the departments for the teaching of the preliminary and intermediate subjects, yet the principle suggested, that graduate instruction needs special provision to be made for it quite independent of undergraduate instruction, is equally applicable.

Out-patient Medical Clinics.

It is also, I believe, certain that the need for post-graduate instruction throughout the country is likely to become a much more general and urgent matter should the system of out-patient medical clinics be set up in the near future by the Ministry of Health. London, with its many medical schools under only nominal University control, and the numerous hospitals, laboratories, and museums already in existence, offers a more complex question. I believe, however, it is in some respects a more easy one of solution, in consequence of the greater number of graduates likely to avail themselves of any advantages offered and the more numerous teachers who could be called upon.

The staff of the school should be of the professorial type, but I think it would be neither practical nor advantageous for it to be composed entirely by permanent whole-time professors. In the laboratories this would probably be necessary, but in the case of the clinical work any difficulty might be surmounted by adopting the system followed by the Assistance Publique of Paris in appointing physicians and surgeons to the individual hospitals for a limited period. Under such a system officers from the various schools in London might be seconded, say for a period of five years, to serve as professors in the secondary school. The method would possess the advantages of regularly infusing new blood into the graduate school, of giving a valuable experience to the teachers of undergraduates, and in establishing a common bond of sympathy in mode of thought amongst the several schools. It might do much to raise the general standard of education, while at the same time it would not disturb the time-honoured and successful method of clinical teaching now in vogue.

Not a few of us must, I think, have been interested in the views put forward by Sir James Mackenzie concerning the difficulties which attend the teacher whose life is passed in consulting practice in his limited opportunity of observing the beginnings of disease or of tracing the continuous progress of the disease in the individual when it has once become established. Mackenzie argues that the general practitioner is the only man suitably placed to elucidate the problems of the commencement of disease and their progress towards their eventual termination. Hence he asks that the general practitioner should take a more active and prominent part in the education of the student. I do not think that this proposition affects the question of primary medical education. In the short period at the disposal of the undergraduate it is enough for him to master the fundamental facts regarding the normal structure and functions of the body, the effects upon them of disease, and the characters of disease when developed. The first steps in his education must necessarily consist of the investigation and appreciation of the strongly marked types, and the extension of his knowledge by following the gradually weakening links which stretch backward to the normal must be the study of the man who has at least reached the status of a graduate. In the secondary school, then, the accomplished general practitioner might find a proper place.

Observation and Research.

The hospital would furnish a certain number of graduates with opportunities for observation and research, and also afford facilities for practical work and technical development of the highest class. The graduates would take the place of the junior officers in a hospital attached to a primary medical school, acting as assistants to the professors. These advantages, however, could be enjoyed by only a limited number, and the occupants would need to be selected with care and due consideration of the aims they had in view.

The further field of action is identical in intention with the efforts that are at present being made for the co-ordination of existing sources of instruction, and making them available for the practitioner who desires to go through a limited course for purely utilitarian purposes. It is obvious that, if the scheme of a central secondary school should find favour, the associations who have the work of co-ordination in hand are the proper agency through which the entire scheme could be completed.

THE CENTRAL GRADUATE SCHOOL OF MEDICINE.

This being the case, the school would be the centre to which all graduates of either class would gravitate, and from it the men would be allocated in whatever special direction and to whatever special teacher they might desire. Thus the whole wealth of material possessed by the hospitals, infirmaries, laboratories, and museums of the metropolis would acquire a bond of union, and a vast amount of opportunity, now so cursorily utilised, might be opened up to any graduate student.

The graduate provided with such a central institution would no longer be a wanderer tilling a solitary furrow, for his school would not only provide a vast field of action, but would also bring him into contact with workers from every school and land—an association which could hardly fail to widen his horizon and extend his experience not only of methods but of men.

The advantages to be gained, moreover, would not be confined to the student alone; the teacher also would benefit in no small degree from contact with the different class of pupil to whom his duty would consist in stimulating the acquisition of knowledge of the highest grade and arousing the faculty of research. Again, the existence of a school of medicine with this scope and these ends in view could not fail to react inspiringly upon the primary medical schools around it. It would tend still further to the elimination of dogma and empiricism from the practice of medicine, and to heighten the standard of education throughout.

Some Considerations

OF

PREVENTABLE DISEASE.

Abstract of Presidential Address Delivered before the Society of Tropical Medicine and Hygiene on Friday, Oct. 17th.

BY W. J. SIMPSON, M.D. ABERD., F.R.C.P. LOND., C.M.G.,

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Professor Simpson began by thanking the society for conferring the honour upon him of electing him as their President in succession to such eminent epidemiologists as Manson, Ronald Ross, Bruce, and Leishman, going on to point out that the chronicles of the knowledge recently acquired in tropical medicine and hygiene would involve, for the most part, a summary of the work done by Fellows of the Society of Tropical Medicine and Hygiene. As ample evidence of the great bearing which exact knowledge, the outcome of scientific research, plays in the hands of sanitary administration, he mentioned the work done by Ross at Ismailia, in the Mauritius, and Greece, by Malcolm Watson in the Malay States, and by Gorgas in Havana and at the Panama Canal; and he pointed out that these results competed with the earlier results of the bacteriological or botanical era, when the ætiology of infectious disease was first found to involve man's relationship with the lower animals, as well as with the vegetable world. He continued:

Our ancestors attributed outbreaks of disease to an epidemic constitution of the air and its influence on man's economy. That epidemic constitution has still to be studied. It has been lost sight of in recent years, though earlier it engaged the attention of philosophers who ascribed the origin and exceptional spread of epidemics to unusual meteorological conditions which caused floods, drought, and famine. Who shall prove that they were wrong? What effect have floods, drought, and famine on the parasites of disease or on the various animal and vegetable micro-organisms that teem in the soil? Do the parasites gain virulence and increased powers of diffusion in the soil or in the diseased vegetable world subjected to these conditions, or in the herbivorous animals that subsist on it, or in the vermin and insects that feed on the diseased animals and plants, or in man who, when famished, is glad to eat any vegetable, seed, grass, fruit, or meat, even if diseased.

Apart from the virulence and diffusiveness gained by the sojourn of the microbe in one or several of these media, what are the factors which combine to form an endemic.

area for a predominant microbe? The geological nature of the soil often limits the geographical distribution and kind of animals living underground, and probably the kind of insects and micro-organisms. Is it in this direction that the explanation may be found concerning the endemic homes of cholera, plague, influenza, yellow fever, and cerebro-spinal disease. Was Cunningham, of Calcutta, on the right track when investigating the nature and composition of the soil and its gaseous, organic, and inorganic contents? Is it the interaction of unusual meteorological conditions on the local fauna and flora of certain limited areas, that prepares the micro-organisms for their migration beyond their endemic homes—not by the air, as Bryden and others thought of cholera, but by making use of man, the lower animals and insects, and sometimes inanimate objects, as carriers. As regards sudden predominance of a particular microbe, I remember once in Calcutta a pond or tank which contained in its water the ordinary microbes found in others. Suddenly it developed only one kind, the remainder having disappeared. What produced it I was unable at the time to determine. Was it some slight alteration in the organic or inorganic constituents in the water that favoured the growth of a single organism at the expense of the other? It appeared to me if this could occur with one kind of microbe it might do so with another, such as the cholera bacillus, and if in the water, why not in the soil, where on the surface of earth drains the cholera bacillus was found? There must be explanation for all these phenomena if we could only lift the veil.

INVESTIGATIONS NEEDED IN THE ENDEMIC CENTRES.

It is necessary to know more about the endemic areas of disease; they should be sought out and classified. It is there that the natural history of the disease in man can best be studied in relation to the geology, fauna, flora, and other conditions existing in the locality, and it is there that the conditions have to be investigated to give us a clue to the factors which change a sporadic or endemic non-spreading or self-limiting disease into a diffusive and wide-spreading epidemic or pandemic. This knowledge will also allow us to adopt successful measures at the fountain-head.

Although much has been learnt regarding preventable disease there are still vast problems awaiting solution by research in preventive medicine. We require to know more about plague, cholera, small-pox, leprosy, influenza, cerebro-spinal fever, trypanosomiasis, yellow fever, blackwater fever, and many other tropical diseases and their relation to man's environment, not only in his home but also in Nature. Where these diseases most commonly prevail research laboratories are necessary, well equipped with all the modern resources which bacteriology, protozoology, parasitology, biochemistry, and geology place at our disposal. The investigations need to be on a comprehensive scale and not, as I found in Uganda in 1913, where Miss Robertson and Dr. Fiske were the only representatives investigating trypanosomiasis in a part of the country that in ten years had been denuded of nearly a quarter of a million of its inhabitants from this disease and where rinderpest was attacking the cattle.

THE DISSEMINATION OF DISEASE IN PEACE AND WAR.

Professor Simpson under this heading pointed out that endemic disease has now acquired greater diffusing qualities because of the ample means for its transport and dissemination, supplied by the movements of commerce, labour, and emigration, while advancing and retreating armies, with their accompanying refugees, favour the spread in times of war. At these times, also, deficiency of food accentuates the conditions, and the longer the war lasts, and the larger its scale, the greater the effects must be, so that the trials of the five years just passed would possibly leave an aftermath of great epidemics. He asked if it were a mere coincidence that the pandemic of influenza of the twentieth century, like that of the fourteenth century, was followed by widely spread manifestations of mental disorder, hysteria, and unbalanced judgment, and quoted Clouston as saying in respect of the milder epidemic of 1890, that it had left the nervous and mental tone of Europe and America lower by many degrees. After reminding his hearers that cholera and plague are now epidemic in Russia, that typhus and relapsing fever are spreading in Poland, and that small-pox is pervading the continent, he continued:—

War and epidemics bring out the weak spots in our armour of defence against disease, but their after-effect is generally to set men's minds actively in train to devise means for future protection and ideas and schemes that have for many years only created a languid interest suddenly get energised into activity and become a reality.

This is seen to-day in the creation of a Ministry of Health in this country, which has been advocated for 50 years but which the war and epidemic of influenza has quickly brought into being. It is seen also in the determination to grapple with the housing question and the problem of the C3 men, women, and children in the population.

It was the Boer War, with its enormous number of dysentery and typhoid cases, that led to the reinstatement of the sanitary officer in the army. There had been a reactionary movement for some ten years before the Boer War, gradually undoing the efficiency of the organisation of sanitary officers which had been the outcome of the Sanitary Commission reporting on the Crimean War. For nearly that period no sanitary officer was appointed at Aldershot, a position formerly held by a deputy sanitary officer. The first fruits of this policy were the large numbers of officers and men who lost their lives from preventable disease in the Soudan Campaign. The navy led the way in protecting her fleets against disease in the tropics. During the wars with France and Spain in 1778 and following years the West Indies was the principal seat of naval operations and much greater fleets were then employed in that quarter of the world than in any former period. There was much sickness in the fleet, varying greatly in different ships and consisting of dysentery, scurvy, and fever. Dr. Blane (afterwards Sir Gilbert Blane), when physician to the fleet under Lord Rodney, had monthly returns sent to the headquarters of the fleet recording the sickness and deaths in each ship, and anything else that related to the health of the ship. He found that the average mortality in 12 months was 1 in 7 of the seamen, and on an average 1 man in 15 was on the sick list. In 1781 he addressed a memorial to the Board of Admiralty pointing out the excessive mortality and expressing his conviction that if certain proposals which he suggested were carried out, more than two-thirds of the seamen who died in that climate would be saved.

These recommendations were similar to those proposed by Dr. James Lind, a naval surgeon in 1757, in his essay on the most effectual means of preserving the health of seamen in the Royal Navy, containing cautions necessary for those who reside or visit unhealthy situations, &c. Sir Gilbert Blane early recognised the fact that little improvement could be effected in the health of the fleet when left to the initiative of individual officers, and that sanitary rules and regulations, based on scientific knowledge, must be issued by the Admiralty for them to be carried out systematically and efficiently. His recommendations were first put into practice in the West India Fleet with excellent results, and later they were extended to the whole of the navy. The improvement of the health of the navy, and the reduction in its death-rate contributed to the victories in the Revolutionary War. Sir Gilbert states at a later period that "if some new means of preserving the health and lives of seamen had not been discovered and put into practice, the whole stock of them must have been expended before the conclusion of the Revolutionary War—that is, between the years 1793–1815." The improvement has continued notwithstanding the changes in the warships, and instead of the mortality being 1 in 7 it is now about 1 in 310. We know what the navy has done in the great war of 1914–18.

We are apt to forget the lessons of the past. For instance, in the Mesopotamian campaign there would have been no scurvy if the history of the navy in relation to that disease and its abolition in the latter part of the eighteenth century had been borne in mind and acted upon. It should not have required the valuable and admirable work of the Lister Institute to resuscitate the necessity of the supply of vitamins in the foodstuffs supplied to the army. One is apt to forget that the use of cinchona bark as a prophylactic goes back to at least the early part of the eighteenth century. Dr. James Lind, the pioneer of sanitary reforms in the navy, more than 160 years ago mentions that the continuous use of bark is an effective preservative against a relapse of malarial fever, and that "on the coast of Guinea the factories were furnished with proper quantities of the bark by the late African Company, which was taken by way of

precaution during the rainy and sickly season, and it was attended by remarkable success with such as could be brought to a regular course of life and refrain from eating such quantities of animal food as they were wont to do in England, which yearly destroyed many on that Coast" (Guinea).

One sometimes wonders whether the many relapses of the soldiers from Salonika and other seats of war were due to our preference for the alkaloids of quinine, for which there has been an unprecedented demand, and some of which may have in their preparation lost the complete qualities of the cinchona bark, which itself varies in quality. Are we quite sure that the procedure which destroys the vitamins of canned food may not affect some of the properties of the alkaloids?

The Crimean War, with its tragedies owing to want of organisation, sanitary and otherwise, and the success which followed the work of the Sanitary Commission, of which Miss Nightingale was an important member, led to important sanitary reforms in the army at home, and later to a Royal Commission to inquire into the health of the army in India, which disclosed a deplorable condition of things and a death-rate of 69 per 1000, although in the later years of the Honourable East India Company, the conditions in regard to the health and comfort of the soldier had been materially improved and the mortality had been reduced from 80 to 69. In consequence of this report, remedial measures were at once applied to the army in India and were extended to the towns and districts adjacent to the cantonments.

THE BEGINNINGS AND PROGRESS OF SANITARY ORGANISATION IN INDIA.

The Royal Sanitary Commission were convinced that if sanitary measures were applied to India under an organised public health service the health of the people of India would in time reach a high standard. It was recommended that such an organisation should be created both in urban and rural areas in India. In 1864 a sanitary commissioner was appointed for each province in India for the purpose of improving the sanitary conditions of the people, and the civil surgeon, who is the Indian Army surgeon, was empowered to advise the civil commissioner of the district on sanitary questions, and later to act as sanitary adviser to municipalities newly formed for the purposes of local self-government. Gaols were also placed under medical supervision, and special health officers were appointed for Calcutta, Bombay, and Madras. Later a very important addition was made by the establishment of central boards of health in each province having for their function the drawing up of special schemes of water-supply and drainage. The work which the organisation here described has been able to accomplish is very creditable, considering that a province in India is sometimes about the size of France, and a civil surgeon's district in which he practises is often as large as a third of Scotland. Vaccination was at first the chief concern; then followed the introduction of conservancy, drainage, and water-supply into some of the more important towns, the registration of deaths, the compilation of statistics, and the regulation of large fairs and pilgrimages which experience showed to be always dangerous centres of disease.

The effect of these and subsequent health measures has been to reduce the death-rate of British troops from 69 to 4.59, of Indian troops from 20 to 6.78, and of prisoners from 82.7 to 30.8 per 1000. Notwithstanding these successes, it is obvious that an organisation which consists of a sanitary commissioner, sanitary engineer, and sanitary board for each province, even with the assistance of the civil surgeons, is quite unequal to the task of dealing with the sanitary administration of these enormous populations, both rural and urban. It must be remembered that civil surgeons of districts, or, as they are called in the Madras Presidency, "district medical and sanitary officers," who ordinarily during peace are officers lent temporarily by the Military Department to the local governments, are expected to attend to the medico-legal work of the district, the medical necessities of civil officials, perform the executive medical and surgical work of all local hospitals and institutions, including gaols, and hold administrative and inspecting charge of numerous hospitals and dispensaries scattered throughout their districts. It is certain that the organisation was quite

incapable of dealing with an epidemic even though a sanitary commissioner was appointed with the Government of India. The defenceless state of the country invited attack from any epidemic disease indigenous or imported into the country. It was these considerations that induced me to bring forward in 1894, at the Indian Medical Congress, a scheme for the special sanitary service for the civil population of India. The most advanced sanitary administration at that time was that presided over by Colonel W. G. King, C.I.E., as Sanitary Commissioner of the Madras Presidency, in which there were district sanitary officer and assistants. Here, in 1881, on the recommendation of the then sanitary commissioner (Cornish) there was attached to each district medical and sanitary officer, an assistant surgeon capable of taking charge of the headquarters station during the absence of that officer on sanitary duty in his district. To this then existing staff, in 1893, Colonel King advised the compulsory addition of technically trained sanitary inspectors qualified by examination. The scheme was sanctioned in 1894, and the men now number over 600. But his efforts to secure permanent appointments for these beyond municipal areas, although approved by the Madras Government and successful in some districts, was largely inhibited by local authorities. The surplus men now form a reserve for epidemic duties on the old principle of locking the door after the horse is stolen, and may find, after further technical training, ad hoc appointments as deputy inspectors of vaccination. By later elaboration of staff (1904) there was secured sanction by him from that Government for a second assistant surgeon attached to each district medical and sanitary officer intended solely for sanitary duties in the district, as well as a public works overseer capable of making plans and estimates to aid the district medical and sanitary officer in formulating recommendations for minor sanitary and anti-malarial works. Here again there has been some inhibition by local authorities of districts. So that even in this comparatively advanced area of India there is failure to reach the reasonable ideal suggested by me at the congress of 1894—namely, that a specially trained and separate sanitary service should be arranged for, quite independent of physicians, in connexion with the hospital or of those in private practice; that there should be schools of hygiene and preventive medicine, and also of sanitary engineering, and that diplomas should be granted to those who were trained in these schools, and fourthly, that laboratories for research should be established in various parts of India. It was approved by the Government of India in 1895. Colonel King, in a remarkably able and statesmanlike address before the East India Association in July, 1914, points out that, notwithstanding the advice of the Royal Commission conveyed in the report of 1863, the urging of provincial sanitary commissions, successive sanitary commissioners with local governments, the first Indian Medical Congress, and the Royal College of Physicians of London, the proposed organised efforts of 1914 were confined to municipalities which only represented the provision of a sanitary service for the protection of 10 per cent. of the population. It may be asked, what is to become of the other 90 per cent.? As shown by Colonel King, the death-rate in India varies in 64 towns from 30 to 70 per mille and the expectation of the young Indian at birth is 23½ years less than that of an English child. He mentions that there are annually one million deaths from malaria and over a quarter of a million deaths from cholera, that small-pox destroys thousands of lives annually, and that there were in the 16 years since plague began in 1896 some 8 million deaths from that disease. This number has since increased to 10 millions. No one can be satisfied with this condition of affairs. The scheme is to have 25 sanitary commissioners, 12 deputy sanitary commissioners, 34 first-class medical officers of health, and 104 second-class medical officers of health for a country which, excluding Russia, is the size of Europe and has a population under direct British rule of over 244 millions and a total population of over 315 millions. The area of British India is 1,097,901 square miles, against 58,308 of England and Wales. Compare these figures with England and Wales, which has 1700 local medical officers of health, 40 county medical officers, and 26 medical inspectors, besides the inspectors attached to the Board of Education and the Home Office, and which now has an additional staff under the new

Ministry of Health. The war cut short even this Liliputian scheme of the Indian Government, and the last announcement is that it will be put into operation as soon as possible. One cannot recognise this as an adequate service for India, and I am convinced that until a proper sanitary service for India is formed, which would be a splendid outlet for young Indian medical men and women, there will be no real progress and India will remain defenceless against epidemics. The root of the matter is there is no Minister of Health in India whose duty is concerned solely with sanitation and the health of the population. Public health should not be as it is in India, a by-wash of the education department in which it is placed as a sort of miscellaneous item along with archæology, and in which the money goes to education and public health is starved and in which the topsy turvy doctrine is held that the people must be educated before they can be protected against disease. No country has waited until its people are educated before it introduced sanitary reforms, and least of all England. Major Justice, the Sanitary Commissioner with the Government of Madras, in his official report for 1911 states that "to wait till the people are educated will be to indefinitely postpone the evil," and Dr. Turner, the late health officer of Bombay, remarks that the Millennium will have arrived when the people voluntarily carry out sanitary matters. The only education in sanitary matters the people understand is sanitary laws and by-laws, and this is the form education should take. As quoted by Colonel King, the Education Minister, thus defines the position: "Our first and signal objective is to educate the people as to the value and the necessity of measures for protecting them in their homes and their lives and those dearest to them from the ravages of plague and malaria, cholera, and other communicable diseases, and all the miseries which follow in their train. Fortified by the results of research in India, we can leave the future with confidence to preventive medicine and preventive sanitation." When a question was asked in the Bengal Legislative Council what this implied, the reply was that protected water-supplies were to be arranged for the people *when they have been taught to appreciate them*. It is difficult to have any patience with such an attitude of mind, and it is no matter of surprise that with such views the troops in Mesopotamia were not furnished with the ordinary requisites and organisation to protect them from the ravages of disease and all the miseries which followed in their train. They were left to be educated. Research can be made an excuse for doing nothing. My views concerning this in regard to India were expressed some years ago in the following terms: "We hear a good deal about research, and research is much cheaper than the *application* of sanitary matters." No one has a greater respect for research than I have. A few years ago I urged that sanitary research and administration should go hand in hand. That is the real position. At the present time a good deal of research has been done, very valuable in its way, and, no doubt, it will be fruitful of results if applied; but I consider that the application of sanitary measures on the basis of what we already know is the urgent need of India. I will give you an illustration of this. Supposing the Government of India had been asked to construct the Panama Canal, the kind of proceeding they would have introduced with the present regime would have been to send out men to make researches—they would not have based their actions on the discoveries already known of Ross and Findlay, as the Americans have done. These investigators would have found that the mosquitoes there were a little different from what they were in other places where malaria and yellow-fever existed, and under the circumstances the recommendations would have been made to postpone the matter until a further discovery was made. I am convinced that sanitation will not receive adequate attention in India until there is a Minister of Health whose duty is concerned solely with sanitation and the health of the population. Then will the organisation required for urban and rural sanitation be formed and India will at last be able to throw off the incubus of plague and cholera and protect itself against other preventable diseases.

The Egyptian campaign led to the formation of a civil sanitary service in Egypt, which did some excellent work but which is, as shown by the Commission of which Colonel Balfour was chairman, inadequate for the public health of

the country. The reorganisation which this Commission recommends covers what a public health service should be under a Minister of Health. It is a most complete scheme, and one worthy to be followed in other countries, modified, of course, according to local requirements. I am glad to see that the United States of South Africa are to have a Minister of Public Health and a General Public Health Act. It is, indeed, a great advance.

A BROADER VIEW OF TROPICAL HYGIENE NEEDED. AN IMPERIAL HEALTH MUSEUM.

Professor Simpson then discussed the housing question in our foreign and tropical possessions, claiming that our outlook in regard to native populations must be wider and more sympathetic from a health point of view than it hitherto has been, and he concluded an address, which was a powerful plea for the realisation of our material responsibilities in the matter of sanitary science, in the following words:—

We have an illustration in West Africa, though its sanitary progress has been set back temporarily by the war, that with even a small but well-trained sanitary service supported by the Local Government and encouraged by the Colonial Office with the advice of the Medical and Sanitary Committee there can be a great change effected in a comparatively short time. It is ten years since this sanitary service was created. In that time water-supplies have been and were being introduced, drainage was being attended to, breeding places of mosquitoes were destroyed, extensive marshes were filled up, building laws were enacted, town planning was engaging the attention of the authorities, laboratories were established; a special research laboratory was built in Nigeria and has been carrying out valuable investigations; a Commission on Yellow Fever has been a means of having the circumstances connected with outbreaks investigated and the disease promptly dealt with. The result has been a healthier life for the Europeans and a greater freedom from disease for the African. There is much more work to be done, and I hope that there will soon be a college of medicine and hygiene established where the African can be educated in both these subjects, and that he will then be able to assist in the work of sanitation and in the medical treatment of his fellow countryman. Much of this success is due to the active and harmonious coöperation of the officials of the Colonial Office with the expert members of the medical and sanitary committee, whose president has been for these ten years Sir Herbert Read, one of the Under Secretaries of State for the Colonies, and the interest of the different Secretaries of State in the work. The function of the medical and sanitary committee has been extended to East Africa. I should like to see it extended to the whole of the Crown colonies with suitable additions to its number of members, so that it might act as a Ministry of Health for them. The East and West African colonies, which before the war were more than three-quarters the size of British India and which, by the additions since the war, are larger than that dependency, are not the only Crown colonies that need supervision and advice in health matters.

Following on this I should like to see a great colonial medical and sanitary service, the members of which well trained in tropical diseases and their prevention in our tropical schools should be available after good service and experience in one colony for transfer to others if required. Associated with this service should be a local service of native medical men and sanitary inspectors who have been trained locally and whose knowledge of their compatriots would be of great assistance to the hospital physician, sanitary officer, and Government and their health administration and their campaign against disease.

I should like to see a league of the Local Governments of the Crown colonies vying with one another to improve the conditions of life of the inhabitants under their charge.

When His Majesty King Edward VII. died I wrote to the Lord Mayor of London, who was chairman of a committee to consider a suitable memorial to commemorate his reign. I pointed out that His Majesty had always taken an active interest in the health of his people at home and in the tropics. When Prince of Wales he had been a member of the Royal Commission on the Housing of the Working Classes. He had interested himself in the Commission to India to inquire into leprosy, and he had been President of the International Congress of Hygiene held in London in 1891.

I venture to suggest an Imperial Health Institute for research with an Empire Health Museum, on a similar or larger scale than that of the British Museum or the Victoria and Albert Museum. My suggestion was not accepted at the time. Now that there will be an Empire War Memorial worthy of the far-reaching victory which has secured safety for us all, I would suggest that in addition to the War Memorial there should be a Peace Memorial in the form of an Empire Health Museum in London in every respect to celebrate the means by which we can triumph over preventable diseases, which, in the long run, is far more destructive to human life and to health than even the greatest war.

The Empire Health Museum would contain models, plans, and other arrangements for illustrating the causes of preventable diseases, the conditions under which they spread and the methods by which they can be prevented; the diseases communicated by animals, insects, and vermin; the diseases of occupations liable to occur in different industries, manufactures, trades, foundries, workshops, and mines, and the known methods of prevention. Side by side would be healthy houses, cottages, flats, and huts, contrasted with those that are unhealthy, both at home and in other parts of the Empire; slums and garden cities, town planning and insanitary areas; schools, healthy and unhealthy; foods and their adulterations; alcohol and tobacco and their effects in excess; infant and child welfare; mothercraft; water-supplies; clean and pure milk as contrasted with the dirty and adulterated article, &c. There would be tropical, industrial, domestic, personal, housing, urban and rural, and preventable diseases sections. The museum would be open to all. The stonemason, the pottery and earthenware worker, the wool-sorter, the workers in hides and horsehair and flax, the dairyman, the schoolmaster, the housewife, the painter, the miner, the brass-founder, the electrician, and the worker in any industry or trade should be able to go and see the risks, if any, to which he or she may be subjected, and the means by which they may be prevented. There should be sections to represent not only the British Isles but also Canada, Australia, South Africa, India, Burma, and our Crown Colonies and Protectorates. Lectures and demonstrations illustrated by models and the cinematograph should be given, and there should be attached a bureau of information. The museum would be a standing reminder to our administrators that next to the safety of the Empire is the health of the people.

NOTES ON AMŒBIC DYSENTERY

FROM THE POINT OF VIEW OF MICROSCOPICAL DIAGNOSIS.

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IN the successful examination of specimens of stools sent to the laboratory for report upon presence of protozoa it is necessary (a) for the specimen to be quite fresh; (b) that a glass receptacle be used in preference to a metal one; (c) that no antiseptic should have been added. If by any chance the specimen cannot be examined at once it should be placed in an ice-incubator, as it has been shown that degenerative changes take place rapidly in amœbæ, &c., at ordinary room temperature or at 37° C. incubator temperature, owing partly to bacterial invasion and partly to intrinsic autolytic changes. A fresh preparation should always be examined in the first instance and will usually establish the diagnosis, but if any doubt exists as to identity of species (see notes on staining methods at end) an iodine preparation—e.g., Weigert's solution: iodine 1 g., Potassium iodide 2 g., distilled water 100 c.cm.—or a fixed and stained smear should be made. Where amœbæ are encysted diagnosis becomes at times a matter of no small difficulty. The naked-eye character of stools is not an entirely reliable clue to the type of dysentery, and in all cases microscopical examination should be carried out, since both amœbic and bacillary dysentery may co-exist. Pus from amœbic abscesses in the liver or elsewhere is usually examined fresh, but in the first pus removed it is quite common to miss amœbæ; although a few days later the discharge from the drainage-tube may show them, unless emetine has been injected into the abscess cavity or given subcutaneously.

Encysted Amœbæ.

For the examination for encysted amœbæ small portions of the stool can be emulsified in (a) normal saline; (b) iodine solution. As a rule the nuclei of *Entamoeba histolytica* cysts do not show up in a fresh preparation, but iodine renders them visible. Cysts of *E. coli* need no iodine for demonstration of nuclei, although this reagent brings them out more clearly. Other protozoa, such as *Lamblia* or *Trichomonas* when motile, are best examined fresh, but encysted *Lamblia* show up well when treated with iodine, the nuclei and division between the two parasites being rendered apparent. According to Wenyon, cysts suspected to be those of *E. histolytica* should always be measured with the micrometer eyepiece, as a very constant figure obtains (10μ–14μ) in these cysts.

After being in an ice-incubator for some time motile amœbæ contract and become non-motile temporarily, but motility can often be restored by placing the specimen for a short time in the 37° C. incubator, or in warm climates by simply leaving it at laboratory temperature for an hour or so. Gentle warming of the slide upon which the fresh preparation has been made is sometimes sufficient to restore motility.

Microscopical Diagnosis of Amœbic Dysentery.

The microscopical diagnosis of amœbic dysentery from a fresh preparation presents few difficulties as a rule, but confusion may arise when the same stool contains both *E. histolytica* and *E. coli*. Moreover, in mixed cases of amœbic and bacillary types *E. histolytica* may be so overshadowed by the presence of large macrophages and cellular exudate of various types of cell that it may be missed altogether, the case being reported upon as a pure bacillary infection. Again, a small type of *E. histolytica* (so-called *E. minuta*) is occasionally met with, more especially in early cases, accompanied by the presence of encysted forms, and this type is sometimes missed. In addition a first specimen may be almost or quite negative, whereas later specimens may show relatively enormous numbers of amœbæ. It is also possible for *E. histolytica* (motile and cysts), *E. coli* (motile and cysts), *Lamblia*, and *Trichomonas* to be present in the same specimen, possibly in symbiosis, where *E. histolytica* has been found, but the stools still retain their muco-sanguineous or muco-purulent character under emetine. Bacteriological search for dysenteric bacilli must be carried out also in any case with a high temperature and marked constitutional symptoms which cannot be referred to other causes (liver abscess, blood infection, &c.).

Differential Characteristics: *E. histolytica*, Motile and Encysted.

Motile forms.—*E. histolytica* occurs in fresh preparations as an actively amœboid mass of protoplasm which has: (1) a clear refractile ectoplasm; (2) a somewhat granular and vacuolated endoplasm containing a nucleus, at times one or more erythrocytes, and a few food-granules. Sometimes a semi-digested erythrocyte may be seen surrounded by a "digestive vacuole." The chromatin of the nucleus is scanty and lies next the nuclear membrane in the form of several rod-like or angular masses, and a nucleolus or plasmosome is usually present. The nucleus is not easy to make out unless dark-ground illumination be used, but the vacuoles are sometimes very prominent and numerous (see Figs. 1 and 6). The pseudopodia are pushed out from the ectoplasm very rapidly, the endoplasm flowing into them at once; as a rule the protrusions appear more on that side towards which the amœba is moving, but at times they occur irregularly and at several points at once. *Entamoeba*, usually in groups but sometimes scattered, are often seen in a mass of mucus, containing also red cells. The presence of erythrocytes engulfed by the amœba is diagnostic, but the latter should not be confused with large macrophages (see Fig. 5) with red cells sticking to them. Such macrophages rarely, if ever, show motility, although whilst still in the intestines or submucosa they must be endowed with a certain degree thereof.

Fixed and stained preparations of *E. histolytica* (see note infra) are necessary for a clear view of the details of structure, but artefacts appear however carefully fixation has been carried out. Such preparations are, however, useful for reference, especially with regard to the chromatin content of the nucleus.