I have chosen this subject because it will enable me to say something about the practical application of our existing knowledge to the problems of hygiene and sanitation which confront us, a matter with which I trust this Institute will soon be intimately concerned.

The future of tropical hygiene depends upon research. Such a statement is doubtless a truism, but I fear its truth is, even in these days, not fully appreciated. Just as in the treatment of disease empiricism has often exercised a baneful influence, so in its prevention measures have from time to time been applied based on no sure foundation, and the result has been disappointing both from the hygienic and the administrative standpoint. Take, for example, the long-continued use of lime juice as a prophylactic in scurvy. Countless gallons of this beverage have been consumed, chiefly by soldiers and sailors, and though doubtless some benefit has accrued, for it contains a modicum of anti-scorbutic vitamine, yet recent research has shown that our faith should have been placed in the kindred lemon juice, which was the substance originally introduced into the Navy for combating the fell disease of sailing ships, but for which the juice of the lime was substituted, probably without thought and certainly without sound scientific approval.

Again, consider how much time and money has been spent on so-called disinfectants. Long ago, when working in Cambridgeshire, I used to be amazed at the liberal distribution of tins of disinfectant to households plagued by diphtheria and enteric fever. Even then I used to wonder what possible service they could render beyond camouflaging the odour of some privy midden, but they were received with thankfulness and, possibly, even employed. It was not until Barlow, in 1910, raised his voice and testified against some of the absurdities of fumigation and the indiscriminate use of evil-smelling powders and equally malodorous fluids that the general belief in such measures was shaken. Yet even now, despite the careful observation of Walcott and Curtis in the United States and the mass of evidence which has accumulated, there are high priests of fumigation who burn sulphur upon the altar of hygiene and strew disinfecting powders broadcast as did others in the Middle Ages.

Pray do not think that I wish to decry the value of disinfection and of disinfectants. I fulminate merely against the unwise use of the latter, the tendency to disregard the rôle of the patient and his immediate surroundings in spreading infection and to forget, more especially in the tropics, the value of fresh air and sunlight as microbicidal agents.

1 Reprinted by permission of the Committee from Vol. xliii, No. 1 (1922) of the Journal of The Royal Sanitary Institute. Lecture to The Royal Sanitary Institute, Wednesday, April 26th, 1922.
Empiricism dies hard and it is strange how slowly scientific knowledge spreads, even in the presence of an all-powerful Press and when the facilities for the diffusion of information have increased a thousandfold.

But recently a gentleman in Mauritius gravely assured me that the appearance of malaria in that island coincided with the introduction of guano from South America and that this fever was undoubtedly due to the pernicious habit of manuring the cane fields with the dung of petrels and of penguins.

Another, interested in the failure of the sewers of Port Louis to function in an efficient manner, a failure due to a faulty fall and deficient pumping power, seriously suggested that all would be well if, by a solution of soap, the interiors of the pipes were well lubricated in a manner similar to that employed by the fashionable physician for the treatment of constipation.

One may pardon the laity; for apart from the lack of training, they suffer because Medicine has so often spoken with an uncertain voice. Theories have taken the place of facts, and, while it would be a sad world without theories, a world ruled by them would become a place to excite the compassion and lachrymation of angels.

Still, there can be no doubt that amongst civilized and enlightened communities great progress has been made and the man in the street can generally discuss in an intelligent manner the etiology of the chief communicable diseases to which he is likely to fall a victim and has some acquaintance with methods of prevention and cure. In short, education has now reached such a stage amongst the inhabitants of most countries in the temperate zone that it may be truly said of them they live to learn, the while they learn to live.

Very different, however, are the conditions in the tropics. Though in many places there has undoubtedly been an awakening of late years, native populations, as a whole, still grope blindly under a pall of ignorance and superstition, and the most pressing need in all matters concerned with their sanitary progress is education. Such education, however, must be on right lines. In several of our Colonies I have found the catechism system in force. I was myself reared upon a certain Shorter Catechism, to which have been attributed remarkable virtues, and to the retention of which, when England discarded it, the surprising development in Scotland is said to have been due. Hence I have no quarrel with the catechism system provided it is properly employed. I grieve to say the health catechisms I have seen in use have not been so employed. Remember they do not deal, like the Shorter Catechism of the Assembly of Divines at Westminster, with abstruse conundrums admirably fitted to constitute a course of mental gymnastics. That Catechism, I take it, apart from inculcating sundry religious tenets in a logical manner, provided, if carefully expounded and explained, a course of mind training which its advocates pronounce second to none. It is, however, inconceivable that the Shorter Catechism should ever be illustrated, or that, even if it were illustrated, its usefulness would be enhanced. On the other hand, what the health catechisms require is graphic exposition.

More than once I have asked a little black or brown girl to tell me what she knew about ankylostomiasis. With hands clasped behind her back and her eyes fixed apparently on the future of hygiene, she has faithfully recited her catechism and recounted all about the hookworm, from the larva penetrating the skin to the adult female laying eggs in the intestine. But when I came to ask her what
The Outlook in Tropical Hygiene

an ankylostome was like she was completely at sea and had no idea as to whether it equalled in length an earthworm or an anaconda. Rarely, very rarely, have there been diagrams or pictures to aid the childish mind. Even these, helpful though they be, are not sufficient. What is really required is the provision of models, and when it can be managed, demonstrations from Nature itself. This latter method is not new. You may remember that it was employed by Mr. Squeers at Dotheboys Hall in "Nicholas Nickleby." One pupil was made fully acquainted with what Mr. Squeers called the "winder" by being made to clean it, while another gained familiarity with what his master termed "bottinney" from being forced to weed the school garden.

Coming to more recent times, many of you must recall the Sanitary Demonstration Centres which were established on all the fronts during the war and proved both stimulating and educative. Something of this kind is wanted in connexion with schools in the tropics wherever a serious effort is being made to inculcate the principles of hygiene. It should neither be difficult nor expensive. In many cases the pupils themselves could make the simple models showing how latrines and incinerators should be constructed and how grease traps and soakage pits may best be fashioned. I am glad to say that the necessity for graphic exposition has been recognized in the schools at Accra on the Gold Coast.

The cinematograph should be summoned to our aid. So far I have only heard of three good sanitary films. They are the rat film, "Swat the Fly," and "Unhooking the Hookworm," the latter two, I need hardly say, being American productions. I have seen them and they are excellent, though both might be better adapted to tropical needs.

There is great scope for a really good film on plague. We know much about plague and can combat it upon sound lines, but it is exceedingly difficult to get native populations to co-operate with the sanitary authorities in campaigns against rats and fleas. They are indifferent or actively hostile, but their attitude is very largely to be explained in terms of ignorance. Educate them, especially when young, and the difficulties will gradually disappear. The matter is well summed up by Mendelson in his recent account of plague at Bangkok.

He says: "The only conclusion the author can come to is that education, though an extremely slow proposition, is, after all said and done, the only possible way of impressing the people and producing permanent results. Practise a wise conservatism, have unlimited patience and perseverance, combined with an absolute faith in the righteousness of your cause, and in the distant future there will dawn a ray of sanitary light, that if properly nursed may even develop into a bright star."

His astronomical simile is not, perhaps, too happily chosen, but his meaning is clear and all with sanitary experience of the tropics will assuredly agree with him.

At the same time in certain directions immediate active work will bring about rapid results, apart altogether from the question of educating native communities, and immediate active work is required, for people are dying and there is a great load of sickness and inefficiency.

These remarks anent education have been rather in the nature of a digression, though one, I believe, amply justified by the importance of the subject.

Let us, however, now hark back to the question of research on which so much
depends. I need scarcely remind you that this country was once foremost in the field. The work of Manson and of Ross, the investigations of Bruce, the findings of Leishman, the labours of the Plague Commission in India, the successful inquiries of Fraser and Stanton, the discoveries of Sir Leonard Rogers, the researches of Low and Leiper and many other British achievements will at once occur to you. I fear, however, that at the present time we scarcely occupy the same position that we did. In some ways this is only natural. The French, a great nation where science is concerned, have long been friendly rivals; for a time, the Germans with dogged persistence wrested secrets from the tropics, and though as a colonizing power, Germany has ceased to exist, her workers are still in the field and she is turning her attention to new spheres of activity. The two nations, however, which so far as research into the more practical side of tropical hygiene is concerned, appear to be outstripping us, are Holland and the United States. They are not doing so because they have better men, but because they have at their command resources which we are denied and also because they work in some ways on better lines.

It is scarcely to be expected that, at a time like the present, our Governments can find large funds for developing research in the tropics, though it is always good policy to cast the sprat and secure the salmon, but, at least as far as the United States are concerned, a great deal of the money which has been spent of late years has come from private sources. As a nation we may be poor, thanks to the fact that, as of yore, we have saved Europe, but it would appear that there must be many individuals who possess more money than they can well spend. The wealthy American frequently endows research. As Mr. Wickliffe Rose of the Rockefeller Foundation said to me the other day, and he should know, "there is far more fun," that is the way he put it, "there is far more fun to be got out of spending money for the betterment of mankind than in any other way." If only our British plutocrats would combine to furnish the sinews of war what fun they might have and what might not be accomplished! Apart altogether from the mere loss of life, the lack of efficiency, the labour shortage, the interference with trade, the waste and worry brought about by tropical maladies and more especially epidemics, think what they connote in the way of sorrow and misery and wretchedness!

Not long ago I saw an old Indian woman weeping bitterly because her son, her sole support in life, had perished because of plague. There are many diseases due to the ordinary wear and tear of life from which mankind may die more or less comfortably, and we may become, perhaps, somewhat resigned to such departures, for they are, to a large extent, inevitable so long as the human body is a machine. It is, however, a totally different thing when young lives and useful lives and lives which mean much to others are surrendered at the call of parasites which we know we can defeat if only means are forthcoming. We deal in a summary fashion with human parasites which prey upon society and on our hoarded wealth, but we are still somewhat callous as to the ravages of bacteria, protozoa and helminths amongst the inhabitants of our colonies and dependencies.

I think if only the wealthy in the land realized the burden of distress and inefficiency which exists and were assured that much of it could, with their assistance, be alleviated and indeed abolished, their purse strings would be loosed
The Outlook in Tropical Hygiene

and the one International Health Board supported by a Rockefeller would have its counterpart on this side of the Atlantic, to the benefit of humanity and the glory of the Empire.

The comparison with Holland is perhaps scarcely fair, for the Netherlands is a small country blessed with large and exceedingly rich colonies, but the Dutch, a thrifty folk, have discovered that to get the best out of these colonies they must make them healthy and keep them healthy, and anyone who has studied their activities in Java and Sumatra will agree that they are working to good effect.

I have said that both Holland and the United States appear to proceed on better lines than we do. For one thing they are quicker to apply the knowledge gained than we are, a point to which I will allude immediately; for another, so far at least as the Americans are concerned, they give their research workers a fair chance.

In our possessions we establish laboratories, though even now there are not nearly enough of them, but we are apt to understaff them in a vain effort at economy and we swamp the scientist with routine work.

Instead of being able to concentrate on some promising proposition he has to examine specimens from hospitals and private sources, he has to undertake sanitary examinations of all kinds of water, food, and so forth. All this is very necessary and useful, but from a research point of view it is wasteful and unwise. There is some reason for thinking that the true research worker, like the poet, is born, not made. There should be a niche for him in every large tropical laboratory and he should be left alone to prosecute his special work. This spells money, another reason for my appeal to the plutocrats, but it also spells progress. It is along such lines that the Americans work and the results are apparent. They concentrate on a problem and when they have solved it they apply the knowledge gained. When we have acted on the first of these principles our efforts have been crowned with success. Ross, at Manson's instigation, concentrated, so far as a niggling Indian government would permit, on the mosquito-malaria problem and revolutionized our conceptions. Bruce, thanks to the aid of the Royal Society, concentrated on Malta fever and lifted the veil of mystery which enshrouded it. Again he took a microscope to Zululand and proved that Livingstone was right in his conjectures about nagana and the tse-tse fly. Finally he and others, devoting themselves to the problem of sleeping sickness, speedily shed light on dark places.

It is true that the harassed general worker has at times made great discoveries. Laveran was a busy army surgeon when he revealed the parasite of malaria; Manson, the Master, who has recently passed to his well-earned rest, was a private practitioner when his classical researches on filariasis were accomplished, but it must be remembered that the struggle becomes more intense, that there are, nowadays, greater distractions. Moreover the superman is rare.

Another point worthy of consideration is the nature of the research work conducted. A vast deal is accomplished which has not much practical value. I am not one of those who think that science should work solely or even mainly towards utilitarian ends. Pure science, as it is sometimes called, true science, as it might well be renamed, knows no boundaries, and moreover one can never tell what bounties may result from its pursuit.

As Professor Fleming has said in his "Fifty Years of Electricity": "If we
could have peeped into the laboratories of the Royal Institution in Albemarle Street, London, in the autumn days of 1831 and seen. Faraday busy with his magnets, copper wire and discs and iron bars we might have wondered that so much time and intelligence were not better bestowed. But, as we have seen, these epoch-making experiments have rendered imperishable service to humanity."

Looking back, however, on the history of research in tropical medicine and hygiene there is evidence that the best results have been secured when the worker has directed his energies towards a definite goal and has had in mind some concrete advantage to be gained as the result of his labours. Moreover there is pressing need for research in certain directions which we know will prove fruitful. Apart from the fact that we wish to benefit humanity and aid the development of the Empire, it must be remembered that we are judged by what we accomplish. The lay administrator, the man of wealth, may not be impressed by the solution of some abstruse problem of high scientific value, but he is quick to note some discovery which he sees may have far-reaching results on the welfare of a country or the advance of commerce. Hence, so far as possible, it is well to be practical and to work on remunerative lines.

There is another aspect to this question of the nature of the work to be followed. It suffers from lack of inspiration and co-ordination. There are two kinds of research worker. The rarer is the brilliant man gifted with ideas of his own which he is capable of transmuting into facts, the commoner, he who, lacking in imagination, is yet, thanks to his technical skill, powers of industry, capacity for logical deduction and well-balanced judgment, able to work out some thought suggested by another, to prove an hypothesis possibly advanced by someone quite unable to establish it experimentally, to unravel the confusion of some fine but faulty conception.

We need both classes, though, of course, the first type of mind is worth much fine gold, for it is akin to genius. It is the case that men stumble on mighty truths. Chance plays a part in scientific work as elsewhere, but, as a rule, it is only by hard thinking and hard work that results of any moment are achieved. A man must be given time to think: another reason why the scientist should not be overwhelmed with drudgery.

When some new method has been evolved or new truth established how often do we say, "Why in the world did we not think of that ourselves?" A recent example may be culled from hookworm investigations. Until Baermann, in Sumatra, devised in 1917 an apparatus whereby hookworm larvae could be isolated from considerable quantities of soil no one had taken up the matter, and yet it is one of great value, for not only does it enable one to study the activities of the ankylostome in the soil, but it makes it possible to determine accurately the source of infestation with hookworm disease in any region. Baermann’s pioneer work in this direction has proved of great service to the American investigators in Trinidad. Again some of these latter, Ackert and Payne to be precise, conceived the idea of studying the rôle played by the domestic pig as a disseminator of the human ankylostome, and they have shown that this animal is an important factor in spreading broadcast human hookworm eggs.

It is curious and unfortunate that these ideas did not occur long ago to British
The Outlook in Tropical Hygiene

workers, many of whom have been much more in touch with ankylostomiasis than the American observers, although it is true that quite recently O'Connor, in the Ellice Islands, and Legg and Rheuben in Queensland described ankylostomes in pigs. However, this is often the case. A man brought into contact with an unfamiliar condition is more likely to emit fresh ideas regarding it than one whose perceptions have been blunted by close association with it. To this aspect of the case further reference will be made from rather a different standpoint.

It must not be thought that I wish to decry the work which is being done in British laboratories. I need only mention the careful and successful investigations of Dr. and Mrs. Connal, at Lagos, on the transmission of Loa loa by biting flies of the genus Chrysops, the manifold activities of Macfie at Accra, the fact that Archibald, in the Sudan, has traced a form of splenomegaly to bacterial infection, and that Scott, in Jamaica, elucidated the mystery of vomiting sickness, to show that we are by no means decadent. Further, have not Stanton and Fletcher, at Kuala Lumpur, worked out the pathology of what is apparently a new glanders-like malady, hitherto called Whitmore's disease or morphia-injectors disease, but now known to have nothing to do with morphia and renamed Melioidosis?

Our work, however, does lack co-ordination. A central clearing-house is needed, and let us hope that the Imperial Institute of Hygiene, the welcome gift of the Rockefeller Foundation to Great Britain, will function to some extent in this direction.

Where, however, we specially fail is in applying the results of our own researches and of those of other nations. Sir Ronald Ross would tell you that for years he has been as a voice crying in the wilderness, and there is no small measure of truth in this statement. Save in certain places, as, for example, the Federated Malay States, we have not tackled malaria as we should have done. For many years we have known how to combat ankylostomiasis, but, where we have not called the International Health Board to our assistance, we have done little to grapple with the problem.

Tuberculosis is one of the commonest and most deadly diseases of the tropics. Both it and plague are largely dependent on housing conditions, but, as Professor Simpson long ago pointed out, we muddle along without town-planning schemes, and without exercising proper sanitary control as regards human habitations. Happily, however, there is a welcome change in this direction so far as British Malaya is concerned, for there the importance of town-planning is now fully appreciated, as are also its manifold difficulties.

We have long known that filariasis is a mosquito-borne disease and that it might with comparative ease be greatly diminished, if not stamped out, for its chief mosquito vectors are of the domestic type. Yet in many of our colonies elephantiasis, a truly dreadful complaint, is common.

I might easily multiply examples, but it is a depressing business, especially when one compares our efforts with what the Americans have done in the way of ridding the world of yellow fever.

I admit it is largely a question of money, but much more than money is concerned. We do not always, I fear, take these matters with sufficient seriousness; we are apt to lack enthusiasm and high ideals, we are in some ways hide-
bound, we pay too much respect to vested interest and the views of the politician. Moreover, those who hold administrative posts are not always sufficiently enlightened, and there is a paucity of sanitary engineers.

The outlook is undoubtedly improving, but we are still very far from even a reasonable efficiency, save perhaps in certain favoured places.

Still there is no reason to despair. The West Coast of Africa, though not yet a health resort, is now far from being the white man's grave it used to be. Trinidad has made, and is making, remarkable progress, and a good deal has been done in British Guiana. In Iraq, as Mesopotamia is now called, and in Palestine, much has been accomplished. I noted the other day with special satisfaction that there were no less than fourteen qualified sanitary inspectors on the establishment of Kenya Colony. Mauritius is setting its house in order. Venereal disease is being combated in Uganda. A public health publicity campaign has been established in India, and in Delhi a most successful Maternity and Child Welfare Exhibition was held in 1921. So, as you will see, there is a bright side to the sanitary shield, and though we move slowly, in some ways we move surely.

But we are far too slow. I think I am right in saying that the first qualified British sanitary inspector to be appointed for Government work in the tropics was Mr. Murray, of Leith, who arrived in Khartoum somewhere about 1906. Yet in 1891 I find that Osbert Chadwick in his recommendations on the general sanitation of Mauritius wrote as follows:

"The sanitary inspectors should be men of good education, not necessarily medical men. They should be acquainted with the general principles of sanitation. In the appendix [that is, to his report] will be found examination papers set by the Sanitary Associations of Great Britain and of Scotland to candidates for the diploma of Sanitary Inspector or Inspector of Nuisances. These, though not perhaps applicable in detail to the requirements of Mauritius, will give an idea as to the essential qualifications of such officers."

I turned to the appendix, and the first examination paper was headed "The Sanitary Institute, 74A, Margaret Street." Chadwick, gentlemen, was a far-sighted Sanitarian, and he would have been, I venture to think, pleased and gratified to see in the first place that the Sanitary Institute of his day had become the Royal Sanitary Institute, and in the second that it had established an examination in tropical hygiene for sanitary inspectors. Important step though this is, believe me, it is not enough. There must be in this country a course of instruction in tropical sanitation for sanitary inspectors. Home hygiene and tropical hygiene are two very different things. I grant you that the underlying principles are the same, but in many respects they have little in common, though it is true that they tend more and more to resemble each other. For one thing the advance in tropical hygiene is bringing into force methods hitherto employed mainly in temperate climates; for another, attention has been directed in the latter to the need of measures formerly limited to the tropics, as, for example, anti-mosquito campaigns. This makes it all the easier to train sanitary inspectors to some extent before they leave for the tropics, so that time will not be wasted when they start work, and they will be able not only to take care of themselves, but to carry out their duties in a much more intelligent manner and with due regard to their altered surroundings.
I need not enlarge on this subject, for I have spoken and written about it on many occasions, hitherto, I regret to say, in vain.

It seems to me that the establishment of the new Imperial Institute of Hygiene opens up a vista of hope and that such an institution might well lend a helping hand in the way of training sanitary inspectors destined for our colonies.

As to the utility and value of such appointments there can be no doubt. As long as the right type of men are chosen we need have no fear but that they will prove their worth. Their success is already apparent. Consider the fourteen in Kenya. It is no longer a question of the thin edge of the wedge. There are now quite a large number in the Sudan. As many as sixteen are at work in our West Coast possessions, and I submit that the outlook is infinitely more hopeful on account of their presence, for they form the necessary links between the medical officers of health and their native subordinates, and they aid in that practical application of knowledge which is all-important.

And now let us ask if there is any other way in which the efforts of our executive officers can be supplemented or improved? There is, for one of the great drawbacks to sanitary work in the tropics is the isolation and the severance from centres of light and learning. A man, striving too often to make bricks without straw, feels himself lost and forgotten. "Who cares," he says, "how I do my work so long as it passes muster?" Or, again, he may find himself up against difficulties with which he is unable to cope for lack of knowledge, owing to the fact that he is far from books and journals to which he can refer. This applies not only to men in out-stations, but to the principal sanitary officers at headquarters, though things are very different nowadays from what they used to be, thanks to the admirable Tropical Diseases Bulletin, and more especially its Sanitation Supplements. What is wanted, however, is rather sympathy and interest in the work and advice by experts given on the spot and with full knowledge of the existing conditions.

If it can only be arranged, I think it would be an excellent thing to have attached to the Imperial Institute of Hygiene a small band of advisers whose duty it would be to proceed abroad at intervals and to help those responsible for medical and sanitary work in all parts of the British tropics. I am quite sure from what I have seen and heard that such men, if of the right stamp, would receive a hearty welcome. Not only could they render signal aid to many an administrative officer, to many a clinician, to many a laboratory worker, to many a sanitary inspector toiling far from those resources which we have at hand, but they could gather a great deal of valuable information as to the conditions prevailing in, and the needs of, the places they visit.

Moreover, they would bring to bear upon the local problems that freshness of outlook to which I have already alluded and which is so valuable, and they might inspire and encourage those whose lot is cast in the less pleasant places of the earth. I can imagine no more useful type of medical missionary and no mission so far removed from the ordinary kind of inspection, which too often tends to be carping and critical. It is that personal touch which in matters general has recently been extended to the West Indies and which has been so greatly appreciated and cannot fail to be of the greatest service.

As giving you some notion of certain of the riddles to be read and of which
any outlook on tropical hygiene must take cognizance, I would cite the question of epidemics. It is much too large a question for consideration here, but it is very necessary in the future that research work on epidemiology should be encouraged. It has to a large extent been neglected in the past, though there have been some notable investigations, as, for example, that of Christophers on malaria in the Punjab, which showed that the determining causes of epidemics are excessive rainfall and scarcity of food. The subject has also received attention from Buckley, Gill, and Perry in India. Cardamatis in Greece correlated heavy rainfall with malarial epidemicity, but there is still need for inquiry into the determining factors. If this is true of malaria, it is yet more true of plague and cholera. What caused plague to assume epidemic proportions in 1921, and, indeed, to prevail as a pandemic? We simply do not know. It may be that climatic conditions were favourable; there may have been unobserved movements of the rat population; some disturbance in trade routes or in commercial activities may have been to blame. It is useless to speculate, but it is easy to see how advantageous it would be to know the why and the wherefore, and to be able to nip outbreaks in the bud.

Cholera is another case in point. We know all about its methods of transmission, or think we do, but how explain the sudden flare of a cholera epidemic of great intensity and severity, suggesting a heightening in virulence of the virus and the acquisition of unwanted powers of spread?

Again, why do epidemics come to an end? Despite the development of immunity there must always remain ample human pabulum for their causative parasites, and yet they do die out, suddenly or slowly.

Is it possible that d'Herelle has found the key to the mystery? His bacteriophage certainly exists. Does it do all, can it do all that he imagines? Are there infinitesimally small parasites which prey upon the pathogenic bacteria, which develop along with them, attack them and slay them? If so, it is easy to understand how epidemics may be aborted. More research is required into this fascinating problem, into what is possibly an unexplored world of life where wonderful battles are being waged and marvellous victories won.

There is no doubt about the necessity for research, but sometimes one is dubious if we apply properly the knowledge gained.

Are we fighting plague altogether to the best advantage? We spend large sums on poisoning and trapping rats. Are these measures of real utility? I believe they are in certain directions, but I do not think we can ever hope to reduce the rat population materially, much less exterminate it, by such efforts. The rodent breeds too quickly. It obeys too literally the Scriptural injunction: "Be fruitful and multiply." It seems to me we must try and defeat it from what we may call the reproductive side. The Rodier system, as you know, is founded on such a belief, but doubts have been thrown on its efficacy, and it is certainly difficult to apply on a large scale. For one thing it is no easy matter to handle rats, for another it is difficult to distinguish sex in the case of young specimens, This does not apply only to rats. In Mauritius these rodents became such a pest that it was decided some years ago to introduce the mongoose to cope with them. Careful arrangements were made whereby, as a start, a few male mongooses were to be liberated on the island. Alas! someone made a mistake in his determination of sex, and now the mongoose is as great a plague as the rats were, has
The Outlook in Tropical Hygiene

almost exterminated the ground game, and has played havoc with the chicken roosts.

At the Institute with which I am connected we have tried to find out some method, some bacterial method, of rendering rats to all intents and purposes unproductive. Our idea has been that by a study of the bacterial flora of the urino-genital tract of male and female rats, there might be found some organism capable of causing abortion—an organism which the male rat might transmit to the female; an organism not dangerous to man but disastrous to the rat's family life. It is true that even were such an organism discovered, the rat would speedily develop an immunity against it in accordance with the mysterious laws of nature which operate against extinction. Still, it is conceivable that such a method of attack might be of great value if applied when plague threatened, when the rat population was found harbouring Bacillus pestis. Unfortunately, though at times the outlook seemed promising, and though the research led to some interesting discoveries, we had to admit failure. It is, however, a line of work which might be pursued in the tropics—though I fear it is not very promising. The rat problem is, I confess, one which has so far baffled us, and the only thing to do is to build the animal out—a costly and difficult matter, but one pursued with some success in Java. One might cite other examples, but I will only mention the very big question which the layman is apt to raise.

Is there any use bolstering up feeble lives? Are we right in striving to perpetuate the puny folk of the human race? Is not the old law of the survival of the fittest what was intended, and are we not flying in the face of Providence in trying to upset it? It is not altogether easy to answer such an accusation, and any endeavour to do so would lead one far afield.

Let me only say that the more we work at the problem the more we find that the hereditary transmission of disease plays a comparatively small part in diminishing our vitality. Doubtless something may still be said in favour of feeble constitutions from the time of birth, in support of the theory of diathesis. There seem to be children born with little or no resisting powers; but even here how much depends on the health of the father or the mother? A virile stock produces virile offspring, and we, in our measure of hygiene, aim at virility.

We know beyond all doubt that what saps virility in early life is, as a rule, bad feeding, bad housing, or infection with pathogenic organisms. Study the case of the poor white children in Barbados and Grenada if there is any dubiety on this score.

Hence there can be no question but that we are right in our efforts to save the weakling, if only because we stamp out foci of disease in a humane manner. It is the duty of the physician to save life; it is the duty of the hygienist to preserve it. We may for a space pass through a bad period and perpetuate lives which lack vitality and bodily strength; but eventually we should reach a higher plane of efficiency and compass a better and a saner world. Again, let us remember that amongst these feeble lives there may be one or more possessing that spark of genius which means so much to mankind. A child's death is always unutterably sad, for no one can say what that child might have become. Not once in a million times would the life develop into anything out of the common, but there is just the chance that we lose a Pasteur, a Lister, some great brain, some outstanding personality, some benefactor of humanity.
Therefore we do well to attack disease, dirt, destitution, and drink, by all the wise means in our power, and of these means the greatest is education, which, at the present time, is the most crying want in the tropics; education on right lines for the teeming millions of our brown and our black subjects. An officer of the Indian Medical Service was right when he said to me: "We are willing to give up to the Indian medical man everything if we can retain our opportunities for teaching, for research, for carrying out sanitary work." The same is true of Egypt. It would be disastrous to lose our hold on these three essentials, disastrous to the very nations who are struggling for what they regard as freedom.

It would neither be fair to them nor to ourselves to remove our guidance and control in these matters until they have grasped their significance and importance. Do you recall what one of our greatest statesmen said long ago?

Disraeli, when introducing the Public Health Act of 1875, spoke with no uncertain voice.

In a speech, famous for all time, he delivered himself of these words: "A great scholar and a great wit, 300 years ago, said that, in his opinion, there was a great mistake in the Vulgate (the Latin translation of the Holy Scriptures), and that instead of saying: 'Vanity of vanity, all is vanity— Vanitas vanitatum, omnia vanitas,' the wise and witty king really said: 'Sanitas sanitatum, omnia sanitas.' Gentlemen, it is impossible to overrate the importance of the subject. After all, the first consideration of a minister should be the health of the people."

I would go even further and say that, so far as the tropics are concerned, it should be the first consideration of the people themselves.

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Reviews.


In this Third Edition of his little book, which the author had completed before his death, he enunciates his very interesting theory as to the causation of sex in man and backs it up with a considerable amount of clinical material which, in many instances, certainly appears to bear out his theory.

The book suffers from most of the drawbacks of the productions of the hyper-enthusiast, the theory is propounded in a too didactic and dictatorial strain; many clinical instances recorded to bear out the theory appear, to the impartial mind, irrelevant; and other instances are wanting in certain vital particulars; such omissions render them redundant. These shortcomings, however, do not detract from the fact that Doctor Rumley Dawson's theory is the only one, in the reviewer's knowledge, supported by the quotation of definite clinical cases, and not merely the outcome of personal surmise.

It has always appeared to the reviewer inexplicable that the sex question, with its innumerable perplexities in the fathoming of which the laity look to the family doctor for help as guide and philosopher, should have been almost entirely missing in the teaching curriculum of the British medical schools. The newly qualified practitioner is turned out into the world a new-born babe in knowledge of sex and all that that little word of three letters connotes, and it is only after many years of experience and observation in the practice of his profession that he