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A HISTORICAL TREND IN TROPICAL MEDICINE

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INTRODUCTION

In looking for a subject appropriate for this Presidential Address I first thought that some account of the development of the Bureau of Hygiene and Tropical Diseases might interest you, and with that in mind I turned to the first volume of the Tropical Diseases Bulletin, issued in 1912. It was the successor to the Sleeping Sickness Bulletin first brought out in 1908.

On looking through that volume I was reminded of the great advances in knowledge of the diseases we conventionally regard as tropical which have been made since 1912, and even more since the latter part of the 19th century, and I therefore went back further, to the first edition of Manson’s classical textbook, Tropical Diseases, dated 1898.

I found these two publications so interesting that I decided not to make the history of the Bureau my subject, but to reflect a little on some features of the development of tropical medicine during the last 100 years or so, and particularly the present century, and to do so against the background of some historical medical ideas.

The main theme I have in mind is that medicine has become a much wider and more human subject in the past few centuries, that this process is still continuing, and that tropical medicine has given an important lead to the rest of medicine in furthering this trend. It is, I believe, one continuous story of increasing maturity of outlook, to which tropical medicine contributes significantly.

I propose first to comment on the social elements in the epidemiology of some of the diseases we conventionally regard as tropical, then to show how medicine has moved since the Renaissance from preoccupation with the individual patient to the wider concept of the influence of environment—including work—in the causation of disease, and the importance of control of the environment. This leads on to the new outlook and stimulus on environmental control which followed the discovery of vectors of tropical infections. Finally I want to say something about the changing pattern of disease in the tropics in this period of unprecedented social upheaval.
Having observed from an editorial chair the development of medicine during the last quarter of a century, I feel that I have had the opportunity to make my own assessment of the way things have been moving.

When Manson wrote, the causes of yellow fever, dengue, the rickettsial diseases, leishmaniasis, beriberi and pellagra, sleeping sickness, yaws, and bartonellosis were not known, and the means of transmission of yellow fever, plague, dengue, leishmaniasis, sleeping sickness, bartonellosis, loiasis, onchocerciasis, schistosomiasis and other trematode diseases, and even hookworm infection, were still not understood. And, of course, some of the infections that now interest us were not mentioned.

We have come a long way since then, and the advances made in the understanding of diseases we call tropical, during the past century, most of which are transmissible diseases, have brought us to the point where we know in theory how many of them could be defeated, by treatment, immunization, and interference with the environments in which they exist. And the means by which the environmental factors could be influenced seem to me to be not primarily medical.

**SOCIAL DISEASES**

Like other diseases, those we commonly think of as tropical originally presented themselves as medical problems, but the elucidation of their causes and transmission systems changed much of the emphasis. They still remain medical problems in that the treatment of patients, drug prophylaxis, and the use of immunizing agents, are the concern of the doctor, but prevention of many of the infections and of the deficiency diseases has more and more moved out of the doctor’s hands, into those of the biologist, the veterinarian, the agriculturist, the engineer, the forestry expert and the educationist, to be controlled as a matter of general policy by the administrator and his financial advisers—but all, we must hope, under the advice of the doctor. And the doctor should, I am sure, call the tune. The elucidation of these epidemiological factors has also made us more aware, I think, of the importance of man himself, his habits, customs, and even beliefs, in the epidemiology of these conditions. The problems of tropical medicine, in fact, are largely problems of social—including economic—conditions.

Examples of some such diseases are obvious. Typhus, for instance, is pre-eminently a social disease. Sir William MacArthur has convinced us that the plague of Athens in the 5th century B.C. was louse-borne typhus, in a population crowded into the city and besieged there, and he has also given us a vivid picture of the same disease as it occurred in Ireland at the time of the great potato famine of the 1840’s, when, again, a great population swarmed into the towns and cities in conditions of extreme poverty. The same is true of typhus in Russia and Poland after 1918, and in North Africa in times of economic stress. No doubt typhus was present in a sporadic kind of way in the populations of those countries before these epidemic outbursts, but it was the intrusion of other, social, factors such as war and famine, with consequent poverty and overcrowding, which was the exciting agent for epidemic spread.

Plague visited this country many times in the past. I do not know that we understand why it broke out to epidemic proportions when it did, but the reason was probably connected with the populations of the domestic rats of our towns and cities. But it disappeared after the 17th century, long before its cause and transmission were understood (though an association with rats had been suspected even in Biblical times), and long before we had any effective treatment. It is at least possible that the general gradual improvement in standards of
living and in the construction of buildings, by providing conditions less suitable to the
domestic black rat, had an effect in the disappearance of plague from Europe. The total
cause of the disappearance of this disease may have been more complex than this, and may
have been connected with a great movement of brown rats from Eastern Europe, which
gradually ousted black rats from the rest of Europe, and Britain, but it seems likely that the
activities of man were major epidemiological factors.

Chagas's disease is also a case in point. It would not affect man if he did not build his
houses of mud and wattle in which the triatomid bugs find suitable quarters. As Craig
and Faust (1951) put it, the bugs "live in the cracks, holes and between the thatch of houses
of primitive construction, as adobe, grass and thatched houses. Since only the poorest
people dwell in such habitations, it follows that they are the ones who become infected."

Tuberculosis in Britain apparently spread to the proportions of a long slow epidemic in
the 18th and 19th centuries, and there is no reason to doubt that the dominating factor was
the movement of country people to the overcrowded industrial slums—a situation which is
now being repeated in parts of Africa, as Dormer (1948) shows so vividly. Yet this epidemic
in Britain passed its peak, and began to decline before any special medical service was organ-
ized against it. This decline may have been part of the normal course of the epidemic, when
the susceptible human strains were dying out, leaving the more resistant to propagate them-
selves. But the improving environment may also have played a part, and in any case the
influence of environment is certain in the upsurge of the epidemic. The decline is now,
of course, being accelerated by the new drugs.

However, I do not mean just these obvious diseases, and the intestinal bacterial and
helminthic diseases which almost disappear when water supplies and sewerage systems are
introduced, but also diseases like yaws, which is rare in countries where bathing, and con-
sequent cleanliness of the skin, is customary. So much so that Hackett (1959), in commenting
on the diminution of yaws in countries where mass campaigns have not been undertaken,
remarks that "all aspects of the improving standards of living are playing important parts."
He puts stress on water supplies and good soap, leading to cleanliness of the skin which seems
to reduce transmission, and links these factors with improved economic and social conditions
in general, especially better housing and better food supplies.

I mean also trachoma, so often, it is said, passed on through contact with infected
towels and other agencies, and by flies, and so much influenced (as in a village in Turkey)
by a plentiful water supply. Even in the absence of modern treatment it can disappear,
and it does not thrive except where hygienic conditions are primitive (Brit. med. J., 1963).
It is a social disease.

I mean also kwashiorkor, which, Morley tells us, may be precipitated by an attack of
measles or—and this is my point—by the death of a parent.

A letter recently appeared in the British Medical Journal which puts the kwashiorkor
situation in Kenya very succinctly. The author (Taylor, 1963) observed a very great increase
in the incidence of kwashiorkor in the Fort Hall District during the period 1956-59, when
he toured the area and kept detailed records of 2,600 children between infancy and 5 years
old. In one part of this area the incidence of kwashiorkor increased from 2 per cent. to
20 per cent.; in another from 15 per cent. to 60 per cent. The probable causes of the increase
were different in different places. In one the main crop was changed from millet to maize
as a move for better marketing, and maize is much inferior as a cereal for infants. In another
the introduction of an artificial insemination scheme for cattle necessitated castration of all
the local bulls, but the poorer people found the scheme too expensive, and would not parti-
icipate in it. Their cows went dry and were sold, resulting in a greatly diminished supply of communally donated milk to a crèche, and kwashiorkor quadrupled within 6 months. In yet another area the land consolidation scheme meant that the large proportion of villagers who formerly had been able to graze their cattle over the unwanted land of their richer neighbours could no longer do so, because under this consolidation scheme that land was wanted for other purposes. Therefore the villagers had sold their cattle, and kwashiorkor rose to affect 37 per cent. of the children under five.

Taylor also draws a parallel between the land enclosures of Kenya and those which took place in England in the 18th century. These English enclosures were part of a general move to better the state of agriculture, and though they led to much hardship at the time—as portrayed by Goldsmith in *The Deserted Village*—they eventually had a beneficial effect. For instance, according to Trevelyan (1944) they helped to eliminate scurvy, which had been a constant accompaniment of winter.

These Kenya land development schemes may lead to benefit in the long run, but in the meantime they have apparently produced severe side-effects, which probably could not have been foreseen, but which are examples of the general rule that social measures may have unexpected bearings on health.

Taylor shows that kwashiorkor is a man-made disease, and says that “This process of change in economy and way of life is happening all over Africa south of the Sahara." He concludes this important letter by suggesting that “kwashiorkor must be prevented not by health education at village level, which is merely shutting the stable door after the horse has bolted, but by similar authoritative and effective action at the national planning level.”

These ideas of the environmental and social elements in disease, which seem so obvious in tropical medicine, represent a development of views about the nature of disease in general which have matured only slowly during the past few centuries. It seemed interesting to follow in outline the development of these ideas, and in doing so it seemed that the history of tropical medicine was a special application of the general principles that were gradually evolving, and that in some respects tropical medicine had taken the lead in that general development.

**The Development of Preventive Medicine**

Allow me to explain what I mean. After the classical era of medicine, which ended with Galen in the second century A.D., there was a long period of over 1,000 years, during which the dominating feature of medical life was reverence for the ancients, and it became almost a heresy to question them, as in the case of John Geynes, a Doctor of Medicine of Oxford, who even as late as 1559 was cited for impugning the infallibility of Galen, and only admitted to Fellowship of the College of Physicians after he had humbly recanted (Munk, 1878). The ancients had said the last word, and medical virtue consisted in blindly following their teaching and applying it. And for the most part this teaching related to the treatment of the sick.

But then, as now, in Britain people who had not been through the course of training recognized by the universities would practise medicine, and eventually the doctors revolted against this invasion of their privileges, and early in the 16th century a movement was made to organize the profession by granting licences to practise only to educated persons approved by competent authorities. The College of Physicians was therefore created, and was granted a Charter in 1511, and in 1522 a statute was proclaimed which precluded any persons from
practising medicine, particularly "those wicked men who shall profess medicine more for
the sake of their avarice than from the assurance of any good conscience, whereby very many
inconveniences may ensue to the rude and credulous populace." The authorities would
admit "only those persons that be profound, sad, and discreet, groundedly learned, and
deeply studied in physic." (Royal College of Physicians of London, 1959). Surgeons were not
included.

Those of us who attend the College dinners from time to time may agree that though
we may be profound, discreet and learned, we fall short of our forefathers in the quality of
sadness.

But in the 16th century the spirit of the Renaissance began to make itself felt in medicine,
particularly in Italy, where true research, free from the authoritarian influence of antiquity,
began to take hold. The anatomists reflected this spirit, and Vesalius (1514-60) began to
look afresh at his dissections, rather than to interpret them in the words of Galen, and he
produced his magnificent volume on the structure of the human body. Admittedly, in the
index to this superb book the name of Galen occupies many columns, but Vesalius did break
away from the tradition that Aristotle and Galen between them had said all there was to say.

Then Fabricius ab Aquapendente (1533-1619) made his detailed observations on the
veins and their valves, but missed the implications of his findings, namely that blood could
flow in them in only one direction, and it was left to his pupil, our own William Harvey
(1578-1657), to discover the circulation of the blood, perhaps the greatest contribution of
all time to the study of medicine. His book on the motion of the heart and blood was pub-
lished in 1628. Harvey was a small dark man, and is said to have been "very Cholerique;
and in his young days wore a dagger (as the fashion then was) but this Dr would be apt to
draw-out his dagger upon every slight occasion." (Aubrey). It is odd to think that this
great innovator advised Aubrey to read the ancients, and referred to the moderns in extremely
rude terms. He was a vigorous writer, as well as a highly critical experimentalist, and
in his account of his meticulous work to prove the circulation of the blood he at one point
became so exasperated with Galen's dictum that blood travelled from one side of the heart
directly to the other, through pores in the septum, that he exploded into a Latin expletive
(mehercule), translated as "But, damme, there are no pores." Robust language, but re-
freshing. And yet "'twas beleeved by the vulgar that he was crack-brained; and all the
Physitians were against his Opinion" (Aubrey, p. 214).

Harvey was a friend of Robert Boyle the chemist, and must have sensed the new scientific
spirit which led shortly to the creation of the Royal Society.

In clinical medicine, the 17th century perhaps reached its height in Thomas Sydenham,
who was chiefly absorbed in the clinical phenomena of disease, and problems of treatment,
writing on an extremely wide range of diseases, from gout to burns, to dysentery, to scurvy
(for which he recommended a drink containing the juice of half an orange), and to the fevers,
including malaria, plague, typhus, cholera and dysentery; he even mentions yaws.

But though Sydenham, like his predecessors, was chiefly absorbed in clinical matters
he did speculate on the origins of infectious diseases. Of epidemic diseases he wrote:—
"There are different constitutions in different years. They originate neither in their
heat nor their cold, their wet nor their drought; but they depend upon certain hidden and
inexplicable changes within the bowels of the earth. By the effluvia from these the atmos-
phere becomes contaminate, and the bodies of men are predisposed and determined, as the
case may be, to this or that complaint."
His conclusions about the inexplicable changes in the bowels of the earth are immaterial; they echo Hippocrates, but that is not the point, which is that Sydenham carried into clinical medicine the emancipation from authority which was in the spirit of the age. He believed "that the art of medicine was to be properly learned only from its practice and its exercise" and one of the lessons he learned was, as he said, that "cleanliness is medicine."

The 17th century also saw Leeuwenhoek's work on his "little animals," which has so obvious a bearing on later research.

The 18th century has been described by Singer and Underwood (1962) as the period of consolidation, with emphasis on clinical medicine, and on the study of anatomy and physiology. But in that century the long voyages undertaken for trade and exploration, and for war, led to the study of conditions in which seamen lived, and these conditions were recognized as factors in the sea diseases—"scurvy, fevers and fluxes (dysentery)." This kind of work is linked with the name of Lind (1716-94) who demonstrated how scurvy could be prevented by fruit or lemon juice. A similar movement in the army by Pringle (1707-82) led to the identification of gaol fever (typhus) with hospital fever and ship fever, and their common association with overcrowding, to the appreciation of the fact that dysentery is associated with bad sanitation, and to the institution of rules for the hygiene of camps, proper drainage, and the avoidance of marshes.

The movement towards general prevention by altering the environment was taking shape.

**Occupational Medicine**

At the beginning of that century, too, in 1700, Ramazzini (1633-1714) published his famous book on the diseases of tradesmen. He was not the first to write on this subject, which had interested Philip Bombast von Hohenheim (1493-1541), better known as Paracelsus, a disturbing and quarrelsome Swiss doctor who studied the fibroid lung diseases of miners, and which had been referred to by a number of other authorities who mentioned specific diseases linked with certain trades. But Ramazzini was perhaps the first to make a deliberate and separate study of the effects of the environments in which people work, realizing that these environments are of the greatest importance for health. He wrote of miners, potters, cleaners of jakes, fullers, laundresses, music masters, printers, soap boilers and a host of others, and he wrote with occasional sly humour: "Fallopious, in his treatise of the Pox, tells us that Jacobius Carpenis got above 50,000 ducats of gold only by curing the pox by inunction [of mercury]; and that he killed many, though he cured the greatest part. It is certain that this anointer knew better than the alchemists how to make a true metamorphosis of mercury into gold."

In his preface Ramazzini remarks: "The Divine Hippocrates informs us, that when a physician visits a patient, he ought to inquire into many things, by putting questions to the patient and the bystanders. You must ask, says he, what uneasiness he is under, what was the cause of it, how many days he had been ill, how his belly is affected and what food he eats. "To which I would presume to add one interrogation more: namely, what trade he is of."

In other words, what is his effective environment?

And to this, incidentally, Maegraith would add: "ubi venis—where have you been?"

Ramazzini's interest was in the causation of these diseases, and he does not say much about prevention, a matter that was taken up more vigorously by our own Charles Turner Thackrah (1795-1833), a physician of Leeds, who in 1831 published his book—*The Effects of Arts, Trades, and Professions and of Civic States and Habits of Living, on Health and Longevity: with suggestions for the Removal of many of the Agents which Produce Disease, and shorten
the Duration of Life. This classic, relating to "about 120 employments," goes further than Ramazzini. It shows how mortality rates of the time were much higher in industrial towns than in the country, and it is a reflection of the medical results of the industrial revolution as interpreted by a keenly observant physician interested in causes and in prevention. In the preface to the second edition Thackrah writes: "A study of medicine, moreover, which disregards the prevention of diseases, limits its utility and its honours. It would strip the profession of its noblest attribute, that of benevolence; and exhibit our practice as influenced more by personal and pecuniary motives, than by an anxiety to relieve human suffering." And he complains that this aspect of medicine—namely prevention—had until then received little attention. He died of tuberculosis at the age of 38.

Thackrah's book was reprinted a few years ago, with an introduction by Andrew Meiklejohn (1957); and a quotation from Meiklejohn's biographical introduction is relevant. Writing of Thackrah he says: "He realized the need for the education of masters, workmen, doctors and legislators, always toward the supreme objective—PREVENTION. . . . The subject concerns not only medicine but engineering in all its branches, management and the social sciences."

During this early part of the 19th century, therefore, people began seriously to realize that industrial conditions, and the resulting urban slum degradation that they brought, were major environmental influences which affected physical and mental health—and morals, always near to the hearts of the Victorians. Some of the artists became obsessed with it, particularly Hogarth with his grim picture of gin lane, and some of the poets, particularly Blake with his "dark Satanic Mills," and his recognition that the ultimate origin of these conditions was in the minds of those who did not place enough value on human dignity:

"I wander thro' each charter'd street,  
Near where the charter'd Thames does flow, 
And mark in every face I meet  
Marks of weakness, marks of woe."

"In every cry of every Man,  
In every Infant's cry of fear,  
In every voice, in every ban,  
The mind-forg'd manacles I hear."

(London).

But industry did not change quickly, in spite of the warnings of writers and some of the doctors. For instance, the hazard of lead poisoning from the glaze used in the pottery industry was known from before the 18th century (for example by Ramazzini), but movements to use glaze free from lead, or containing only a small and safe amount, were opposed in the 19th century by those who blamed this poisoning on the apathy and carelessness of the work people, or who said that prevention was uneconomically expensive. It was only in 1947 that legislation was finally enacted to put an end to this hazard (Meiklejohn, 1963).

THE 19TH CENTURY PUBLIC HEALTH MOVEMENT

This trend towards the study of occupational diseases was a definite advance on the earlier preoccupation with the sick patient, and the impulse came largely from doctors. Ten years after Thackrah the trend was sharpened by the publication of Chadwick's Report on
Chadwick’s mind seems to have been the realization that disease—particularly typhus—caused a drain on public expenditure for the relief of individual patients, so high that it appeared essential to remove the cause of disease, and so relieve the public expenditure. The Commissioners interviewed doctors and other persons throughout the country, and they saw for themselves the conditions in which the people lived. And what they found appalled them.

This was the period of the full working of the industrial revolution, when the economic theory of laissez faire held the political field. It was a doctrine which revolved round the principles of freedom, and this doctrine held that everybody was at liberty to pursue his own self interest without interference from the state, so that the so-called natural laws of economics could operate to the advantage of the community as a whole. This doctrine entailed buying materials (and labour) as cheaply as possible, and selling for as much profit as competition would allow; it led employers to regard labourers as units of production, and it led builders to throw up the slum houses which still persist in parts of the country, as cheaply as possible and without more than the minimum of regard to the amenities indispensable to human dignity. The Commission reported on these back-to-back houses, small, dark, unventilated, without water or light, and without any sanitary fittings except the ancient forms of privies which discharged into the natural rain channels between the rows of houses. And in these and the great tenement dwellings of the cities—not only in England, for they give some account of even worse conditions in Paris—the Commission found crowded families living in unimaginable squalor.

The account of this work, written in the measured language of the time, conveys more forcibly than any highly coloured fictional picture such as is found in Dickens, the dreadful state in which human beings can be brought as a result of an economic theory. Chadwick (1800-1890) and his colleagues, who included Dr. Southwood Smith (1788-1861), a doctor who was also a Unitarian minister and a man of wide humanitarian interests, were left in no doubt about the association of insanitary housing with excessive illness. They believed that infection was carried from putrid animal or vegetable matter in ditches, cesspools, stagnant drains and such places, in the air as a miasma, and they tended to equate disease with bad smells. Therefore they paid great attention to drains and sewers, and the engineers, under this kind of pressure, reorganized the sewerage systems and this reorganization led to improvements in drainage and water supply which were entirely beneficial. These investigations, besides leading to sanitary improvement, also convinced Southwood Smith and the others that pauperism was not due, as had been supposed, to idleness, improvidence and drunkenness, but was more likely to be due to ill-health brought about by environmental causes (Singer and Underwood, 1962).

The result of all this work was the Public Health Act of 1848, which made some impact on health, though its effects were inevitably delayed because of the enormous extent of the necessary work.

And even then the reforms met much opposition on the grounds of expense. Chevers (1852), writing of the means of prevention of removable and mitigable causes of death, notes that in the Parish of St. George’s, Hanover Square, overcrowding was such that “it is customary to let half or a quarter of a room to a family; each has its corner.” And he comments “It is not less discouraging to notice how stubborn an obstacle any danger of pecuniary loss
or outlay still throws in the way of the most vitally important sanitary movements, urgently called for as they may be in times of threatened danger, or even when devastating pestilence is at its direct height."

It is perhaps interesting to quote from a document published in the United States in 1962; it is entitled *Tropical Health*, and is a comprehensive survey of needs and resources. It contains one statement worth special notice:— "it cannot be entirely accidental that a low per capita income coincides with high morbidity and mortality and a low life expectancy." Apart from the dreary use of the phrase "per capita" when "per caput" is meant, this seems to me to be one of the massive understatements of our time. But a more relevant statement in this volume is:— "the medical contribution to broad social planning is unlikely to secure judicious consideration unless it can be supported by an argument that relates it to the over-all economy." In other words, it is hard to get money for health projects unless they may lead to financial gain. We do not seem to have advanced far in a century.

It is interesting to note that the recommendations made by the sanitary reformers, though based upon faulty theories of the nature and transmission of infection, were effective. The bacteriological era which followed later in the century did not upset the measures taken many years before, though it added to their effectiveness.

By the latter part of the 19th century, therefore, enlightened medical opinion in Britain and Europe had turned sharply in the direction of prevention, without in any way detracting from the need for curative medicine. And in this preventive effort the engineers and the builders became more closely involved as legislation was enacted to regulate their work. Prevention, in fact, became a social effort, and it is at least reasonable to assume that the reduction in death rates at early ages and from certain infectious diseases was at least partly the result of these social changes. I am, of course, aware that other factors—vaccination, antiseptic surgery and other purely medical factors—were also effective.

With this movement for the prevention of physical hazards there has more recently been increasing emphasis on the study of mental health in industry and in the social conditions of our industrial civilization. Most people would agree, I think, that the enormous stresses inherent in the change from a rural to an industrial economy are reflected in increased mental disturbance, and that this is the concern of public health and preventive medicine. Whatever other factors may be involved—increasing age of the people, or genetic factors—the effect of social environment is recognized.

**SOCIAL INFLUENCES IN TROPICAL MEDICINE**

You may wonder what all this has to do with tropical medicine. The main theme that I have in mind is that, as in these matters the kinds of diseases which were most damaging in Britain up to the end of the 19th century could largely be controlled by co-operative effort of different departments of the economy of this country, aimed at social betterment and impelled by a gradual process of enlightenment and increasing regard for the individual as a human being, so a similar process was at work, based upon a different set of circumstances, in the tropics.

Manson's discovery of the mosquito transmission of *Wuchereria bancrofti* brought to notice the principle of vectors—intermediate hosts—of some of the tropical diseases. It was not the first time that the conception of an intermediate host in the life history of an animal had been entertained, for Steenstrup in Denmark had already in 1845 worked out the principle of alternation of generations, and mosquito transmission of yellow fever had been
suggested in America. But Manson's work opened up the subject in relation to human disease, and the principle was soon extended to malaria, trypanosomiasis, plague, the rickettsial diseases, and the water-borne helminthic diseases. And with this knowledge, in the absence of effective drugs to control these diseases, the idea of control by interfering with the vectors was explored. This, I believe, was a far-reaching step ahead of other ideas of environmental control, and in this sense tropical medicine took a lead.

This entailed much study of the vectors and animal reservoirs of disease, and involved collaboration with entomologists and zoologists, and, for practical results, with engineers, and in due course it embroiled the agriculturists and even the forestry supervisors; and it gradually involved consideration of the whole way of life of the people. Studies on these lines became more and more detailed and elaborate, and before the days of the new insecticides these combined efforts had been built up into comprehensive schemes which were reasonably and promisingly effective. Malaria was being controlled, as was proved in Malaya, India, Europe and the United States—where, you remember, anti-malarial measures were built into the great water works of the Tennessee Valley Authority. And in Brazil Anopheles gambiae was defeated. Eradication was then inconceivable, of course, except in small islands. Sleeping sickness was greatly reduced, the control of Chagas's disease was possible through social effort, plague was gradually being ousted, for instance in Java where subsidies for house improvement were driving out the rats, and even typhus was disappearing from areas where social conditions were improving. And as protected water supplies and sewerage schemes were gradually introduced, the water-borne diseases were slowly being reduced. This is what I mean by social effort, of which, of course, economic improvement is part.

It is true that the control of cholera in India remained difficult, largely because it involved interference with the great religious festivals, and that schistosomiasis was actually spreading. But we knew in theory how these diseases could be prevented, and combined efforts were being made to cope with them, just as we tried to cope with hookworm and other intestinal helminthic diseases; we knew that control depended on the regulation of water and the proper disposal of human excrements.

The success achieved may now seem rather small beer in comparison with the success gained in some areas of health by the use of the residual insecticides and the new drugs, but this remarkable development does not invalidate the older efforts. In view of the known extent of resistance of some mosquitoes and flies to insecticides, and of tubercle bacilli and staphylococci to antibiotics, I am unable to share the extremes of optimism sometimes expressed.

Let me illustrate what I mean. Quite recently it has been said that if tuberculous persons are brought for drug treatment reasonably early, and persist in that treatment for two years or more, cure can be guaranteed. But in the less developed countries, where there is only a skeleton health service, and where therefore it is most difficult to ensure that the relatively expensive combined treatment can be taken as it should, and where isoniazid can be bought and used without supervision, it seems to me that the social situation renders optimism difficult, especially as primary resistance to the relevant drugs is high.

But, to revert to the pre-DDT and pre-penicillin days, I think that because the problems of infectious disease presented themselves more dramatically in the tropics than elsewhere, tropical medicine took a lead in exploring the principles of control. But the idea of prevention by interfering with environment was in line with, and was an extension of, the trend to be observed in medicine generally during the past few centuries, as I hope I have
illustrated. And it depended for success on collaboration and combined effort; it was, in fact, an essay in social medicine.

This collaboration is still needed, and has been explicitly stated in a publication I read recently on trypanosomiasis in Africa (WHO, 1963). This is a collection of 16 papers, all written by men who have spent much of their working lives in the study of this group of diseases in both man and animals, and all summarizing modern concepts, including the concepts of control. Some of these authors are medical men, others are veterinarians or biologists.

These papers contain much detailed information on a wide range of subjects, but the points brought out which particularly interested me were those, repeated by different authors independently, in which this idea of collaboration between different disciplines as an essential to the control of this group of diseases is stressed. This attitude echoes the measures actually taken 30 years ago or more by Dr. George Maclean and his colleagues of other departments, to cope with the epidemic of *Trypanosoma rhodesiense* sleeping sickness in Tanganyika. The fact that the present authors are so unanimous in urging this kind of collaboration gives the impression that although much has been accomplished in this way, for instance at Anchau in Northern Nigeria, there is still the need to press strongly for co-operation of this kind, and not only for trypanosomiasis.

I cannot quote all the remarks made on this subject in this WHO document, but I should like to remind you of some of them. They emphasize the social nature of sleeping sickness.

In one paper (Wilson et al., 1963) the authors state categorically that “The problems presented by trypanosomiasis affect almost every aspect of human activity.” And they emphasize the effect of this disease on rural economy. The habits of the people themselves of course affect the prevalence of the disease.

In another paper Robertson (1963) comments on the effect of the old traditional land-tenure system in the spread of sleeping sickness in Uganda, and comments on measures of control. “Unfortunately no plan can succeed without the disciplined restraint of the local peasants and alteration of the land-tenure system.” This seems to bring in the anthropologists.

Ford (1963) writes that “the situations with which we deal today are often the result of localized human activity . . . whatever other effects it may have had, the impingement of western culture on African societies has, so far, tended to exacerbate and not to ameliorate the effects of trypanosomiasis.” And he remarks that: “The point is that *Glossina*, like the Negro, like *Brachystegia* or *Butyrospermum parkii* or, indeed, like the African pathogenic trypanosomes, is only one component of a single ecosystem. It has been the failure to realize the implication of these complex relationships which has been responsible for the disappointing response to the attack on *Glossina*.”

But the general theme is well expressed, I think, in the words of Fendall, Southgate and Berrie (1963), who remark that “Drastic alteration in ecology through rapid expansion and development of commerce and trade, changing patterns of cash crops and movements of population can all contribute to a changing pattern of disease.” And they argue that control measures for sleeping sickness should be integrated into a broad-based public health service which deals with all aspects of health, and takes into account “demographic trends, agromonics, industrial and sociological progress and education.”

They might have added religion, which, as Duggan (1962), and Nash (1948) before him, have stressed, is important in sleeping sickness in that fly-infested groves are the sacred
places to which the people go for religious ceremonies; and interference with these is a difficult psychological venture. I am trying to argue that control of much present-day disease in the tropics is a matter for combined effort, and I need not, I think, explain that all available means for controlling infections should be exploited including, of course, the use of insecticides and molluscicides, and of drugs for treatment and prophylaxis, and of vaccines.

I do not wish to push this general idea too far, but it does seem to me that the medical profession was slow, in the West, to accept the conception of preventive action by deliberate interference with environment. It is true that the Greeks had their regimens, their baths and exercises, and the Minoans their drainage systems, and the Romans had their aqueducts and cloaca maxima, and the Jews of Biblical times had their sanitary laws; it is also true that the Venetians instituted the practice of quarantine, and that there were lazarets and plague hospitals, and that the unfortunate people thought to have leprosy were denied human society. But the real effort to manipulate environment in the interest of prevention of disease made only tentative beginning in the 18th century, and reached its full energy perhaps only in the 20th. And the move for mental health is even more modern.

In tropical medicine, however, the enormous possibilities of prevention by interfering with vectors, and therefore with environment as a whole, were realized very soon after the principle of vector transmission was established, and medical men very early began to realize the need for a combined effort of all services. Tropical medicine became adult very quickly, and has remained so. It is now, however, entering upon a new phase in which the diseases of crowds and urban industrial life will be added to the rest, and these will have to be faced and, we hope, prevented by deliberate action based upon western experience.

In theory we know how to prevent or control most of the major infectious diseases, and the diseases of malnutrition; the difficulty is not so much in technical knowledge as in the application of that knowledge in the social conditions as we find them, and this is wrapped up in matters of belief, education, economics and politics—it is in fact a social problem. It will change in emphasis as the patterns of disease change and as expectation of life increases.

I have mentioned that the course of prevention of disease in the West has been strongly influenced by regard to the individual as important in his own right. This, of course, is an attitude of mind, a sense of values. A similar movement can be seen in the tropics. I am thinking chiefly of Africa, where more and more attention is being turned to the mental health of the people, and more and more it is being realized that the changes now taking place in the social structure of African life, both political and economic, are bringing unusual mental stresses, just as the change from rural to urban conditions in Britain during the industrial revolution brought its own stresses.

It is generally conceded that the older types of African community life, in which the family units were large and authoritarian, catered well for the mental stability of their members. The unit was large, friendly and protective, and it paid much regard to each individual. It had its own elaborate code of conduct which was respected and obeyed, and observance of the traditional rules and customs solved most of the psychological problems which today we in the West try to solve individually, with varying success. But the old African community life is no longer in line with the new movement for expansion of industry and education, and the young people are moving away into strange surroundings where they may lose their old loyalties without gaining any others of equal dignity and value. And at the same time they may retain some of the old feeling that the world is ruled by the dark supernatural forces which can be used against them by enemies. The idea of political freedom
and of the importance of private empirical judgement is as yet new, and there is little doubt that the stresses brought about by these new conditions, telescoped as they are into so short a period of time in a rapidly changing world, will have their repercussions on mental health.

Here again, as in the West, the historical pattern is being repeated in the tropics, and the study of mental attitudes and health, long carried out by anthropologists and more recently by psychiatrists, is now taking root among African doctors like Lambo (1959) and Ajose (1954), who are fully aware of the psychological situation and should be better able to understand it than any person of an alien culture.

We may hope that some of these features of social cohesion which I believe have had so great a part in promoting the psychological stability of the Africans will not be lost, as it has so much been lost in restless western communities.

The traditional infections may not for long be the most pressing problems of the tropics; these may turn out to be the social and psychological problems of rapid change in modes of life. If these are accompanied by economic or political theories which in the long run prove unsatisfactory, they may have as much adverse influence on health as any which we have experienced in the past.

Control of health in the tropics will not much longer be in the hands of the West, and the new governments face difficult times, but it seems to me that the trends in medicine, tropical and non-tropical, have moved towards the recognition of the extreme importance of social understanding and behaviour, and the fact that man himself is the most important factor in epidemiology. Medicine is much wider than our fore-fathers thought, and tropical medicine has been a leader in the recognition of this fact. The future, I suspect, depends very largely on how we communicate this kind of conception to those who may turn to us for experienced guidance.

REFERENCES


