in which it deposits a large part of the flocculate, and finally it goes through a gravel filter, in the outlet pipe from which it is treated with chlorine (0.5 to 0.7 mgrm. of chlorine per litre). The Kailai waterworks, which serve a village of two thousand inhabitants, have a discharge of 10 cubic metres per hour. The cost of the entire plant, including the piping system in the village, was 10,000 piastres ; the cost of supplying the water is 3 to 4 cents per cubic metre, but the charge made is double this amount. Only one workman is employed to look after the works, and another to supervise the distribution system. The cost of upkeep is 1,000 piastres per annum. There are now five works of this type in Cochin-China.

In Siam, the inhabitants of the banks of the Menam only drink the river water after a rough process of coagulation with alum.

C. Disposal of Excreta and Domestic Garbage.

Latrines.

In the East, except among peoples who use human excreta as manure, the latrines used by the villagers (where the latter do not use the fields for the purpose) are generally very shallow pits or small platforms projecting from the banks of streams. Such latrines should, needless to say, be condemned.

It being the duty of all health administrations to induce the peasants by educative measures to construct—and, above all, to use—sanitary latrines, it is similarly for these authorities to decide which types are most suitable and cheapest.

The pail system, which can only be used in fairly large centres, and septic tanks, which are much too expensive, can be rejected forthwith. Of the other devices, there are two in fairly common use. The first is that of rectangular pits of the Antipolo [1] type, which have no watertight revetment and are not more than 2 metres deep. The danger of pollution of the subsoil water with this type would not appear to be very great, since, according to experiments made by KLIGLER in 1921, the vertical infiltration from latrines does not exceed a depth of from 1-1½ metres, while horizontal infiltration is negligible. This is only true in soils of low porosity, for the infiltrations in sand, chalk or marl could be far more extensive.

The second type is the bored hole latrine with a deep hole (3-6 metres), well known to all hygienists, thanks to the efforts made by the Rockefeller Foundation to generalise its use. This type has a certain number of advantages, such as long life, absence of smell and of flies and the possibility in consequence of sinking the hole in the immediate vicinity of dwellings.

Though a few hygienists still remain unconvinced that there is no danger of pollution of the subsoil water, or at least are sceptical on this point, the general opinion is that there is no danger if the bored hole latrines are distant at least 30 metres from a well, unless, indeed, there should be fissures in the ground. According to an experiment carried out at Singapore in 1929, wells within 21 metres of the latrines reaching down to the same subsoil water were infected by *B. coli*, whereas those 32 metres away were not. In determining the direction and speed of the subsoil flow, fluorescein is useful. YEAGER goes to the length of assuming that a well, even if downstream, cannot be contaminated if it is 10.5 metres from the latrine, provided the subsoil water flow does not exceed 1.2 metre per day.

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[1] Antipolo is the name of a small town in the Philippines, where these latrines are in current use.

Latrines of the above two types can be constructed by the villagers themselves. The implements required for digging the holes should be lent to them by the local authorities or by the health centres, bamboos being used for the lining. Where white ant is to be feared, sheet metal from old petrol tins can be used instead of bamboo.

There only remains the concrete platform which must be purchased by the peasant. Models have been worked out after much thought and are now produced on a large scale at a low price.

Manure and Household Refuse.

While certain Eastern peoples use manure as a fertiliser, others burn it as fuel. In either case, the manure is stacked in the immediate vicinity of the house, whereas it should be dumped, with the household refuse, in a pit some distance away from the house and the well. The health authorities and rural reconstruction officers should explain to the inhabitants how important this is.

The problem of manure presents not only a health aspect but also an economic aspect, which is of even greater importance. In countries such as India, where the soil has become impoverished for lack of sufficient nitrogenous fertiliser, stable manure should be spread on the fields instead of being used as fuel. If this is to be done, however, the peasant must be able to buy fuel at a price he can afford. To that end, it might be possible, with the necessary adjustments to suit local conditions, to follow the example of East Africa, where active propaganda is carried on in favour of reafforestation with the *Acacia decurrens* (wattle), a very fast growing tree native to Australia, which supplies, not only firewood and building timber, but also a bark rich in tannin.

In the villages, the use of incinerators for the destruction of household refuse is already general and should be encouraged ; in larger communities where the use of pails is practicable it might be more economical to treat excreta and household refuse together by the " compost " method.

D. Fly Control.

In view of the diversity of the climatic and zoogeographical zones in which the Far-Eastern countries are situated, the fly problem is much more complicated there than in Europe. The problem is that of flies in general rather than of the house-fly only, for conditions are such that even flies which do not usually enter houses may act as vectors in the East, where people take their meals out of doors and food is prepared outside the house for consumption inside.

The habits of Oriental flies may differ appreciably from those of European flies—for instance, in many parts of the East, manure-heaps are not necessary for the hatching of flies, whose chief breeding-place is in the isolated excreta of various animals.

At a meeting of entomologists held in London in 1935 under the auspices of the Health Organisation of the League of Nations, for the purpose of discussing a plan of experimental research to ascertain what part is played by the house-fly in the epidemiology of diseases of the intestinal tract, this difference in the aspect of the fly question in Europe and in the East was emphasised and earmarked for attention by the Bandoeng Conference. A programme of researches appropriate for the East was then drawn up by Professor B. A. R. Gater, of Singapore, and communicated to certain entomologists of Asia, who agreed in principle to undertake this research.

IV. NUTRITION.[1]

Investigations into the state of health of the peoples of the East, no matter what their starting-point, lead back invariably to the question of nutrition. Dietetics is a branch of science which has a variety of aspects in Asia ; there, even more than elsewhere, dietetic research requires the close co-operation of chemists, physicists, agronomists, physicians, veterinary surgeons and

[1] This chapter was written by Professor de Langen.

economists. It is therefore to be hoped that this necessary contact will be established as a result of the Conference.

The prevailing opinion is that the state of nutrition of the populations of rural districts is not wholly satisfactory in any of the Asiatic countries. It is thought that, of the 1,150,000,000 inhabitants of that continent, not less than 75 % have a diet below the standards fixed by European science. From various publications, and from the information that the Committee collected during its tour, it appears that a large part of the population is living on the border-line of the minimum requirements, while millions are even below that level.

These statements should, however, be accepted with some caution, because an examination of the studies so far made in Asia shows that few accurate statistics are available.

Whereas in other continents there has been on occasion over-production of food at different times and places, so that production has been restricted and food even destroyed, this has never occurred in Asia. Everything produced is always quickly consumed, and, so far from there being a limitation of crops, the dominant question everywhere is how to increase them. An exception may be made as regards a few articles intended for the world market, such as sugar and copra.

The food problem in the East is almost exclusively a rural problem, since more than 90 % of the population live outside the towns. Only the main lines of the question can be discussed here, and we shall confine ourselves to four subjects which, in the Committee's opinion, should be considered at the forthcoming Conference. They are : the composition of the diet ; the chemical constitution and biological value of the different foodstuffs ; diseases of alimentary origin, and proportion of the family budget spent on food.

A. Composition of the Diet.

It would be of the greatest value to collect exact data regarding the composition of the daily fare of the population in all the countries of Asia. Hitherto, we have been too easily satisfied with an indication of the principal articles of food, and the subsidiary items in the diet have been given very scanty

attention. For example, the daily food of groups of the population that are popularly supposed to live almost exclusively on rice and fish is generally far more varied than that. This point has already been investigated on a small scale—*e.g.*, in the Netherlands Indies in 1934.

Enquiries of this kind may with advantage be conducted by health centres as the necessary contact with the population has already been made. It should, of course, be borne in mind that, if a health centre has been working for some years, its area will cease to reflect the real position accurately, as considerable changes may have taken place through the influence of health propaganda. But such an investigation would be of great importance for the purpose of comparison between the areas served by these centres and hitherto untouched districts.

In these investigations, use would have to be made of auxiliary medical personnel, who would thoroughly grasp the object in view. They would have, as far as possible, to be drawn from the same district, and to have remained, socially, in sufficiently close touch with the population to be able to establish that intimate contact with the families to be investigated, which is essential for such an enquiry.

In these investigations, more attention than hitherto would have to be given to the diet of children. Too little has been done in this respect in Asia, and the mistake has been made of making no distinction between the needs of adults and of children.

It will not be enough to draw up a list of the articles of food ; they must also be analysed, because the nutritive value of a particular kind of produce may not always be the same in different areas. Further, the market value of everything consumed should be ascertained as exactly as possible.

In this investigation of the diet, an attempt must be made to determine the proportions in which the various articles of food enter into it ; the percentage of protein, of fat and of carbohydrates, and the nature and quantity of the various minerals ; what kind of proteins are consumed, vegetable or animal, and what is their biological value ; what part of the fats are of vegetable or animal origin, and their degree of saturation ; and the kind and quantity of the various vitamins.

For this investigation, close collaboration with chemical and biological research laboratories is necessary. Valuable work in this field has already been done in various parts of Asia, but too often the plan of investigation has not been complete enough, and the data collected have remained fragmentary.

For the forthcoming Conference, the material available should be collected and analysed by a committee of experts, who will then have to outline a plan of future investigations whereby reliable and comparable material may be obtained. At present, the suggestions made are too often based merely upon individual enquiries on the spot or observations from Europe, and consequently they frequently prove to be quite wrong or economically impracticable. In Europe and America, for instance, one suggested means of improvement is to increase the consumption of milk, eggs, butter, meat, vegetables and fruit; but in most Asiatic countries any considerable developments in regard to the first three items are out of the question. In Asia, therefore, entirely different solutions will have to be sought.

Some efforts in this direction have already been made. The soya bean and the foods prepared from it, including soya milk, have been one of the most important subjects of study in recent years. But a local acquaintance with the food problems of the Far East justifies the assumption that big improvements in the composition of the diet can be brought about by other means.

B. Chemical Composition and Biological Value of the Different Foodstuffs.

The Caloric Value of Food.

What is, expressed in calories, the minimum daily allowance for adults and for children, at rest and at work? On this question, the " Report on the Physiological Bases of Nutrition ", drawn up by the Technical Commission on Nutrition[1] of the Health Committee, gives precise figures for the requirements in calories in temperate climates. It also deals with the distribution of the calorie requirements between the two main

[1] See *Quarterly Bulletin of the Health Organisation*, 1936, 3, 391.

classes into which the Committee has divided foodstuffs—viz., protective foods (rich in minerals and vitamins) and strictly energy-yielding (calorie-producing) foods. It does not seem permissible, however, to accept these standards for Asia without question, owing to the differences between Asia and Europe, both in foods and in men themselves, in height, weight, work and mode of living. One of the problems which the Conference will have to consider is how to endeavour to establish standards applicable to the East.

Carbohydrates.

These form, throughout Asia, the chief ingredient in the daily fare. So far as they are digestible, they serve exclusively as sources of energy. Even the indigestible residue may perhaps be useful to supply substance for the intestinal flora. Although an excess of carbohydrate absorption may not be a bad thing in itself, the quantity of vitamins and mineral substances required by the organism in such circumstances is also apt to be greater. This is important for the study of the beriberi question. A large quantity of carbohydrates requires a large quantity of vitamin B_1.

Proteins.

In the case of most Asiatic peoples, the daily protein intake is very small. Of those proteins, from 80 to 95 % are vegetable. It is only in the diet of the relatively prosperous classes that animal proteins predominate. Proteins serve mainly as body-building material, and are usually not broken down beyond the amino acid stage ; they serve as sources of energy only when too little of the other foodstuffs is provided. For the tropics, it should be borne in mind that, for the oxidation of proteins, when used as sources of energy, an enormous amount of energy is necessary, of which a great deal is given off in the form of heat. Hence, the percentage of protein in the food of inhabitants of the tropics ought not to be too large.

The value of a protein is the greater the more closely its composition resembles that of human protein in respect of both the nature and the relative proportions of its constituent

amino acids. Hence, animal proteins are of considerably greater value than vegetable proteins.

At present we know of twenty-two different amino acids, and we think that these include all the varieties occurring in nature. The question how far this is true is certainly of importance to Asia. Only a few years ago there was discovered a second amino acid containing sulphur—*i.e.*, methionin. It is precisely these sulphur-containing amino acids, such as cystin and methionin, that are of great importance, because they cannot be built up by the body itself, and yet are indispensable. Many vegetable proteins contain little or no cystin. Animal proteins are much superior in this respect. The supply of sulphur-containing amino acids for the inhabitants of Asiatic countries is probably not very great, in view of the prevalent lack of animal and dairy products in their diet.

Certain vegetable proteins which in themselves are deficient —qualitatively or quantitatively—in amino acids can often mutually supplement each other. Examples are the protein of cereals and that of various kinds of beans. In this respect, a more thorough research is needed, especially in the East.

Not all the protein administered to the organism is actually assimilated. Part of it serves as a nutrient for the intestinal flora. This question of the intestinal flora which has a bearing on the problem of the protein content of the diet in Asia is still obscure. The results of a large number of laboratory tests would seem to show the importance of the quality of the intestinal flora. If the proteins supplied are of poor value, there is the greatest likelihood of the development of an abnormal intestinal flora. It is generally believed that, in pellegra, a certain part is played, not only by B_2, but also a peculiar bacterial flora resulting from a diet of incomplete proteins. In cases of beriberi, the flora may be the decisive factor governing the assimilation or non-assimilation of vitamin B_1.

Various groups of racially different men may thus have their own special characteristic intestinal flora and so also react in a typical way of their own to a particular food. This is a point that certainly calls for greater attention than it has often received from clinicians in Asia, and may revolutionise the view taken of certain diseases.

The digestibility of proteins also depends on the structure of the protein molecules, their compactness and the composition of the food as a whole. The quantity and nature of the fats consumed at the same time are also of importance. Thus the proteins of many kinds of beans are hard to digest, so that a great deal passes out in the fæces. The custom followed in different countries of adding bicarbonate of soda to many kinds of peas and beans in cooking is thus a very useful one, as the compact proteins are thereby more readily attacked by the pepsin and made more digestible.

In several Asiatic countries, it has been observed that the population, in preparing food from vegetable proteins (particularly bean proteins), add certain fungi. The effect is again to facilitate the break-up of the compact proteins. The cookery receipts of Asiatic populations many contain many more modes of preparation calculated to promote digestion, but the exact significance of which we have not yet discovered.

Lastly, the question of the assimilation of proteins must also be considered. Of this we know little as yet ; but we do know that finely divided proteins, such as those in cereals, are better digested and absorbed than the compact proteins of beans, carrots and turnips.

The last point for consideration is the metabolism of proteins, which appears to be regulated according to the protein intake. If this is small, it is turned to much better account for the benefit of the body.

It is taken as axiomatic that one-third of the daily quantity of proteins must be animal protein. Observations in Asia already lead to the presumption that this cannot be so. Whenever such an assertion is found in the literature of the subject, it proves on examination to be very ill-substantiated and to be based on unjustifiable extension to man of the results of certain animal tests.

In studying nutrition in the East it will be well to exercise some caution for the time being in accepting various assertions based on laboratory tests and to examine how far theory and practice coincide and how far they conflict with each other. The study of all these problems will have to be taken up systematically. It will hardly be possible to give definite advice

as to an improved composition of the diet until we possess full data as to the biological value of the proteins that are most widely consumed in Asia and are cheapest. It is not unlikely that entirely new aspects of the question may be revealed.

The scientific research to determine which proteins are the most suitable—and this applies also to other foodstuffs—will have to be carried on in close co-operation with agricultural research institutes. The varieties of a plant may often differ in their chemical composition. By the selection of seeds it is possible to obtain, not only a larger crop, but also plants with a higher protein content ; and certain evidence indicates that modfications of the component proteins can also be secured by selection. Another question is whether a better grouping of proteins can be obtained by selection of different soils or of particular manures. A great deal can be done for these countries by proper collaboration between the different experts.

Another matter that is no less important is close co-operation between nutrition experts and the veterinary services. It will certainly be possible to find ways of making the increased consumption of animal proteins an economic possibility.

Fats.

So far, fats have been regarded mainly as calorie-producers and not as essential factors of nutrition. Indeed, the view is often held that fats could be entirely replaced by carbohydrates as part of the diet. But the work of Burr and his collaborators in America has revealed to us an entirely new deficiency condition, and one of great importance for the interpretation of various phenomena which have hitherto been unexplained. Accurate experiments have been made which show that, when all the fats have been carefully eliminated, while the fat-soluble vitamins were added in a sufficient concentration, young animals did not attain their proper growth and finally died in a state of cachexia. From this it would seem clear that fats cannot be omitted, but must be regarded as an essential dietary component. If, before the moribund stage was reached, the diet was supplemented with a small quantity of unsaturated fatty acids, all symptoms disappeared and normal growth returned.

The acids used in the tests were the linolic and linolenic acids that always occur in the organism. Moreover, it was observed that these two representatives of the unsaturated series not only had a curative effect but also, if added to the standard diet from the outset, had a preventive effect, as no symptoms of sickness or disturbances of growth appeared. These researches, confirmed by others, show that all kinds of nutrient fats are not of equal biological value for the human and animal organisms.

If we now examine the quantity of fats consumed by the various peoples of the Far East, it will be seen that this is much smaller than in Europe, and, further, that the fat is mainly of vegetable origin and only to a very small extent of animal origin.

In some countries, the proportion of vegetable fat amounts to 95 %. A more detailed study of conditions as regards vegetable and animal fats is desirable if the question of nutrition in Asia is to be fully understood. Most vegetable fat is much poorer in unsaturated fatty acids and lipoids than animal fats. The formula of unsaturated fatty acids always presents one or more double bonds (oleic acid, linolic acid, linolenic acid). The nearer the pole, the more double bonds there are, and the lower the congealing point of fatty oils. The same linseed will yield fats of very different composition according to whether the plant was grown nearer or to farther from the equator. If in countries far from the equator, there is always a great increase of unsaturated fatty acids. It is an excellent illustration of the adaptation of the metabolism of an organism to external environment.

Thus, the fat mostly consumed in tropical countries—coconut oil—is composed wholly of saturated fatty acids. Such fats, moreover, always have a poor content of lipoids, as these always occur in conjunction with unsaturated fatty acids. On the other hand, the nut fats widely consumed in various places in Asia are relatively rich in linolic and linolenic acid.

The research work of Burr, already mentioned, shows the great importance of various unsaturated fatty acids for the normal growth. In view of the importance that these new views ascribe to the metabolism of fat—and we have noted

here only a few of the effects that have recently become known— it is quite clear that research into the fats which the peoples of Asia consume in their diet, and into the composition of those fats and their influence on the human body, must be further developed.

Lipoids.

So far, in the study of popular nutrition little or no importance has been attached to lipoids. Yet, if we examine how much of these relatively little known substances exist in our bodies, and in important organs too, such as the brain, the suprarenal glands, the liver, etc., we can hardly fail to realise that they play a much more important part than is usually assumed. The same inference may be drawn from the distribution of these substances among the various foodstuffs. The study of lipoids is of great importance for national nutrition in Asia. As far as we know at present, the content of these substances in foodstuffs is very low in most countries. Yet their absence has not such serious consequences as was formerly believed, for it has been shown in recent years that lipoids, such as cholesterin and lecithin, can be synthetised in sufficient quantities in the body itself.

Minerals.

It is clear, again, that a better knowledge of mineral metabolism would be very desirable for Asia. Even in Europe, however, little is known on this subject. Research work and practical interpretation in this field are still rendered very difficult by the fact that frequently the important point is not so much the presence of a particular element as the state in which it is present and the organic substances with which it is combined. The only elements whose function is to some extent known are calcium, magnesium, phosphorus, iron and iodine. Investigations concerning the mineral content of various foodstuffs have been carried on in various Asiatic countries, but there remains a vast amount of ground which still calls for further systematic research. Such research will, more than any other, need to be conducted in close collaboration with those who are investigating the composition of the soil.

Vitamins.

Asia has taken part from the outset in the study of vitamins. These investigations have been carried on by means both of experiments on animals and of clinical research. At the outset, the problem seemed clear and simple ; but it has recently become rather more complicated, owing to the discovery of an unexpected number of vitamins. It was also found, that not all animals require the same vitamins (which opens up an unpleasing prospect as regards deficiency diseases of human beings) and that the relation between deficiency of a given vitamin and " avitaminosis " properly so-called is fairly complicated.

So far, in Asia it has been usual in compiling nutrition tables to indicate the vitamin content of nutritive substances by +, + +, etc. It must not be imagined, however, that this content is so constant that any useful conclusions may be deduced from these signs, for animal tests and chemical determination of vitamins sometimes give fairly different results. Moreover, the climate, the composition of the soil, the sun and the stage of development all affect the vitamin content. One of the objects of the forthcoming Conference will be to co-ordinate the scattered data into a single whole and to establish uniformity in matters of research and assays. It would be advisable, in Asia, as elsewhere, to effect vitamin assays in terms of international units, as determined by the Permanent Standardisation Commission of the Health Organisation.

Of vitamin A, an adult person requires ± 1 milligramme per day. Vitamin A, as such, occurs only in animal products. For the peoples of Asia, who live mainly on a vegetarian diet, the chief source is pro-vitamin A, which occurs in plants. These are the carotenes, which, according to their constitution, may be converted by the liver into either one or two molecules of vitamin A. In a diet rich in fat, as much as 80% of the pro-vitamin A intake is absorbed. On the other hand, if the diet is practically devoid of fat, absorption may be less than 20%, a fact that is of great importance for Asiatic peoples, who live mainly on a diet containing little fat.

Of vitamin B_1, the daily requirement is $\pm$ 0.5 to 1 milligramme, but for rice-consuming countries it is important that, with an increase in the consumption of carbohydrates, the quantity of vitamin B_1 should increase too. There is no need to consider in detail this vitamin in Asia, and particularly among rice-consuming nations ; it is important, however, that the rice should not be too highly polished.

Of vitamin C, a comparatively large amount is necessary —namely, $\pm$ 30 to 50 milligrammes ; on the other hand, it occurs in almost all vegetables and fruits. The problem is therefore of little moment to Asia. As for vitamin D, of which only 0.005 gramme a day is necessary, the sunny countries of eastern Asia are not likely to suffer any shortage. Moreover, in Asia, a considerable number of fungus products are used, and these, too, are usually very rich in vitamins C and D.

From the wide field covered by the study of vitamins, we have only noted a few points which have a special bearing upon questions affecting Asia.

The task of the forthcoming Conference will be to collate everything of value from among the material available in the present state of our knowledge and to draw such conclusions as it can regarding popular nutrition.

C. Different Diseases of Alimentary Origin.

As a general rule, the diseases classed under this heading are primarily, or even exclusively, the vitamin deficiencies. The syndrome of classical avitaminoses, however, is not produced solely by the absence of the vitamin concerned. As a rule, other factors concerned with nutrition also come into operation, and of these our knowledge is at present incomplete.

The non-characteristic forms of vitamin deficiency and pre-deficiency are also known in Asiatic countries, and it is better, for the time being, to include these under the general conception of malnutrition.

Beriberi.

This was the first known form of vitamin deficiency, and is, in point of fact, localised mainly in Asia. Now that we know

how to prevent it, adequate measures have been taken in most countries. In the majority of countries, it occurs only sporadically. Indeed, beriberi has never been widespread among rural populations ; it is connected rather with towns, armies, shipping, prisons, schools and large undertakings—in short places where catering is collective. At the forthcoming Conference, it will be well to review the position in regard to beriberi in the different Eastern countries, and examine what measures have been taken.

Another important question is that of infantile beriberi. In some countries, it has been thought to be more prevalent than appeared from official statistics. Supervision of the diet of expectant and nursing mothers will be necessary. This preventive work will have to be taken in hand by the maternity and child welfare centres. It has been clearly shown that, in the pathogenesis of both forms of beriberi, one of the main factors is lack of vitamin B_1. Whether other vitamins, or the intestinal flora play any part, is not yet known.

Pellagra.

Apart from the lack of vitamin B_2, the factors in this disease are the intestinal flora and protein deficiency. There are also indications that sufficient B_1 must be present to form the classical syndrome. According to the data we have collected, pellagra does not play an important part in any of the Asiatic countries. It would seem that, where beriberi occurs, little classical pellagra is found ; while, on the other hand, in countries where pellagra is endemic, there are few typical cases of beriberi. Slight cases do occur here and there, and mild and ill-defined mixed forms are sometimes reported. The assumption of an antagonism in the diet as between vitamins B_1 and B_2 would offer a plausible explanation of these facts.

Rickets.

For the sunny countries of Asia, rickets does not constitute a problem of any importance, at all events where there are no particular habits of life or circumstances which preclude exposure to the sun.

Teeth.

Wherever a detailed study of the teeth has been made in the countries of Eastern Asia, particularly among children and young persons, the findings have been unsatisfactory. Caries is commoner than was once thought. It will be necessary to consider how the position could best be remedied. The care of the teeth, upon which so much stress is laid by medical propaganda, both in schools and in health centres, is no doubt useful as accessory to general cleanliness. But it should always be borne in mind that dental hygiene is powerless to prevent the deterioration of the teeth, and it might perhaps be well to try to instil this fact in the popular mind.

The real cause lies in the diet. Unfortunately, we are not yet in a position to say what ingredients are necessary to develop and keep a good set of teeth. Many agree with MELLANBY that, besides a sufficient supply of calcium and phosphorus, chief importance must be attached to vitamin D. But most children in the sunny countries of Asia are hardly likely to be suffering from vitamin D deficiency.

Full data will have to be collected regarding the incidence of caries among children in Asia, and also as to whether there are indications that particular foodstuffs have a protective effect.

Nutritional Anæmia.

In recent years, it has become more and more evident that various forms of anæmia may be due to an unbalanced or insufficient diet. There is also clear evidence that the normal process of blood formation and destruction is governed, *inter alia*, by the nature of the diet. In recent years, information as to the different forms of anæmia has been collected in various Asiatic countries, and it would be very useful to make a complete collection of available material. These forms of anæmia are found particularly among women, and more especially pregnant women. For the health and physique of the rising generation, the health of women is more important than that of men. If the question of the influence of diet on the composition of the blood has already proved of great importance for European

and American countries, how much greater must its importance be in Asia, where diseases such as malaria, ankylostomiasis, kala-azar, and others constitute a far-reaching menace to that most important element of life, the blood ? These diseases have a powerful ally in under-nourishment, which undermines the power of resistance of whole groups of the population. Only a few questions are put forward here with a view to further discussion :

1. How far is the diet of Eastern countries deficient in iron ?

2. Is tropical macrocytic anæmia allied to pernicious anæmia, or is it a more or less direct consequence of complete or partial under-nourishment ?

3. What is the position as regards the incidence of true pernicious anæmia in the different Eastern countries ?

4. The extrinsic factor seems to lie largely in the pericarp of rice. What sources of diet in Asia are also rich in this factor ?

5. Does the hypochromic microcytic form of anæmia occur beside the hyperchromic macrocytic form ? What are the factors causing its occurrence in Asia ?

Infant Mortality and the Nutrition of Infants.

Infant mortality is exceptionally high in all Asiatic countries. In several of them, it accounts for more than half the total mortality. It is true that the statistics are still far from reliable, except for Japan, but that the position is unfortunately as stated is beyond question. If the cause is sought, the direct or indirect significance of the factor of nutrition immediately comes into prominence. Breast-feeding must always and everywhere be regarded as the ideal ; yet this dogma seems to require certain qualifications in Asia. Infantile beriberi has shown that the mother can transmit disease to her child through her milk ; and xerophthalmia has taught us that a mother can make her child blind for life through her own milk. Thus the infant is imperilled first of all by the milk of an under-nourished mother.

In the second place, danger resides in the incomplete diet which the mother gives her child in case of sickness.

Lastly, in the absence of the mother's milk, there is danger in inadequate artificial feeding.

These last two dangers are the direct outcome of the lack of milk and its products as a popular food.

Accordingly, the question of milk and foodstuffs to replace milk is of the greatest importance in Asia. The study of soya milk is being conducted on these lines ; at the same time, attention has been unduly fixed on this, and the search for other resources which might be discovered through collaboration with agricultural and veterinary services has been corresponding lyneglected. Closer attention should be given to improved milk powders and varieties of sour milk. This would be a highly desirable task, particularly for health centres. A great deal can be done with relatively simple and inexpensive means. In another respect, infants have certain advantages in Asia : in sunny countries they can be exposed daily to ultra-violet rays, so that there is very little likelihood of their being infected with bovine tuberculosis ; and countries with abundant fruit and vegetables throughout the year provide an inexpensive supplementary diet of bananas, citrous fruit juice, etc.

Influence of Nutrition on the Power of Defence against Infection.

This head should embrace syndromes such as xerophthalmia, gallstones, various skin diseases, and diseases of the respiratory organs, such as the various forms of bronchitis and bronchial pneumonia.

These syndromes are seldom found in large numbers ; they are generally isolated sporadic cases. In several countries, however, diseases of the respiratory organs in children and young persons are common, and it seems hardly likely that diet is not to some extent accountable. There is clear evidence to show that, when food it scarce or unobtainable, the number of fatal cases of lung disease greatly increases. More exact data are urgently required on this point.

Data have been collected here and there suggesting a connection between the various skin diseases and certain

nutritional deficiencies, and between diet and the lymphatic tissue of the naso-pharynx ; there is a reduction in the power of withstanding infection, which may be due either to a reduced power of antibody production or to the disappearance, through the food deficiency, of the antibodies already present. But research workers unanimously agree that, at all events so far as enquiry shows, the various forms of malnutrition do not affect either the quantity or the production of antibodies. The cause of the reduction in the power of resistance is thus unspecific, although in the different forms of nutritional deficiency the point of attack is certainly found to be different ; for example, a deficiency of vitamin A affects more especially the skin, the eye, the lungs or the urogenital tract, or several of these parts at the same time. The inference is that there must be various forms of interaction between vitamins and hormones, and between the vitamins themselves.

Vitamin A is at present rightly regarded as pre-eminently the anti-infective vitamin, as during the war, when there was a shortage of animal fat, many cases of xerophthalmia were observed, mainly in towns, as well as a number of infections of the respiratory organs, ears and urinary tract.

Investigations regarding the influence of other vitamins on the power of resistance have not yet afforded any really conclusive results. Recently, evidence has been obtained which seems to show that the B complex also has considerable influence, especially on certain skin diseases. This is important, because it is precisely in the East that the B complex requires constant control in the diet.

In Asia, sick children are in great danger of incurring vitamin A deficiency. In Europe, a sick child, particularly if suffering from intestinal troubles, is placed on a diet consisting largely of milk. In Asia, the place of milk is often taken by gruel ; vegetables are withheld, so that the child's food is almost devoid of vitamin A.

Of the abundant literature on this subject in recent years, the papers published by GREEN and MELLANBY are still of importance for the sunny countries of Asia. They show that an outbreak of spontaneous infection in the case of vitamin A deficiency is hastened by an extra supply of vitamin D. If such

is also the case with human beings, that is a matter of importance from the standpoint of clinical medicine.

Lastly, investigations have been made into the part played by diet in various other diseases, such as tuberculosis, leprosy and the innumerable leg ulcers that are found in Oriental countries.

As regards the first, a great deal of work has been done in Europe, and it has been proved that under-nourishment plays a prominent part in the development of tuberculosis. As regards the connection between nutrition and leprosy, various investigations have been made in recent years, and some definite results seem to have been arrived at ; but these investigations are still only in their initial stage.

As for the large leg ulcers, the general view at present is that diet plays a predominant part. Their occurrence is said to be attributable not so much to the absence of a particular vitamin as to general undernourishment.

D. Proportion of the Family Budget spent on Food.

To form a sound opinion as to the importance of the diet, and the various ways of improving it, it would be necessary to conduct in all countries of the East a very careful enquiry as to the part of the family budget spent on food. In agricultural areas in Europe, it is found that 50 or 60 % of the earnings of the working-class is spent on food. In Asia, the percentage is much higher. The subject has been very little studied, but the available data show that there are large areas where this proportion is 90 % or even higher. Now the possibility of improving the diet in quantity and in quality depends upon the state of the family finances. If 80 or 90 % of the budget has to be spent on the most essential food—and such is undoubtedly the case in many parts of Asia—all efforts must be directed to reducing prices and to teaching the people wisdom in the choice of and preparation of their food.

In such cases, any recommendation to improve the diet—for example, by increasing the consumption of milk and eggs—is quite useless ; the proper course is to find which of the foodstuffs approximate nearest to the food value of these articles. Progress along these lines has already been made

in some countries by introducing the use of the soya bean and its derivatives, and in other countries by stimulating the consumption of fish and fish pastes.

It is sometimes said that, if a people's needs are increased, they are thereby stimulated to do more work and to increase production. Various attempts to develop local industry are also based on the principle that to create increased needs is beneficial. But if a people's general needs increase, a change also takes place in their budget, and the percentage available for food may decrease. Unless there is a simultaneous rise in wages or a fall in food prices, the creation of additional needs may have a bad effect on the general diet. Once it has been ascertained what proportion of the family budget is spent on food, the results of the investigation will have to be kept up to date, taking into account the price of foodstuffs and the new needs of the people. Here, too, it will be important to establish close co-operation with agriculturists, stockbreeders and economists.

E. Final Remarks.

In conclusion, we should like to offer a few observations as to the place of nutrition questions in national budgets.

A well-fed and healthy population is vital to every country for its development and future. But, in all Asiatic countries, only relatively trifling sums are allocated to the detailed study of national nutrition or to attempts to improve it.

In some places, the authorities think this is a field that should rather be left to private initiative. The public authorities still fail to appreciate the great importance of food problems. Only in the event of a war or economic depression do they decide to act.

The growth of the population and the ensuing increased importance of adequate nutrition will certainly help to wean most Governments from this shortsighted policy. The assertion often made by the authorities that very primitive peoples show an unfailing intuition in regard to their food supply in time of need is obviously exaggerated, and, indeed, is contradicted by practical experience. A small measure of intuition there certainly is, but it can easily be overrated.

If the Conference helps to bring about a change in the views of some of the Governments, that will in itself be an appreciable advance.

The Conference will no doubt have to decide what researches are to be set on foot, and how any funds available for the purpose are to be employed. It is generally agreed that the most effective method is the foundation of institutions—of which there are already a number in the Far East—dealing especially with the study of these questions. Where the available funds are insufficient, the practice is to entrust this work to specialised services attached to the existing laboratories. Moreover, at almost all medical schools, the teaching staff includes specialists in physiological chemistry who take a sufficient interest in these matters to devote all the scientific activity of their department to their investigation.

Any of these methods can produce valuable results and enable important data to be collected. But could not the problems connected with nutrition be attacked on broader lines ?

The aim must be so to organise the work as to obtain the most efficient collaboration of all who are able and willing to take part in it. We have in mind co-operation of chemists, both analytical and synthetic, physiologists, physiological chemists, specialists in internal medicine, pediatricians, gynæcologists—in short, representatives of almost all branches of medicine and hygiene ; and, in addition, agriculturists expert in the growing of fruit and vegetables, veterinary surgeons and lastly, statisticians and economists. All these experts must be induced to work together for the common aim, but it is by no means necessary or even desirable that they should devote the whole of their time to such work.

The ideal would be a central chemico-physiological institute with a permanent staff, working to a plan drawn up by a body consisting of representatives of the various branches of science. In this way, it would be possible to form teams of workers who would examine each problem from different angles and conduct any necessary investigations. Whether such an institute should be national or international in character is a point which calls for serious reflection. In any case, it is certain that, in Asia, international collaboration in this field is urgently needed.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

A. Malaria.

It seems hardly necessary to stress the ravages caused by malaria in the East or to quote morbidity and mortality statistics, which only partially reflect the real situation.

To say that the ultimate object of any treatment campaign—to place the drug within reach of the whole population—has been achieved would be unduly optimistic. Here drug is synonymous with quinine, since, notwithstanding their undoubted merits, which recent researches made under the auspices of the Malaria Commission of the Health Organisation have served to demonstrate, synthetic drugs are still only used to a limited extent, owing to the fact that they can only be administered under adequate supervision ; the results recorded in the Malay States and Ceylon with atebrin and plasmoquine show, however, how useful these drugs may be for curative and preventive purposes when dealing with a population which is under close medical control.

It is important, therefore, that no effort should be spared to make the treatment available to the inhabitants of even the most remote country districts. Here two factors have to be considered : the price of quinine and the method of distribution.

For non-producing countries, the price is governed by the fluctuations of the world market ; if delivery contracts covering an appreciable period could be concluded with Governments, more satisfactory prices could probably be agreed on. Use might also be made of Totaquina, a mixture of total alkaloids of cinchona recommended in 1931 by the Malaria Commission, which is cheaper than quinine.

The cost of anti-malarial treatment is beyond the peasant's means. Consequently, the State will have to sell quinine below cost price or distribute it free. In some countries—*e.g.*, Siam —quinine is only supplied free to the destitute, in the form of coloured tablets. This system of free distribution is complicated,

however, by the long administrative procedure before the drug reaches the patient. If it is the village headman who has to decide which malarial subjects shall have free treatment, it is doubtful whether his judgment will always be strictly objective.

The money spent by the Government on buying quinine may be wasted if the staff of distributing agents is inadequate ; for, if the initiative is left with the patient, the drug will never be used, but will remain stored in the depots. This raises the question of quinine propaganda, which should be conducted on popular lines but should at the same time be under medical supervision, since otherwise there may be waste of the drug. Propaganda should aim at reaching the mothers, so as to make them realise the need for treating the first attack when the child is quite young and still fully receptive.

Curative treatment has hitherto been the only anti-malarial method employed in rural districts, owing to the difficulties attaching to clinical prophylaxis, anti-larval measures and mechanical protection. True, clinical prophylaxis is practicable in organised communities : the public services, the army, the police ; for plantation labour, which is generally immigrant and fluctuating, preventive quinine treatment needs to be permanently employed to avert the danger of the introduction of new and particularly virulent parasitic strains. This is a costly process, demanding constant supervision to see that the coolies take the drug ; the thorough treatment of clinical attacks and relapses is more effective and less expensive.

There is only a limited scope for anti-larval measures, in the form of drainage or the use of larvicides. As for mechanical protection, anyone who has seen some of the bamboo huts must realise that, if it is to be made effective, not only the openings but the whole of the walls would have to be screened. There could certainly be no justification for pulling down and rebuilding the dwellings in a whole malaria-ridden district, on the lines so successfully adopted in the case of plague. But what could be done would be to move certain villages situated in regions where hyper-endemic malaria prevails, with its usual corollary : economic distress ; we have in mind populations living in the hill districts in Northern Siam, where, the rice fields being terraced, *A. minimus* breeds and maintains exceptionally serious

endemic conditions, whereas the neighbouring plain, with its rice fields under stagnant water, is relatively clear.

There still remains the use of mosquito-nets as a mechanical means of protection. The kind of mosquito-net to be recommended will vary according to whether the population sleeps on mats, on " charpoys ", or in beds. Standard models exist, in the Philippines in particular, and they might be turned out by mass production to lower the price. But the mosquito-net must be properly used and not allowed to become a mosquito-trap. This presupposes a standard of health education which, in certain countries at all events, can only be created by the influence of the visiting nurse over the rural population.

If, then, anti-larval measures and mechanical protection are applicable only in certain given—and indeed exceptional—conditions, what measures, apart from treatment, can be employed to cope with malaria in rural districts ? Endeavours might be made to develop the natural means of combating anopheline infection, by the use of biological methods, some of which have proved their worth, while others should be more fully investigated, provided that they satisfy the following conditions : they must be economical and utilisable without technical supervision.

The introduction of larvivorous fish yields very divergent results in different cases : urban malaria of the *A. stephensi* type can be eliminated by the judicious use of gambusias in towns in India ; certain districts on the Italian and Dalmatian coasts have been cleaned up by means of these fish alone. But elsewhere larvivorous fish bring about only a partial destruction of the anopheline fauna. It is sometimes possible to acclimatise species foreign to the local fauna and capable of very effective action ; the cleaning-up of the Java fish-ponds is a classic example. The climate must, however, be suitable. In Indo-China, for example, the first hatching of the larvæ coincides with the moment when the fish's larvivorous activities are at their lowest, owing to its cycle of development and to the fact that the temperature of the water is still low. In some parts, again, the country population is so poor that it is impossible to prevent it from living on certain small fish which are, however, the most active destroyers of the larvæ.

The method recommended by WILLIAMSON, of filling with brushwood streams which serve as breeding-places for the larvæ, is simple and has been found effective in the Malay States. In Uganda, afforestation (eucalyptus, acacia, casuarina) is being employed as a method of drying up the swamps. The quantity of water has thus been reduced, which facilitates drainage later. Besides, it effects a change in the undergrowth, papyrus being replaced by an umbelliferous species, and the shade thus created makes the ground less suitable for the development of the two principal local vectors—*A. gambiæ* and *A. funestus*. Only a passing reference need be made to the procedure of destroying adult anopheles in houses by systematic spraying with liquid insecticides. This process has produced excellent results in Natal and Zululand, but it is hardly applicable, except in villages, and requires a fairly big staff.

Close co-operation between the various administrative services is absolutely essential to cope with anophelism. Steps must be taken in future to see that the construction of railways, roads and other engineering works and timber felling shall not create breeding-places for the larvæ over what are sometimes considerable areas. Most important of all, the big irrigation works must not be allowed to transform into malarial zones districts which were previously immune. Irrigation is a source of wealth, and part of the income derived from it should be set aside for the sanitation of the country.

Notwithstanding the ubiquitous nature of malaria in the East, the problems which it raises cannot be dealt with—or settled —without an intimate knowledge of local conditions. Any attempt to proceed on standardised lines would be disastrous. This study of the local environment may be carried out by an expert staff, if the health administration includes an independent antimalarial service, or by the peripheral units of the medical and health services ; hence the importance, for every medical officer, of acquiring thorough knowledge of malariology in the course of his studies. The international courses given every year at Singapore under the auspices of the Health Organisation will assist largely in training the staff of malariologists so badly needed in Asia.

The problem of malaria has been considered in this brief survey only in its rural aspects, since any organised community —a town, a village, a plantation or a mine—can find a solution, given the necessary funds ; examples are not lacking in the East, where antilarval measures were first developed. It must be admitted that, except for a few quinine tablets distributed here and there, the health conditions of, say, a peasant living with his family in a hut in the middle of a marshy plain, on the banks of a stream or on the outskirts of a forest, have received very little attention. That to-day is, in our view, the real crux of the matter. One thing is certain—and the Pan-African Health Conference in 1935 strongly emphasised the point—and that is that, unless the economic and cultural level of the rural populations can be raised, there can be no hope of employing curative or preventive measures with any degree of success. Malaria is a health and social problem ; it must be attacked simultaneously from both these angles. While, on the one hand, marked economic progress may depend on the success of anti-malarial measures, these, on the other hand, will be facilitated by an adequate diet, healthier dwellings, more widespread education—in a word, by rural reconstruction. That must be the object.

B. Plague.

We propose to deal here with two aspects only of the campaign against plague in rural surroundings—viz., (1) housing improvements and (2) vaccination.

(1) The gigantic efforts made in Java to improve housing conditions compel our admiration. Not all health administrations, however, can, with the inhabitants' help, rebuild over 1,300,000 houses to standard designs and with standard materials. This may be why the example of Java has not, so far as we know, been followed elsewhere. If the past cannot be obliterated, it may, however, be possible to try by legislation to safeguard the future by, for instance, requiring all new building to be rat-proofed.

It is not always possible to pull down and rebuild, more particularly when an epidemic threatens and time is short. In such circumstances, the procedure in Java is to clean up the

" desas ".[1] The inhabitants have to build huts outside the village and live in them while the rats in their houses are being destroyed and the most urgent improvements made (abolition of double walls and dark corners, plugging of hollow bamboo). In Ceylon, the villagers have to go into the country, where they are fed for five days free of charge ; the village is declared an infected area which no one may enter without permission. When the number of rats has been substantially diminished by using a large quantity of traps, the foodstuffs are taken out of the dwellings and placed in new bags, while the old ones are burned. The houses are cleaned out and the demolition necessary for health purposes effected. The village may only be reoccupied when biological tests have given negative results and the inhabitants have been told of the improvements they must make in their homes.

Special regulations should be issued for the storage of cereals. In Ceylon, village shops are not allowed to stock more than five bags of each kind of cereal ; these bags must be kept in self-closing metal bins. In the districts of Senegal where plague is endemic, the Health Department has had to insist on a very simple device being adopted for keeping rats away from millet granaries—the foundation piles are capped with petrol-tins.

Even when not rat-infested, a house may harbour infected fleas ; this is not, of course, a novel idea, but recent research in Madagascar has brought out its epidemiological importance : by the use of a special trap, *X. cheopis* has been found, sometimes in large numbers, among the refuse and dust in native huts. The only reason why they were not discovered sooner was that, to be caught in the traps, the fleas had to jump. Actually, however, *X. cheopis* is a poor jumper ; it hides in dark corners where the temperature and moisture are constant and where the broom never reaches. In houses where a case of human plague was detected without any rats being discovered, captured specimens of *X. cheopis* were shown to have been infected when ground up and injected into guinea-pigs.

Rehousing must, therefore, go hand in hand with a greater sense of order and cleanliness on the part of the occupants. A

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[1] Villages.

lengthy process of education will be needed to impress these ideas on housewives, and this brings us back to the question of rural reconstruction.

(2) As some countries felt there was little advantage in using anti-plague vaccine made from dead microorganisms, it was natural, and in conformity with present tendencies, that laboratories should concentrate their research on live vaccine. Thus, in recent years, we have witnessed two large-scale experiments, one in Java and the other in Madagascar, where a live strain of plague bacilli not pathogenic for man was used as an antigen.

Was the scepticism felt about dead vaccine justified ? Yes, to judge from some of the replies given to a questionnaire sent by the Office international d'Hygiène publique in 1931/32 to the health administrations concerned. No, to judge by the reply from India. Actually, the Haffkine vaccine, as prepared by the Bombay Institute, has always proved to be highly immunising in the hands of our colleagues in India. A total of 147,000 vaccinations performed in India, at Baghdad and Aden between 1897 and 1919 affords evidence that among vaccinees the risks of contracting plague has been diminished to one-fourth and the risk of death to one-eighth.

Yet this same Haffkine vaccine, when employed in the 1921/1922 epidemic in Java, reduced the death rate from plague by 50% only. In some districts where the epidemic was increasing, the reduction was no more than one-third.

These results, though interesting in themselves, were not sufficiently conclusive to convince the population of the benefits of vaccination. Accordingly, Dr. L. Otten, Head of the Bandoeng Pasteur Institute, directed his research towards the production of a live vaccine : he chose a strain known as Tjiwidej (from the name of the district where it had been isolated), which, after passages through the rat and maintenance for four months in serum agar, proved entirely innocuous to the rat and guinea-pig, while at the same time retaining very marked antigenic properties. This vaccine was first administered in 1934 to 37,000 inhabitants of the Bandoeng Regency. In the next two years, this method of vaccination was extended to more than 2,000,000 persons. Post-vaccinal reactions were very slight :

redness at the point of injection and occasional slight temperature. Among vaccinated persons, the death rate from plague was ten times less than among the unvaccinated, so that the method would seem to have brilliantly stood the test.

In Madagascar, human vaccination with various types of anti-plague vaccine (Haffkine type, aqueous vaccine from the Paris Pasteur Institute, lipo-vaccine) had not given very encouraging results, and the population, impressed by the number of obvious failures, was losing confidence in the efficacy of the method. Further, extermination of rats and insects in houses was ineffective in the small bush settlements, where only efficacious vaccination could have improved a serious situation. Accordingly, Dr. G. GIRARD, Director of the Pasteur Institute at Antananarivo, resumed the study of vaccination by means of live, but attenuated, bacilli. Using the " E. V. " strain,[1] which had been subcultured on agar at a temperature of 16-20° C. for five years, he found that, in subcutaneous injections, it was non-virulent for the guinea-pig and rabbit. When it was administered in heavy doses by the intra-peritoneal route, some of these animals rapidly succumbed to peritonitis and septicæmia ; the germ isolated in a blood culture showed the characteristics of the " E. V. " strain.

With slightly smaller doses, small reactive modules are formed in the spleen and liver 5 to 15 days after injection, but disappear without leaving a trace between the 15th and 20th days. These lesions differ from those caused by virulent plague bacilli : no bacilli are visible and the lesions in no way affect the general condition of the animals.

The vaccine, which is administered in one injection, is prepared in a special laboratory where no other plague strain is manipulated. The post-vaccinal reactions observed were, in 90% of the cases, a slight rise in temperature and swelling at the point of injection. In exceptional cases, the reactions are more marked, with œdema, but disappear in about a fortnight.

The first inoculations into man with the " E. V. " strain date from 1932 and were made on volunteers and incurable lepers.

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[1] The initials of the European child from whom it had been isolated in 1926.

The vaccinated persons were kept under strict observation for two months and showed no abnormal symptoms. Between 1932 and 1936, more than 800,000 inoculations were performed in Madagascar in successive stages, without any incident having to be recorded.

As for the results obtained, it may be said that, among vaccinees, the death rate from plague has been cut down to one-third of the rate for controls. Moreover, not a single case of pulmonary plague, primary or secondary, has been recorded in the case of the vaccinated persons, though 17 were reported among the controls.

Dr. GIRARD considers that the antigenic value of a plague bacillus which is to be used as a vaccine for human beings is dependent upon the maintenance of a certain pathogenicity for small rodents. It may, therefore, well be asked whether the successive subcultures of the " E. V. " bacillus will not finally attenuate it to such an extent that it will lose its present qualities. If this proved to be the case, it would be necessary to use other strains which would meet the requirements of an efficacious vaccine; the Pasteur Institute at Antananarivo now has three such strains which behave in the same way as the " E. V. " bacillus.

Dr. GIRARD believes that it would be extremely desirable that close collaboration be established between the laboratories of the various countries which are searching for an efficacious vaccine. At the same time, only those strains should be exchanged which have been found to be both active in the laboratory and innocuous to man.

In the two experiments just described, the live vaccine proved to be completely harmless and gave more marked protection than the dead vaccines hitherto utilised in the two countries in question. In face of such results, it may be questioned whether, as regards plague, there is any further ground for the reserved attitude shown by certain health administrations to immunisation methods based on the use of live germs.

Is it possible in these days to conceive of an anti-plague prophylaxis campaign in rural areas based exclusively on vaccination, or should the latter be regarded as merely one of the factors in the campaign ? That is a question which might usefully be considered by the Conference.

C. Ankylostomiasis.

The prophylaxis and treatment campaigns undertaken in the majority of Eastern countries at the instance and with the assistance of the Rockefeller Foundation are so well known to the medical profession that they need not be dealt with here.

On the showing of past experience, it may be asserted that ankylostomiasis cannot be eradicated by treatment alone. The construction and utilisation of adequate latrines are the essential corollary of treatment. It remains to be decided whether such construction should be made compulsory or remain optional. Both systems have their adherents and it would be useful if they could state their views at the Conference. Whatever the solution adopted, it is the duty of the health authorities to provide facilities—equipment, labour and subsidies—for the construction of latrines ; we have seen in a previous chapter which were the most suitable types from the hygienic and practical points of view.

In Ceylon, in the districts served by the health centres, and in all the Philippine Islands, the provision of latrines is compulsory ; their construction is being carried out under a five-year plan, which is nearly completed.

For the treatment of the masses, use is generally made of the existing medical and public health organisation. In Ceylon, on the other hand, where the campaign initiated in 1916 reached its culminating point in 1934 with nearly two millions of cases treated, there is a special ankylostomiasis control service, which sends its squads all over the island to make microscopic examinations, apply treatment and compile statistics. This method is very efficient owing to the specialisation of staff which it involves, but it is not within the reach of all health administrations.

That the campaign against ankylostomiasis is an excellent means of spreading health education, particularly if the help of teachers can be enlisted, is a statement to which all Eastern hygienists will subscribe.

An examination of papers published concerning the diagnosis of ankylostomiasis will show in striking fashion the very great variety of techniques employed for the concentration and

counting of eggs. It may be wondered whether it would not be desirable, in order to render infestation rates, and hence treatment results, comparable, to choose among these techniques a standard method which could be used as a common measure ; this could not fail to improve the accuracy of statistics.

The infestation rate does not, however, give the measure of the severity of uncinariasis considered as a disease, for a number of different factors, especially nutrition, may intervene to enhance or attenuate the pathogenic action of helminths.

An exchange of views in the Conference on the activity, toxicity and cost price of the various anthelminthics would assuredly prove instructive.

D. Tuberculosis.

In the last few decades, attention has repeatedly been drawn to the increase in the incidence of tuberculosis in the Far Eastern countries. Japan is, however, the only country for which exact statistical data are available, and elsewhere only estimates and sampling surveys have been made. Twenty years ago, tuberculosis ranked sixth or seventh in order of importance in the list of causes of death. In many Eastern countries, it now occupies the third place ; in Japan, it takes second place and, in the Philippine Islands, it even heads the list.

This, of course, does not mean that, in absolute figures, the incidence of tuberculosis has increased. The improvement in methods of prevention of diseases such as smallpox, cholera, malaria and typhoid fever has made it possible to reduce the mortality caused by these diseases, so that tuberculosis has acquired greater prominence. Another cause of the relative increase in its incidence resides in the improvement of methods of diagnosis and in the closer observation of its various forms. Thus is has been found that tuberculosis of infants and young children, which was formerly believed to be very rare in Asia, was, in reality, fairly prevalent.

In several countries, enquiries have been undertaken to determine more accurately the incidence of latent or clearly characterised tuberculous infections and the manner of infection. These researches, which are, of course, difficult to carry out,

have remained fragmentary and do not, so far, warrant any generalisations or comparisons with the data obtained in Europe. From these enquiries, there emerges an increasingly clear impression, however, that in numerous countries tuberculosis has already become one of the most important social diseases, and that its spread to wide rural areas which had hitherto been comparatively immune constitutes one of the most serious and urgent health problems in Asia.

In order to establish a rational plan of campaign against tuberculosis, and especially of protection for districts hitherto largely immune, it is essential to have full information as to the situation, not only in each country, but also in each province, and to consider separately towns and rural districts, distinguishing, among the latter, between those which do or do not provide labour for industry and agriculture. Any attempt to apply identical measures against the invasion of uncontaminated rural areas by tuberculosis, against its spread in epidemic form in a recently contaminated area or against the long-standing endemic disease in towns would be as serious a blunder as to introduce identical anti-larval measures against malaria in deltaic, mountainous or urban districts.

In order to ascertain the degree of tuberculous contamination of populations, statistics of causes of death can doubtless be used. But it will also be necessary by sampling investigations (either in the form of skilful questioning of rural families concerning their medical history or of a series of post-mortem examinations in towns) to ascertain the probable plus or minus margin of error of the existing statistics, which are based on the comparatively unskilled diagnoses of village headmen or civil register clerks.

It will, above all, be necessary to examine representative specimens of the rural and urban population in order to discover subjects with a positive tuberculin reaction as a sign of tuberculous impregnation, and to make a clinical and, if possible, a radioscopic examination of a certain proportion of these subjects.

If comparable results are to be obtained in different places, it is necessary to adopt a uniform and well-defined tuberculin-test technique and a standardised tuberculin, whether it be the standard tuberculin established by the Permanent Commission

on Biological Standardisation of the Health Organisation or a purified tuberculin obtained in a synthetic medium.

The data thus obtained and the supplementary epidemiological enquiries undertaken will make it possible to ascertain whether the population under consideration is infected or not, and, if so, at what age and in what circumstances tuberculous infection takes place. The practical measures to be taken will be determined by the knowledge thus obtained.

The problem is not that of choosing between pneumothorax, gold salts or ordinary sanatorium treatment for proved cases, but of framing and applying a preventive policy adapted both to the epidemiological situation and to budgetary resources.

The health education of the masses—both school-children and adults—regarding the manner of tuberculosis infection and the diet and mode of living likely to strengthen resistance against the disease can, no doubt, be regarded as genuinely useful ; but this education must be perfectly adapted to local conditions and not be a slavish imitation of the health propaganda suitable for the inhabitants of Western Europe or the United States.

Among poor and ill-fed populations the raising of whose standard of living, and hence of whose resisting power, can only be considered as a distant aim, specific protection by vaccination assumes particular importance.

As regards Asia, BCG has hitherto been used systematically only in Indo-China. The Conference should be informed of the results of BCG vaccination in that country, in order to be able to decide whether its use should be recommended in other countries. But, here again, a rational adjustment is necessary. BCG is very rightly administered to new-born infants in French, Roumanian and Indo-Chinese towns which are strongly infected with tuberculosis, for this vaccine, to be effective, must be given before any tuberculous infection has been contracted, and such infection may take place very early where the disease is endemic. In Eastern towns which are heavily contaminated, BCG should also be given to infants. But the same does not apply to areas which are practically immune and in which the rare infected subjects have contracted the infection during a temporary stay in the towns where they hire out their labour.

Rural labourers free from infection should be vaccinated on their arrival in towns or industrial areas ; in this way, indirect protection will be afforded to the villages to which the labourers will one day return with their savings.

While the general subcutaneous vaccination of subjects with a negative tuberculin reaction is justified in regions invaded by tuberculosis, there is clearly no point in vaccinating children in rural districts which are uninfected and little exposed to infection. Indeed, without re-infections of exogenous origin which maintain the immunity engendered by BCG premunition, this immunity would gradually be attenuated and finally disappear.

Adaptation to local conditions is no less indispensable if we consider the policy of providing for the hospital treatment of tuberculous patients. In towns where tuberculosis is endemic and where fibrous forms are frequent, curative treatment can be organised by means of dispensaries giving pneumothorax treatment and hospitals and sanatoria where the rest and education cures can be initiated or even completed if the necessary resources are available.

But in districts where tuberculosis is spreading and where forms with massive caseification are frequent, chief attention should be given to the segregation of patients rather than to their treatment, and to the protection of healthy subjects by vaccination or other means.

A simple imitation of the anti-tuberculosis organisation of European countries with their networks of dispensaries, hospitals and sanatoria would lead to a waste of public money, for it would necessarily remain incomplete for lack of sufficient funds. Moreover, it would not answer to the special needs of Eastern populations.

A preventive measure which seems to be essential everywhere is the supervision of individuals engaged in occupations which are dangerous from the point of view of bacillary transmission ; this remark applies particularly to teachers.

As far as is known, bovine tuberculosis is not widespread in the countries of Asia, so that it need not be taken into account in the organisation of the campaign against tuberculosis.

E. Pneumonia.

Among certain races, pneumonia takes on a special character, owing to the fact that in a high proportion of cases it is accompanied by a pneumococcus invasion of the blood stream. Hence the frequency of metastatic foci : arthritis, pericarditis, myocarditis, hepatitis, nephritis and, above all, meningitis. The disease is, therefore, not so much pneumonia with the regular cyclic evolution as pneumococcus septicæmia.

The black race is undoubtedly the most vulnerable to the action of the pneumococcus, whilst in the majority of Asiatic races receptivity is much higher than in the white race. Comparison between the British and native troops in India (Sikhs, Pathans, Gurkhas, Rajputs, etc.) shows that, from 1920 to 1928, the number of pneumonia cases admitted to hospital per thousand was three times as high, and the death rate five times as high, among the native troops as among the white troops ; among the latter, pneumonia has never assumed an epidemic form. In Java, in a force of 2,000 European soldiers and 4,000 native soldiers, 15 cases of pneumonia were recorded from 1927 to 1929 among the whites, as against 85 among the natives.

But the racial factor is not the only cause of a predisposition to pneumonia ; change of environment is also blamed, and with justice ; when, for example, labour is recruited, coolies who may be resistant to the pneumococcus strains existing in their own village come into contact with carriers of other strains which for them are fully virulent. It has therefore been recommended that every undertaking receiving periodical drafts of native labourers should possess a " preparation camp ", so that the newcomers may be only gradually brought into contact with the older hands.

Among other factors likely to increase the prevalence and severity of pneumonia, we may mention overcrowding in badly ventilated quarters, insufficient or excessive clothing according to the climate (particularly the practice of letting children sleep naked at night in certain climates, and the ill-advised wearing of European garments), a diet deficient in vitamin A, and the

concurrent existence of such diseases as malaria and ankylostomiasis, which weaken the power of resistance.

As regards prevention, great hopes had been placed in vaccination on account of the brilliant results obtained in South Africa between 1912 and 1918. During that period, however, three types of pneumococcus predominated, whereas it subsequently became necessary to increase the polyvalence of the vaccine by the addition of new antigens, on account of modifications in the bacterial flora. In the Transvaal, opinion as to the value of vaccination is now divided ; it is applied by certain mining companies, but rejected by others. In Asia, experiments made in 1922 on the troops stationed in Baluchistan proved very disappointing.

In the circumstances, therefore, vaccination, which like the search for germ-carriers would in any case only be possible in organised labour groups under medical supervision—can be of no great value in rural districts ; to say nothing of the fact that the preparation of the vaccine would require preliminary investigation of the types of pneumococcus most prevalent in each area. Means of prevention must therefore be sought in another direction.

The recruiting of labourers from a given area might perhaps be discontinued when experience has shown that they are particularly susceptible to pneumococcus infection. In South Africa, for example, the employment of natives coming from districts lying to the north of 22° south latitude has been prohibited, with a consequent reduction in the pneumonia morbidity rate. Otherwise, it would be necessary to fall back on measures of general hygiene which are in no way specific : avoid over-crowding in all places where people are brought together in considerable numbers—plantations, mines, barracks or prisons ; prevent sleeping on the ground by the issue of bedding suited to the climate ; see that wet clothing is changed and dried, and provide a well-balanced diet ; lastly, isolate any cases of pneumonia that might occur—it is too often forgotten that the disease is infectious—and provide proper nursing.

We may quote here the conclusions of a paper on tropical pneumonia submitted in 1931 to the Advisory Council of the

Eastern Bureau at Singapore, which apply now as they did then :

" The interest shown in pneumonia has not so far been proportionate to the gravity of the problem ; whilst important resources in personnel and money are devoted to the fight against malaria, yellow fever or sleeping-sickness, tropical pneumonia has remained more or less neglected, despite the toll of lives it claims. This may be related to the fact that pneumonia has not interfered with the settlement of the whites in the tropics, as is the case with malaria. Only in big exploitations, where the disease has assumed the proportions of an economic menace, has the problem been adequately approached.

" There certainly is now a tendency to pay more attention to it ; but the attempts made are still isolated, and no general plan of campaign appears ever to have been discussed. The drafting of such a plan could be entrusted only to a body of experts, comprising clinicians, bacteriologists and administrative officers, all fully aware of tropical conditions and possibilities."

F. Yaws.

Though the problem of yaws, the rural disease *par excellence* has an economic and social aspect, this is not due to the death rate, which is practically nil, but to the incapacity which it causes. In advanced cases, indeed, the osteocopic pains, scars, retracted tendons and stiffening of the joints may entail partial or total incapacity for work, and that at a stage when specific treatment is no longer of any avail. Hence the necessity of detecting and curing cases at the outset, particularly as a *therapia magna sterilisans* is available. This requires a network of dispensaries, or enough mobile squads to cover the entire country.

The diagnosis of yaws is easy ; if mistaken for syphilis, this is of no importance, since the medication is identical, even though the diseases are not. Yaws are arrested by a single injection,

and that is why in rural districts the syringe is credited with almost magical powers. The dexterity and rapidity with which intravenous injections are administered by doctors and dressers in the rural dispensaries is impressive ; though they do not take all the precautions usual in Europe, accidents are virtually unknown.

In many countries, the active support of the inhabitants for the treatment campaign has already been obtained, and the same result could be easily obtained elsewhere, as the cure is sufficiently striking to impress even the most sceptical.

We do not propose to deal here with the respective merits of the arsenobenzenes, bismuth preparations or stovarsol. The deciding factor in the choice of the drug would appear to be its cost. The arsenical preparations are undoubtedly the most active, but they are also the most costly. When, for financial reasons, they cannot be generally employed, the only alternative for purposes of mass treatment is to use bismuth, though its action is certainly less pronounced, more injections are required, and toxic phenomena are more frequent, particularly among certain races. Nevertheless, in view of the results obtained in Kenya and Tanganyika, for example, where tartrate of bismuth is prepared in the Government laboratories and costs less than one cent a dose, it is obvious that the bismuth treatment has proved its worth.

The importance of housing in the transmission of the disease should not be underestimated. It stands to reason that a beaten earth floor, after absorbing the discharges from frambœsia lesions, will be a more permanent source of contamination, particularly for children, than a wooden floor which can be thoroughly scoured with water. The part played by bloodsucking flies—particularly of the *Hippelates* variety—as vectors of the disease has been proved in Jamaica and should receive attention.

Any campaign against yaws should form part of a comprehensive scheme of health propaganda and education ; the prestige which the doctor gains by curing a sometimes repulsive and painful complaint will enhance the reputation of modern medicine among the inhabitants of rural areas and facilitate its spread.

G. Leprosy.[1]

I. — The Present Situation.

For a long time, Governments left the care of lepers to public charity exercised, with the help of grants, mainly by religious missions. In more recent times, they relied upon lay societies whose work was based more directly on modern science and hygiene. In principle, this appeared to be a satisfactory method of dealing with the problem, but, in practice, the resources of the societies proved to be inadequate. It is only latterly that public health authorities, confronted with the evidence of the wide prevalence and tenacity of endemic leprosy that has been obtained through the investigations of doctors and hygienists, have begun to take an active part in the anti-leprosy campaign.

It is sometimes said that scientific research has neglected leprosy, regarding it as a desperately difficult subject which does not respond to the investigator's efforts. That is no longer true to-day, as is proved by the relevant bibliography. It is possible that the research is still too scattered, but a great deal has been done to organise it by the establishment of special laboratories and institutes (French West Africa, Brazil, British India, Netherlands Indies, Japan, Philippines) and the foundation, under the auspices of the Health Organisation, of the International Centre for Research on Leprosy at Rio de Janeiro.

Science has not yet acquired all the knowledge needed for the prevention of the disease ; we do not yet know exactly how leprosy is contracted and transmitted. In time, it might be possible to eradicate leprosy by the methods employed in health work to-day. But reliance is being placed on scientific research to achieve more rapid and more reliable results. Science should not be confined to the laboratory, co-operation should be organised between experimental research, clinical study (particularly dermatological), epidemiological investigations and therapeutics.

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[1] This chapter has been written by Professor Et. Burnet, general rapporteur of the Leprosy Commission of the Health Organisation.

Epidemiology.

Since, in addition to its specific cause, every contagious, endemic disease depends on habitat : soil, climate, population, customs and level of civilisation, every country in which leprosy is prevalent should work out its own epidemiology : this work is being carried out nearly everywhere on the same general lines as the epidemiology of tuberculosis. It must be based on a census, which can be taken only with the participation, and indeed under the control, of medical specialists ; the object is to detect not only obvious cases but also incipient cases, latent cases and carriers and to make patient enquiries into the genealogy of cases (examples : the surveys undertaken in British India and the recent enquiry at Cebu in the Philippines). The special situation of children should be ascertained, chiefly by the inspection of schools. These investigations afford an opportunity for carrying out and testing the "leproline" reaction. Epidemiology is in itself a form of scientific research.

Its aim is even more to break down leprosy foci than to trace individual lepers : reference may be made to the suggestions advanced by CHAGAS regarding the foci in the State of Minas Geraes in Brazil, some of which seemed to him very active while others appeared to be dormant. Nevertheless, there are certain countries in which enquiries disclose no groups of lepers representing a focus of contagion but only isolated individuals (Africa, Afghanistan).

There is no need, however, to enlarge upon a policy of which the anti-tuberculosis campaign affords a classical example— namely, a determination to seek out the patient in his own environment. This may be termed a "penetrating" form of epidemiology. Without it, it is impossible for experimental research to obtain its material, to raise problems or decide questions such as the part played by insects in the propagation of the disease and the actual manner of propagation.

Scientific Research.

The problem which takes precedence over all others is that of the reproduction of the disease in laboratory animals. Progress has been made on the rat through the research work of SHIGA

(1929), and subsequently of JORDAN and his collaborators (São Paulo, 1935), but the problem has not yet been solved.

The second problem is that of the culture of the leprosy microbe. As LIE wrote : " I have seen nearly all the cultures made throughout the world ; they are all different ". We are entitled to add that, up to the present, none of them has proved its worth.

These two problems have been complicated by the researches into the pleomorphism of the bacteria and the existence of life cycles at different stages. At the present time, the ætiology and epidemiology of leprosy are dominated by the hypothesis of a filterable virus or inframicrobe of leprosy, which has been largely modelled on the research into tuberculosis. The chief points are as follows :

The positive filtration experiments—the value of which, however, has been weakened considerably by the experiments in electrical cataphoresis of filtrates (PLOTZ and CHOUCROUN) ;

The observations of RODRIGUEZ, MABALAY and TOLENTINO : a decrease in bacillary forms and a multiplication, during treatment, of the granulations already existing in incipient, closed and untreated cases ;

RODRIGUEZ' observation : treatment (chaulmoogra) does not prevent the development of the first signs of leprosy in children ; it has a beneficial action on lepromas which are swarming with bacilli but it does not appear to affect the maculæ in which bacilli are rarely present ;

The general interpretation of these facts by MANALANG : the bacilli do not transmit the infection : the contagious stage is that of the virus. The isolation of lepers covered with lepromas will not eradicate leprosy.

Apart from this central question, there are two others of great importance to the epidemiologist :

The intradermal leproline reaction (MITSUDA-BARGEHR), the physiological nature and practical significance of which have not yet been fully determined ;

The possible part played by insects, particularly the mosquito and the phlebotomus, in the transmission of the

disease (LUTZ), whether the insect really acts as a vector and transmitter, or the bite, if it is scratched, leaves the way open for the bacilli, which have somehow settled on the skin (L. ROGERS).

Prevention.

Compulsory segregation has been condemned as barbarous (rounding-up by armed guards has been replaced by epidemiological medical investigations) ; ineffective (it did not prevent the persistence of foci of infection) ; impossible to carry out (as a rule the number of lepers was greatly in excess of the available accommodation).

The liberal preventive policy which is now advocated for lepers is similar to that of tuberculosis and can be explained in one word—namely, detection (through dispensaries and health visitors) ; treatment of non-contagious cases at the dispensaries ; isolation, with treatment, of contagious cases in sanatoria ; observation of treated cases after treatment ; reinstatement in society of patients in whom the disease has been arrested or cured.

It is important to note that, although compulsory segregation has been rejected, isolation has not been relinquished any more than in the case of tuberculosis patients ; the compulsory isolation of contagious tuberculous patients is provided for under the laws of several European countries. The practice adopted in this connection depends partly on the number of lepers and on available isolation facilities : British India is unable to isolate, but Japan and São Paulo consider that they can isolate all their contagious lepers. But it is also a question of scientific principle : Japan and the State of São Paulo adhere to the principle that compulsory isolation is in every case the essential basis of prevention. It has been urged that lepers should have the benefit of the ordinary law, but this cannot be the same for them as for healthy persons and necessarily requires the organised isolation of contagious cases that are unwilling or unable (or both) to isolate themselves in their own homes—under supervision, of course, especially as the majority of lepers are poor people, uneducated and without means of livelihood.

In the old days, the only institution in existence, the leprosarium, received lepers of all kinds, without distinction, and never let them go. The functions which it exercised have now been divided up theoretically as follows :

Non-contagious, chiefly incipient cases.	Voluntary treatment at the dispensary.
Old cases (mutilated or infirm).	Assistance in institutions.
Lepers who are seriously ill and bedridden.	Special hospital or special hospital service.
Active lepers (except for special treatment, and occasionally treatment at an infirmary).	Sanatorium or colony or treatment station.
Lepers' children—from birth to adolescence.	Crèches, boarding-schools.
Lepers in whom the disease has been arrested or cured but who cannot return to community life.	Colonies for ex-lepers.

In practice, is it possible to have as many different institutions as there are functions ? How many countries would be able to establish and maintain half a dozen specialised institutions ? Since most countries in which leprosy is prevalent have a mild climate and are situated in the tropical or sub-tropical zone, establishments which are economical to run and—as there is no lack of space—the grouping of the various services according to local conditions are now recommended.

The main institution is the rural and agricultural settlement, with an infirmary and a hospital attached. As is well known, very large settlements have been established at Culion (7,000 lepers) and Agua de Dios (Colombia). Opinion is changing, however, on this subject as it is on that of large sanatoria for tuberculosis patients, at a distance from the towns ; the arguments against them are the cost of the journey, the breaking of family ties and the patients' distress at being treated as outcasts from society. The tendency is to place the settlements

nearer towns or villages, and to decentralise them by establishing regional settlements or " treatment stations ". (This tendency is very marked in the Philippines and at São Paulo.) In the Philippines, it is urged that Culion should be broken up. The proposal to merge the three Colombian colonies (from 7,000 to 8,000 lepers) into one is not in accordance with the new ideas.

In organising and establishing the necessary institutions according to the conditions obtaining in the various countries, the authorities should be guided by the principles of social medicine.

Treatment.

At the Bangkok and Manila Conferences, a distinction was made between the general treatment of the patient and the special treatment of Hansen's bacillus infection. For special treatment, the only remedy that may be held to possess actual curative power is chaulmoogra oil (and its derivatives). It must be admitted that this power cannot be asserted to be specific. Certain leprologists who have had very wide experience still contend that it does not exist.

Certain gold compounds and methylene blue administered in specific quantities and by a special technique may be regarded as adjuvant remedies.

During the last few years, treatment with chaulmoogra has improved. It has been applied more regularly and for a longer time ; recourse has been had to intradermal and intravenous injection, and the physical and chemical qualities which chaulmoogra oil should possess have been ascertained (these data have been inserted in the Codex of various countries).

Despite the criticisms levelled at chaulmoogra, the necessity for its use is commonly acknowledged because it is the best remedy and nearly all patients demand to be treated : this latter is not a scientific consideration.

In present circumstances, the pharmacological problem of chaulmoogra deserves to be studied for practical purposes ; this problem has three different aspects :

Clinical aspects	To what extent is it efficacious ?
Physico-chemical aspect . .	Characteristics of efficacious chaulmoogra products.

Botanical aspect . . . . . Cultivation and use of plants producing efficacious oils.

Apart from the associations specially and regularly engaged in combating leprosy, these questions have recently been taken up by the International Pharmaceutical Federation and the British Medical Association.

II. — Leprosy and Rural Hygiene.

The Agenda of the Conference on Rural Hygiene in the Far East might almost seem to have been drawn up with special reference to leprosy, so much is the study of the conditions of leprosy prevention implicit in its several items.

Leprosy is indeed essentially a rural endemic disease : the only hope of its eradication lies in a sanitation, housing and food policy.

It is a truism to say that, in sparsely populated countries, leprosy is a rural disease, but even in densely populated countries with large urban centres, the real foci are generally to be found, not in the large towns, but in the small and remote country villages. The lepers are attracted to the towns by the possibility of relief and begging—but they come from the villages. The towns are the places where lepers gather, and not the foci of the disease. The Calcutta School would appear to have been the first to demonstrate this fact in British India.

This consideration suggests that preventive activities should be decentralised and that epidemiological work, prevention and treatment should be directed to the promotion of rural hygiene.

The best guide will always be the analogy with tuberculosis which, though originally an urban disease, has come to be in large measure a rural endemic.

The rounds of the staff engaged on detection in rural districts are no longer a mere adjunct but the essential operation of epidemiology, whose task henceforward will be to seek out leprosy " in the nascent stage " in the country districts.

The prevention organisation should extend its ramifications into the remotest country districts like the capillaries into the tissues.

In our opinion, therefore, there can be no question of setting up a special autonomous leprosy organisation, recourse being had in most cases to the joint machinery of the public health and social medicine services. The inclusion of leprosy in the general pool of public health is all the more indicated in that it does not lead to sudden swift-moving epidemic outbreaks. In the case of leprosy, the disease and prevention are both chronic and the problem is to give leprosy its proper place on the premises, and in the programmes and time-tables of the health centres, dispensaries and hospitals.

For reasons of economy, however, centralisation (subject, of course, to regional devolution) will continue to be applied as regards homes for incapacitated and incurable lepers. As treatment and equipment are both simple, decentralisation in the treatments of non-contagious cases can be carried to great lengths.

As regards both methods and staff, the anti-leprosy campaign is assuming more and more the form of rural hygiene work.

The chief characteristic of the method is mobility ; detection, supervision, isolation and even treatment can be left to travelling squads such as those employed in Morocco and Tunisia in dealing with typhus and in Egypt in dealing with trachoma.

Schools are increasingly used as meeting-places, examination centres and centres of health education.

As regards staff, leprosy prevention—like medicine in general —cannot rely exclusively on the fully qualified doctor of medicine or the highly trained hospital attendant. Mobile or travelling preventive squads, and even the small fixed centres, require medical auxiliaries and nursing auxiliaries. The question of auxiliary staff is one of the most important which the Bandoeng Conference will have to examine and is second to none in its importance from the point of view of leprosy prevention.

It is impossible to mention auxiliaries without referring to missionaries. For what is termed field epidemiology—detection, the examination of families and the inspection of houses, the observation of patients after treatment, of " arrested " cases, and perhaps even of the cured—the missions can do service no less valuable than in the days when they had sole charge of the leper hospitals. When, some years back, we paid a well-merited

tribute to their devoted services, we invited their assistance on these lines. The Toc H organisation (Rev. P. B. Clayton) has taken up such work of its own accord. It would be a great mistake not to take advantage of native auxiliaries in dealing with leprosy, as has been done in the sphere of general medicine and assistance in various British and French colonies and protectorates.

These are not theoretical statements but are based on experience—that is to say, on the practice which health authorities have already been compelled to adopt through force of circumstances. As it is not possible to go into details, we will simply enumerate the examples of the last ten years : the surveys in India; the investigations in French West Africa, Australia, Brazil, the Guianas, Japan and the Philippines ; the tours arranged for purposes of detection by the Union of South Africa, with the help of native assistants ; the work of the British Empire Leprosy Relief Association now in progress in several British territories in Africa ; and the preventive work at once organised and decentralised in the State of São Paulo.

No part of public health work is now isolated from the remainder, and the whole question is becoming more and more closely bound up with the progress of general civilisation. The fate of leprosy depends on the solution of the main problems with which modern hygiene is confronted : sanitation, housing, nutrition. This will have been sufficiently obvious from the brief explanations we have been able to give. As regards sanitation, it should be pointed out that flies and other insects have not been exculpated so far as the ætiology of leprosy is concerned. The rural foci of leprosy are mainly house foci; from the point of view of leprosy propagation, the part played by dwellings is no less important in Asia and Africa to-day than it was in mediæval Europe. Leprosy is an endemic disease which yields before the advance of general civilisation. It has been said that leprosy is only too anxious to disappear, but, if this is to happen, the resistance of exposed subjects must not be weakened by diseases which chiefly occur in rural surroundings.

As for nutrition, there is no need to emphasise its importance —this has already been sufficiently demonstrated and acknowledged. In connection with leprosy, we may quote,

inter alia, the example of the British Sudan, where consumption or non-consumption of milk (chiefly) and meat determines the prevalence of, or practical freedom from, leprosy in a district ; the " spontaneous " disappearance of the infection in children who are well nourished ; and the facts observed in British India by MUIR—namely, the " spontaneous " improvement in the condition of lepers who were given an adequate diet (including milk, in particular) but who received no special treatment.

In short, general civilisation represents a victory over poverty and ignorance, which in all countries are the root cause of the endemicity of the most stubborn diseases—malaria, typhus, tuberculosis, leprosy. Being personally convinced of the need for pursuing experimental research into leprosy as vigorously as possible and improving its specific treatment, we have no hesitation in saying that, assuming, for the sake of argument, that we had to choose between them, we should decide that pharmacology is less important than nutrition and rural reconstruction, with the assistance of the population duly educated for the purpose.

Position in Eastern Countries.

India, the Netherlands Indies, Japan and the Philippines have had, for varying lengths of time, first-class research centres which have issued a large number of publications. It would be desirable for each of these centres to give a brief account of its work to the Conference.

In the epidemiological field, Australia could contribute the results of close enquiries in districts where leprosy is rare ; India, the highly valuable results of enquiries carried out in an increasing number of districts in a country where the vastness of the area and numbers of lepers would seem to defy classical methods ; the Philippines, the regional experience of their treatment stations.

In the matter of prevention, Japan and the Netherlands Indies adhere to the doctrine of the systematic isolation of contagious cases. Indo-China, the Malay States and Siam also favour this policy. India, where the isolation of all contagious cases appears to be impossible in present circumstances, affords

an example of the progressive application of rural prevention by means of "voluntary treatment". In addition to establishing institutions for the isolation and treatment of cases, the Philippines have started a prevention campaign.

China, whose Government realises that it must make itself responsible for a task with which the missions are no longer able to cope, has not only its own internal problem but, owing to emigration, also an external problem to solve.

In Oceania, there is the difficult problem of organising preventive action which is dispersed among a multitude of islands administered by different Governments.

From the point of view of the next International Conference on Leprosy which is to meet at Cairo (March 25th, 1938), the Conference on Rural Hygiene in Eastern Countries comes at an opportune moment. It might render an inestimable service, not by supplying additional information and detailed studies, but by condensing and summarising, and drawing conclusions from the experience acquired, both in the field and in laboratories, in that part of the world where leprosy is chiefly prevalent.

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