

may show hyperendemic malaria—malaria epidemics do not occur in them (except when new non-immune labour is introduced, when there may be a virulent local outbreak).

In the Punjab and the sub-tropics conditions are entirely different. There is a prolonged and sometimes severe cold weather, during which the anophelines are hibernating and transmission ceases. This reduces the infection quantum to a minimum, but—as a result—the immunity quantum is also reduced to a minimum. Under these conditions, given a few years of famine or high food prices, which will destroy the cattle and reduce the resistance of the population to infection, an abnormally heavy monsoon, which gives rise to an abnormally high prevalence of transmitting anophelines, is responsible for the occurrence in the autumn of a great and widespread epidemic of malaria associated with high mortality. In short, widespread epidemic malaria in the autumn is the price which the Punjab pays for its very pleasant cold weather. And it is of but little use to institute antimalarial measures *after* the epidemic has set in; the horse has already bolted from the stable.

In Col. Gill's opinion anti-mosquito measures are impracticable, as neither the men, money nor material necessary to institute mosquito control over this wide area exist, and he has therefore concentrated attention upon palliative measures in the shape of quinine and drainage, etc., and in the meantime he has endeavoured to investigate the mechanism of these epidemics with a view to discovering fresh ways and means of controlling them. The result of his investigations has been to enable him to prepare accurate malaria forecasts each year—a preliminary forecast on September 1st, and a final one on September 15th. These depend on four main factors: (i) the humidity or rainfall factor; (ii) the spleen rate factor at the beginning of the epidemic season; (iii) the economic factor, which is represented by the average price of food grains during the preceding two years; and (iv) the "epidemic potential factor," which is the coefficient of correlation between the total rainfall in July and August for each district concerned, and the recorded "fever" mortality in October and November for the period 1868 to 1921. Of these (i) is known; (ii) is ascertained beforehand by a spleen index survey; (iii) is known, and also (iv). Hence it is possible early in September to issue a malaria forecast; to assemble men and munitions for antimalaria operations in the dangerous districts beforehand; and such forecasts, now published for the last eight years, have proved to be very accurate in the light of what actually happened. "Forewarned is forearmed," and to know beforehand where and when epidemic malaria is to strike the province is to know beforehand where and when to

institute the antimalaria measures necessary. They may be antilarval—as in towns, or the issue of prophylactic quinine, or both combined.

The upshot of this policy has been the institution of a great organisation for distributing quinine in rural areas, and land drainage operations and anti-waterlogging measures on a large scale, with the result that endemic malaria has been reduced and epidemic malaria apparently abolished from areas that previously were highly malarious and peculiarly liable to frequent epidemics. It is a not inconsiderable achievement.

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We have tried to show how varied is the problem of malaria control and prevention in different areas in India. There is one last point which must be referred to. As the result of innumerable papers which have appeared during the past fifteen years, it is now possible to define fairly accurately the position with regard to "prophylactic quinine." It will not prevent the development of malaria in a person bitten by an infected anopheline mosquito, but it will render such malaria fever, when it occurs, comparatively innocuous—and this especially with regard to epidemic malignant tertian infections. Hence its routine use cannot be recommended, but for those who are exposed to conditions where other measures of control are impracticable—e.g., troops on active service, men on shooting trips in infected areas, engineers and labour forces on construction work in hyperendemic zones—prophylactic quinine is indicated. It may not ward off a subsequent attack of malaria, but it will enable men to remain on duty under conditions of exposure to infection.

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We suppose that the controversy between the "old school" and the "modern school" will continue, but we agree with Col. Gill that there is no harm in such divergence of opinions so long as both parties preserve an open mind and avoid personalities.

R. K.

Special Articles.

"IS PUBLIC HEALTH WORTH WHILE?"

AN ADDRESS DELIVERED ON THE 29TH APRIL, 1930,
TO THE ROTARY CLUB, RANGOON.

By G. JOLLY, C.I.E.,
LIEUTENANT-COLONEL, I.M.S.,

Officiating Director of Public Health, Burma.

WHEN I was invited to address the Club, I at first felt at a loss for a suitable subject, but after some reflection decided that I might interest you best by propounding a question and attempting to answer it. This is the question I have selected—"Is Public Health worth while?" It is a subject which was well discussed a few years ago in the medical press, but which is perhaps a new topic of thought to some of my audience.

At first sight the question seems rather childish. Of course Public Health is worth while: everyone knows that. We maintain a large Public Health staff in

England, and have been pioneers in this branch of work. We have prided ourselves on our Public Health development as a nation, and even in Burma we have a major Department of Government specially for this purpose. On the other hand, there is no reason why we should accept general beliefs without examination, and it is open to question just how much Public Health is worth while. As a matter of fact, there are many men who, while admitting that Public Health is generally speaking a good thing, fail to support specific health projects or laws, when these become so personal as to affect either their pockets or their liberty of action.

The Laws of Health.

Public Health and Hygiene have been variously defined as the science of healthy living, the measures that may be taken for the promotion of health or the prevention of disease, preventive medicine and so on. I prefer to regard Hygiene as "that branch of science which deals with the laws of health," and Public Health as "the practical application of these laws of health to communities." That a study of the laws of health is worth while no intelligent educated person will dispute. It is when we come to their practical application in our civic life that differences of opinion appear. Obviously the question has a humanitarian and an economic side and at times these two aspects clash. From the humanitarian standpoint, anything which tends to promote health or to prevent disease deserves support. The economist, however, may look askance at measures which tend to preserve the unfit at the expense of the fit, or which seem to impose an immediate burden upon trade and commerce for a distant and, as he may put it, a doubtful advantage.

In discussing the question "Is Public Health worth while" I shall endeavour to pay due attention to the economic side of the question.

Public Health measures affect either the environment or the individual. They may be carried into effect either by projects or by rules of conduct. Sanitary projects for the most part are directed towards the improvement of the environment, while legislative rules in the main direct the action of the individual. This rough classification is admittedly defective, but it is a convenient one for my present purpose and I shall adopt it.

Environment is Changeable.

First of all a few words about the individual and his environment. We are all of us the product of our heredity and our environment. Our heredity for good or bad is a fixed quantity; our environment is changeable. Public Health measures cannot, with the exception of that branch which Galton called "eugenics," affect our heredity. They can only act upon us through the medium of our surroundings. Thus, if we wish to be long lived, our best plan is to select long-lived parents. This is well known to life insurance companies, but they likewise know that, within limits, our environment also affects our longevity, and they have a way of adding extra premia to our policies, to counter-balance such risks of life as residence in definitely unhealthy places or the following of dangerous or unhealthy occupations.

Many of the early steps taken in England at the beginning of the sanitary reformation were of the nature of "sanitary projects," with the definite object of improving the environment, so as to reduce the incidence of disease. These include such measures as the provision of pure water, the construction of good drainage, the rapid removal and efficient disposal of rubbish and excreta, and the provision of healthy houses. These may be regarded as the fundamentals, or as Sir Andrew Balfour has called them the "gilt-edged investments" of the Public Health market. Their intrinsic value is so great, and their dividends in improved health so certain, that all enlightened Public Health authorities invest largely in them. I do not doubt for a moment that my audience here agrees with me that these

measures are worth while, both from the humanitarian and the economic standpoint. Nevertheless in this country we still lack many of these fundamentals, and there are not a few unready to admit that these things are necessities, or that they pay.

Take the case of water supplies. Between twenty and thirty years ago, all English textbooks on public health dealt in great detail with water supplies, especially in their simple forms, such as rain water, shallow and deep wells, springs, streams and lakes, and their suitability as sources. Nowadays the majority of textbooks deal very perfunctorily, if at all, with such matters. The reason is that in England we have got past this stage. The health officer has little to do with advising on sources of water supply. The supplies have for the most part been provided long ago, and have been in successful operation for many decades; their management has become a routine matter, and only occasionally a question of extension comes up, which is dealt with by a few specialists on the subject. The man in the street thinks not at all of his water supply. He has only to open a tap and obtain an abundance of pure water. He has no occasion to wonder if it is safe; he knows it is. The position in this country is in marked contrast. It is the exception in England to find a town or large village without a pure safe water supply; it is the exception here to find one with it.

Protected Water Supply.

The value of a protected water supply to health is enormous, and is indeed almost incalculable. There is a great group of diseases which are usually or frequently spread through the medium of water. The group includes cholera, typhoid fever and dysentery, three diseases which are so rare as to be curiosities in England, while they are ever with us in this country. These diseases are nowadays looked upon as tropical diseases. It is worth while remembering that at one time they were all of common occurrence in England. In the 19th century the British Isles were ravaged by epidemic cholera, which caused so many deaths that, following the severe epidemic of 1871, public opinion became thoroughly aroused, and the Government of the day was forced to take immediate energetic action to improve the Public Health. It is no exaggeration to say that epidemic cholera in England was one of the principal causes that led to the establishment of the Local Government Board, and to the modern development of Local Government. In the eradication of cholera from England, the provision by local sanitary authorities of pure water supplies was a decisive factor. The great English Public Health Act of 1875, which has served as a model to the world, laid upon all local bodies the duty of providing their districts with a wholesome water supply, whenever an existing supply was a danger to health, either on account of insufficiency or unwholesomeness.

What has been done in England can be done here. The provision of pure water supplies in towns and districts is an essential step in the eradication of cholera and other water-spread diseases. That it will in time prove successful is evidenced by the chart, which was published in the *Annual Public Health Report of Burma for 1924*. The marked contrast between cholera rates in the years preceding the introduction of a piped water supply, and in those following it, is well shown. A pure water supply pays. Not only is cholera reduced, but all water-spread diseases with it, and many other diseases too, which are fostered by insufficient or impure water. But while a pure water supply pays, it requires energy and authority on the part of a Local Body to introduce it, and economy in its use. I know of no town in Burma in which the introduction of a pure water supply was not opposed at the outset by the uneducated and shortsighted among the people, and I know of no town which after its introduction did not appreciate the advantages, or which subsequently desired to revert to its former conditions.

Cost of Piped Water.

The cost of a piped water supply is fairly well understood by the man in the street in England, but not so in Burma. The tendency here is to regard water as the gift of God, and to use it with prodigality. Unless this tendency is curbed, and curbed with firmness, the introduction of a piped water supply does not pay, at all events from the strictly economic point of view. Where uncontrolled waste is allowed the position becomes impossible. I was in Hongkong some 18 months ago. It is a town with very similar climate and population to Rangoon. I enquired about the water supply and was somewhat surprised to learn that it varied from 18 to 25 gallons a head per day. I was informed that, when they had only 18 gallons they were a bit short, but that with 25 gallons a head they did very well. On enquiring how they managed, I was told that prevention of waste and metering were the secret. I was shown a copy of the *South China Mail* of that date in which the following appeared—

“Sergeant Henderson charged a coolie before Mr. R. E. Lindsell this morning, for wasting water at a fountain in Mallory-street. According to the Sergeant, while on beat at 11-30 this morning, he saw the defendant fill a kerosene tin with water at the fountain. Then without turning off the water, defendant crossed the street with the water tin and returned with an empty one. For about 45 seconds the water ran to waste before defendant returned. A fine of \$3 or in default six days' hard labour was imposed.”

Judging from Hongkong's experience it would appear that similar measures in Rangoon might postpone the present acute water shortage, and give perhaps ten years' grace for the careful preparation of schemes for future extension to the supply. Before leaving the subject of water supply, I would like to refer to the *Report of the Punjab Government's Expert Committee on the metering of Piped Water Supplies*. Referring to the repeated occurrence of water famines in municipal towns provided with piped water supplies the Committee states: “No single remedy for this state of affairs can be found, but the installation of meters, both on the mains under municipal control and upon house connections, will exercise a profound effect in limiting the waste of water.”

Time alone prevents me from considering in detail other groups of sanitary projects, such as drainage and sewage schemes and housing. These are considered in England as on a par with or only slightly inferior in importance to water supplies. An ill-drained site is an unhealthy site. It is not commonly realised how drainage schemes in England have eradicated malaria, a disease which used to be prevalent in many parts. I have seen country farmers in the South of England suffering from typical ague fits, the result of malaria, reintroduced during the war, in an imperfectly drained Anopheles-infested area, by convalescent soldiers from the East. They wondered what had hit them, and could not understand what had gone wrong with the old country.

Sewage schemes, and particularly the introduction of the water carriage system, have revolutionised city life. Picture the state of English towns conserved by the pail system—flies everywhere, typhoid and dysentery rife, and epidemic summer diarrhoea taking its terrible toll of infants and young children. The water carriage system of sewage disposal is costly and therefore only economically practicable in closely settled communities, but it certainly pays high dividends on the capital invested. It is now becoming well recognised that no large institution or housing scheme should be permitted in an urban area, in or out of the tropics, without a water carriage system of sewerage removal.

Good rubbish disposal is also a gilt-edged investment. Rubbish heaps are usually the most prolific sources of fly breeding around a town, and many flies always mean a high mortality and much sickness, with the inevitable economic loss. I look upon the improvement of rubbish disposal in Rangoon as only second in importance

to the improvement of the water supply. The 1926 epidemic of flies and dysentery must be fresh in many of our minds. Disposal by dumping into the sea or by incineration in destructors are the two obvious alternatives. Either of these methods would make a wonderful difference to dysentery incidence in Rangoon.

Healthy housing has been described as the basis of Public Health. It is significant that the great housing schemes of England, which have brought about the construction of over a million new houses since the war, have been supervised by the Ministry of Health. Even so, many unhealthy houses have been built. Dampness was the principal fault and as this predisposes to rheumatic fever, it is a serious fault. Arising out of a *Report by the British Medical Association Sub-Committee on Rheumatic Heart Disease*, the Science Committee of the Royal Institute of British Architects recently carried out a survey of such damp houses, and found that, of those built during the last ten years, in 32.8 per cent. the dampness was due to porosity or faulty construction of walls, in 26.6 per cent. to inadequacy of damp proof courses, and in 14.4 per cent. to failure to cover the site with a surface of suitable concrete.

Anti-mosquito Measures.

I cannot leave the subject of sanitary projects without a reference to anti-mosquito measures. The wonderful anti-mosquito work, carried out by Surgeon-General Gorgas, enabled the United States of America to construct the Panama Canal after the French attempt under De Lesseps failed on account of disease. That this fine piece of work paid there can be no doubt. A perhaps greater though less spectacular work has been carried out successfully in Malaya, where a great part of the country has been freed from malaria by anti-mosquito measures. One has only to note the enthusiastic way in which the hard-headed planters there, and in Ceylon and Assam, have tackled anti-mosquito work, to be convinced that their enthusiasm has not been inspired purely by philanthropic motives. I have recently returned from a visit to that great mining concern in the Northern Shan States, The Burma Corporation, and have been amazed at the energetic way they are tackling the malaria problem there, but the Burma Corporation is fully convinced that health pays, and has put its beliefs into practice in a most efficient manner.

Not only do mosquitoes spread malaria, they are also responsible for yellow fever and dengue. Yellow fever is a dangerous disease with a high mortality. If it ever reached Rangoon, teeming with the carrier mosquito, the black and white *Stegomyia*, the result would be a disaster of the first magnitude. The disease is endemic on the west coast of tropical Africa, and with rapidly improving means of communication, the danger of its spread to other parts of the tropics is increasing. The Eastern Bureau of the Health Section of the League of Nations at its meeting a few weeks ago is reported to have passed a resolution, recommending Eastern countries to prohibit aeroplane communication with yellow fever infected areas. Because of this danger and of the serious prevalence of dengue and the mosquito nuisance generally, the Corporation of Rangoon has accepted my suggestion to carry out a mosquito survey of the town and this is now in progress.

As an illustration of how authorities with an intimate knowledge of yellow fever appreciate the value of anti-mosquito measures, I would mention that, when yellow fever was re-introduced into Rio de Janeiro in 1928, causing 351 deaths in 9 months, 6,000 men a day were employed on anti-mosquito operations. They evidently believe there that anti-mosquito measures are worth while.

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Legislative measures to benefit the Public Health generally affect the individual. They may prohibit certain actions dangerous to the community, such as the import of dogs from abroad into Great Britain without

adequate quarantine against hydrophobia, or they may make compulsory the performance of certain beneficial actions, such as compulsory notification of infectious disease, or compulsory vaccination.

Rabies was at one time as common in Britain as it is now in many parts of the tropics. The muzzling order, combined with licensing and quarantine of imported dogs, has freed the country from this terrible disease.

Vaccination, owing to Jenner's great discovery, has relegated epidemic smallpox to the more backward (in the sanitary sense) countries. Smallpox, which was once a national scourge in England is now, as the Chief Medical Officer of the English Ministry of Health has put it, "the perquisite of those who elect to have it." Even in Burma we have tackled smallpox more thoroughly than any other disease. In spite of many difficulties, administrative and otherwise, and in spite of the rudimentary nature of our Public Health Department, which has in the past been able to do little more than act as spectators and chroniclers of outbreaks of preventable disease, we have succeeded in reducing smallpox mortality in Burma by about one half during the last 15 or 20 years. That we have not stamped it out is due solely to the incompleteness of our vaccination; but of recent years there has been an improvement in this respect, and if we steadily push our policy of universal vaccination and re-vaccination we shall certainly succeed in eradicating this loathsome and easily preventable disease from the country. Our knowledge of the method of prevention in this case exceeds the practical use we have made of it.

Inoculation.

I have mentioned cholera in relation to water supplies, but there is an individual method of preventing cholera as of preventing smallpox, namely by inoculation. We have only been using this in Burma for the last four or five years, and yet we have had remarkable results. In an epidemic, which broke out in the Meiktila District in 1928, the disease attacked 152 villages with a population of 55,011. Out of this population we inoculated 32,450 persons. Among these we had only 38 deaths from cholera, while among the 22,561 uninoculated persons we had 706 deaths. A rough rule-of-three calculation from the deaths among the two classes shows that our inoculation campaign saved approximately 1,000 lives in these infected villages alone, not to speak of the spread of disease to other villages. The cost of our inoculation campaign works out to between Rs. 7 and Rs. 8 per life saved. If we value the lives of villagers of the Meiktila District as low as the price of a Negro slave in the 18th century, namely £18, our little inoculation campaign has saved the District of Meiktila and the Province nearly 2½ lakhs.

Someone has remarked that "nothing is so misleading as facts except figures," a remark with a good deal of truth in it, but both the facts and figures in this Meiktila case are very striking, and I would claim that 1,000 lives saved in one cholera outbreak at a cost of under Rs. 8 per life is "worth while" both from the humanitarian and the economic standpoint, and is an encouragement to proceed with similar measures in other outbreaks.

Rules regulating the conduct of individuals for the good of the public health must be enforced if they are to be effective. Such rules are either in the form of acts passed by the Legislature, or of bye-laws made by the local bodies, urban or rural. It must always remain the duty of the Government of the country to ensure that such local bodies frame the necessary bye-laws and take steps to see that they are effectively enforced. This enforcement of bye-laws for public health can only be properly carried out by Health Officers appointed for the purpose, and one of the first steps taken in England by the Local Government Board after its creation, was to insist upon all local authorities appointing such Health Officers. The function of a Medical Officer of Health was, in the words of Sir John Simon, first Chief Medical Officer of the

Local Government Board, to act as "an impartial accuser and adviser against whatsoever unwholesome influences in his district may be removable under the sanitary law." Obviously such important duties can only be efficiently performed by a public servant of high moral and technical qualifications, not subject to the changing influences of local politics. The building up of such a service of Medical Officers of Health is an essential step in the development of Public Health and of good Local Government.

It is a truism that history repeats itself. Eighty years ago in England "the current conception of a local authority was that of a body with power to do as it pleased, even were it pleased to do foolish things, or to do nothing." That false conception of "local government" which implies that the part is greater than the whole, or at least its equal, was corrected in England by the creation of the Local Government Board. We are at a stage of development in Burma when history is repeating itself, and when it is necessary for local bodies to remember that they hold their authority from the Government of the country, and that this Government cannot divest itself of its responsibility of controlling the actions of its subordinate authorities to whom powers have been delegated. For the system of Local Government to be successful, local bodies must recognise the central authority as one whose function is to act as a sort of Father O' Flynn.

"Checking the crazy ones

Coaxing onaisy ones

Lifting the lazy ones on wid the stick."

I have perhaps diverged somewhat from my immediate topic, but it has seemed to me necessary to emphasize that if the Public Health functions of local government in this country—and these are the main objects of local government—are to be exercised successfully, and to be "worth while" we must be guided by the experience of countries which have been successful in their operation. Those of my friends in the Public Health Departments of the United States of America, whom I have consulted on the matter, have generally admitted that the intrusion of local politics into the matter of the appointment and control of Health Officers in the "States" has proved a serious handicap, and has militated against the rapid development of Public Health under the Local Government system. Public Health to be "worth while" must be efficient, and there is no room for patronage or for the undue influence of vested interests. The law must be uniformly observed and equal for all.

Preventable Disease.

I have touched upon sanitary projects and rules of conduct; a few words are necessary about the economic loss caused by preventable disease. My war-time colleague, the late Dr. Maynard, who was an eminent statistician, as far back as 1908 calculated the loss due to certain preventable diseases in the Union of South Africa at £2,640,000 per annum, but quoted Lord Playfair's words. "The record of deaths only registers as it were the wrecks that strew the shore, but it gives no account of the vessels which were tossed on billows of sickness, maimed as they often are by the effects of recurrent storms." This maiming effect is very marked in certain of the preventable diseases such as tuberculosis, malaria and dysentery.

Col. Christophers has pointed out that, while in England out of every 1,000 persons born 530 reach the age of 50, in India only 186 reach that age. There is further nothing to show that the natural span of life in India is any shorter than in England. The difference, which must represent many crores of rupees a year loss to India in productive work, is accounted health in India. Col. Christophers goes on "All I can say is that the tribute paid to disease in a country like India is one of importance economically, even politically, and one that has many financial and commercial aspects. It however transcends this in being of

importance to the welfare of 320 million human beings who, by their tacit acceptance of such calls as may be made upon them, signify their belief that they are being governed to the best ability of those responsible for such Government. The important matter therefore seems to be that proper and enlightened views should be held by Government as to the steps to be taken to justify that trust." Health is purchasable. We have a pretty good idea of its cost, and can estimate it as so much per head of population, but to obtain it we must be prepared to find the money. Is it worth while? An Insurance Company as a business measure has spent 18,700,000 dollars spread over 15 years upon a vast health programme among its policy holders, and has estimated the reduced mortality saved thereby at 35,000,000 dollars in the same period. We consider it worth while to cure disease, and spend large sums of money for that purpose. Surely it is more worth while to prevent disease.

Even in that branch of Public Health which is considered by some most open to challenge—I refer to Child Welfare—the words of the English economist Malthus remain as true to-day as on the day they were written. "It should be remembered that a young person saved from death is more likely to contribute to the creation of fresh resources than another birth. It is a great loss of labour and food to begin over again. And universally it is true that under similar circumstances that article will come cheapest to market which is accompanied by fewest failures." Under the strenuous conditions of modern life, the prize in the contest goes to the race that is fittest. It is an open competition and in the result the health of the competing nations must be the decisive factor.

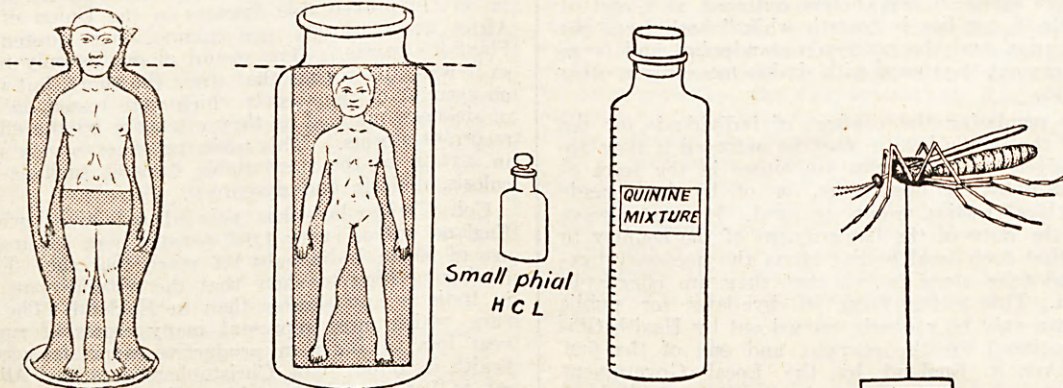
I have attempted in all too short a time to answer the question "Is Public Health worth while?" To a Rotary Club whose members are business and professional men, having as their ideal "Service before Self" the question should be one of interest and importance. For myself I find that the Rotarian ideal is identical with the ideal of the Health Officer. The longer I study Public Health the more firmly I become convinced that if "based upon knowledge tempered with caution," Public Health measures are worth while, and that indeed few things are more worth while. The preservation of law and order is a "sine qua non" of stable Government; given that, the first consideration, for both humanitarian and economic reasons, should be the Health of the People.

HEALTH EDUCATION—A DEVICE.

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THE problem of awakening what may be termed a health conscience in the public presents peculiar difficulties in the East, as the aspects of this important



subject are quite different from those in the West. It is not so important to issue leaflets and insert notices

in newspapers, as illiteracy forms a formidable stumbling block. The important question is not education in the hygiene of the pre-cancerous or the pre-nephritic stages, but in the avoidance of the scourges of such epidemics as cholera, plague, smallpox and malaria. Something is being done; and with the introduction of medical inspection in schools the teaching of hygiene in schools has received attention and the propaganda work carried out among the public in various forms is a healthy sign. Public health exhibitions and health weeks which include popular lantern lectures and health films are useful aspects of the work. This note is therefore written to describe a simple experiment which forms an attractive device of educational value for the illiterate villager. It was first mentioned in an original article entitled "Notes from the Diary of a Medical Inspector of Schools" in the *Indian Medical Gazette* of May 1922. Since then it has been improved upon and used extensively at exhibitions in the United Provinces. It admits of still further improvement and modification but they will necessitate extra expenditure. The device described below costs little and can be set up anywhere.

The ignorant public is not prepared to believe that a small insect like the mosquito can be so poisonous as to vitiate the quality of a comparatively enormous amount of blood, produce malaria, and consequent prolonged anæmia.

Take a short-necked wide mouthed white flower vase and paint the front in black, leaving the outline of the body of man in the middle; a cardboard head is then tied to the neck with a strip to complete the man, and this hides the neck of the vase. Or the whole form of a man is cut out on paper which is pasted on a white short-necked bottle; in this case the neck of the bottle remains uncovered. Partially fill the bottle with water which is tinged red with weak caustic soda solution and phenolphthalein. This will show that man has plenty of red blood in his body.

Have a mosquito cut out in cardboard and mount it on a stand at the height of the man's face. Bring the mosquito in contact with the man and explain that in biting the small insect pours a few drops of her poison in the body, and simultaneously pour a few drops of strong hydrochloric acid from a small phial into the man. The public will see that the few drops of poison have rendered the man pale and anæmic and will be reminded of the pallor and weakness of the sufferers from malaria in their own homes.

Next, pour into the model, drop by drop the liquid from a longish phial which has a large number of small marks for doses and is labelled "Quinine Mixture." It can then be shown and explained to the full conviction of the people that for the cure of the results of a few drops of the mosquito poison (don't use the word parasite) a large quantity of quinine will have to be given, as the laked "blood" in the anæmic man will only gradually regain its normal tinge. This demonstrates

the importance of prolonged treatment after malaria and incidentally makes one realise that not only