

press of this country that at a congress of sanitary inspectors one gentleman had suggested that sanitation should be taught in the primary schools of England. Doubtless he was unaware that the School Board of Lagos has solved that problem. A few days ago it was stated at a congress on infantile mortality held at Essex that the death-rate among children at Barking is, during certain months, over 40 per cent. Does that not show that there are in this country many people other than children that require to begin their sanitary education?

Personally, I believe that to make our work in sanitation progressive and permanent in Lagos, it is absolutely necessary to educate the natives of the country in sanitary matters.

Then again, I have at the present time a very direct interest in the question of sanitary education in this country, because I have been trying to form a great malarial trust for Lagos, which is to comprise all the missions engaged there, and all the merchants living in this country that have establishments in that Colony. With co-operation and assistance from these quarters, the Government can do much more than it could possibly do working alone. The most willing and hearty co-operation has been promised from the Roman Catholic Mission, from the Church Missionary Society, from the Wesleyans, and from the merchants of Liverpool. I look with confidence to the merchants of Manchester, whom I have not yet visited, for similar co-operation. We want assistance and encouragement from a still greater public, for all alike have a responsibility in this matter.

Whilst on the question of education I should mention to you an objection with which I am often met, and which generally takes this form:—"But I am not convinced that malaria may not be communicated to man in other ways than by the puncture of the mosquito."

Gentlemen, we do know with absolute certainty that appalling numbers of people are inoculated with malaria by the mosquito, and thus lose their health or their life. We do not know that malaria is communicated in any other way. Once I was approaching the coast of New Guinea in a steamer lent me by the Government of Queensland. Without a moment's warning we touched some coral, and in an instant had a stream of water pouring upon us through a large leak. We did not sit down to debate the problematical possibility of there being a small leak somewhere of which we knew nothing, but we promptly pumped water out to keep ourselves afloat, and we tried to stop the leak we saw. We know that the mosquito opens a leak through which death rushes on hundreds of thousands of ourselves and our fellow subjects. I say, therefore, that it is our duty to try at once to close that great leak, and not to waste time in first looking for possible smaller ones. Indeed one would, *a priori*, be inclined to think that as the changes in the cycle of Ross are so pronouncedly specialized, the probabilities are strong that malaria is produced in man only by the puncture of an infected *Anopheles*, a view that would be favoured by the analogy of certain other diseases well known to you, that are communicated only by a special host or intermediary. At the same time we must not forget that malaria can be inoculated directly from one man to another, a fact that of itself should restrain us from pronouncing at present an absolute dictum as to the *Anopheles* being always the only one channel of infection.

From what has been stated it will have been gathered that at Lagos we attack malaria at all points in all the several ways and methods that have been mentioned here to-day. European and native alike begin to take an interest in the subject, and to understand something both of the nature of the malady and of the great importance of bringing it under control.

We believe that we have already brought about considerable amelioration, and our experience tends to steadily confirm us in the conviction that we are proceeding on the right lines. For my own humble part I confidently expect to see scepticism disappear in respect of malaria as it did in regard to antiseptic surgery.

Gentlemen, I thank you for having honoured me with your presence here to-day, and I wish to express my deep obligation to one of the greatest of my teachers for having allowed me to meet you in this manner.

REPORT OF A CASE OF BILHARZIA FROM THE WEST INDIES.

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WITH the exception of Mesopotamia, Cyprus, and Mauritius, bilharzia disease has hitherto been supposed to be peculiar to Africa. The following case shows that the parasite has a wider range. Personally, until I came across this case, I never encountered the disease in patients from the West Indies, but its occurrence in a white man from that part of the world practically proves that in some of these islands, if not in all, it must be by no means uncommon amongst the coloured population. Now that attention has been directed to the subject, we may expect to hear from time to time of similar cases. It is evident that the distribution of this and similar parasitic diseases depends on the presence or absence of the efficient intermediaries. Possibly our zoologists may be able to point to some mollusc or anthropod which the West Indies and Africa have in common, and thereby indicate the long-sought-for, but hitherto undiscovered, intermediate host of bilharzia haematobia. Another African disease, guinea-worm, was at one time said to be endemic in Curaçao and others of the West India Islands, and in a limited area in Brazil. I understand the disease has disappeared from Curaçao, and we hear no longer of its presence in the Brazils; it may be that bilharzia has obtained a similar precarious footing in the Western Hemisphere, and that subsequently it will disappear from that region; meanwhile we can assert its presence there as a fact.

I may mention that the patient, an Englishman and a professional man, came to me as a private case complaining of vague symptoms, lumbar pain, headache, etc. As I could not account for the symptoms, and as he looked anaemic, and knowing that he came from a place where ankylostoma duodenale is very prevalent, the idea that he suffered from ankylostomiasis occurred to me. I made an examination of his faeces and discovered the ova of bilharzia. In this case, as so often happens in bilharzia ova from the alimentary canal, the spine is placed laterally.

I am indebted for the following notes to Major Ross and Dr. Daniels, of the London School of Tropical Medicine.

Previous History.—The patient is an Englishman aged 38. Five years ago, in Antigua, after a heavy day's work he felt a dull pain in the lumbar region; it went off after rest, but would come on again after active exercise. During the last year this pain has increased in severity and duration; he was invalidated home on account of it. Has resided in the West Indies chiefly for fifteen years, and has had many attacks of malaria. Never passed blood in his urine; never noticed blood in his stools.

Present State.—Temperature 97°; tongue slightly coated; is slightly anaemic; complains of right frontal headache; has some enlargement of liver and spleen.

Microscopic Examination.—*Faeces*, bilharzia ova not numerous; generally distributed throughout the faecal mass; lateral spined. *Urine*, no ova.

Blood (By G. Duncan Whyte).—Haemoglobin, 84 per cent.; red blood cells, 4,650,000; white blood corpuscles, 8,200; polymorphonuclear leucocytes, 49 per cent.; lymphocytes, 21 per cent.; mononuclear leucocytes, 17 per cent.; eosinophiles, 12 per cent.; intermediate, 1 per cent.

History of Patient's Residence in West Indies, by Himself.—I went from England to Antigua in May, 1887. In the place I lived in there are a good number of swamps, but my house was a mile from the nearest; water was obtained from cisterns (iron) and ponds, was often stale, and contained visible living things; had two or three attacks of malarial fever, one severe. I removed to Anguilla in 1889. It is a flat and dry island. The drinking water came from stone cisterns, the bath water from wells. My health here was fairly good.

Moved to St. Kitts in 1891. This is a mountainous island, no swamps within six miles of my residence; water from public service reservoir conveyed in pipes. My health was fair, but had two or three "run-downs" and one or two attacks of fever. Came to England in June, 1894, and returned to St. Kitts in January, 1895.

In September, 1896, I returned to Antigua—same district, but nearer to swamps; water from stone cistern; plenty of frogs, etc., in water, which was usually boiled; health very unsatisfactory; pain in back severe, but generally yielding to rest and treatment.

In June, 1898, I came to England and returned in January, 1899. In December, 1900, I returned to St. Kitts, but to a different neighbourhood; house 600 ft. above the level of the sea; nearest swamp 3 miles; drinking water from private mountain source; water for baths, etc., from open mountain source (very unsatisfactory at times), passing through a village, and used by everybody. On two or three occasions I got an "itch" in the bath, called locally "cow itch." My health, at first good, soon failed, and for the whole of this year I have had pain in the back, and headache in right side and right eye; also pains in the knee-joints, and always tired. Was invalided home in July.

I ought to have added that between 1891 and 1901 I have been to Nevis on short visits many times; water there is good. To Montserrat two or three times; water there also good. I spent five days in St. Thomas in 1894, and five weeks in Barbadoes in January, 1900. I have never been to Africa or any where else except the British Islands.

SERUM REACTION OF "BACILLUS PESTIS" IN PLAGUE.

A PRELIMINARY COMMUNICATION.

By R. ROW, M.D.LOND., B.SC.LOND.

India.

ON the basis of the conclusion arrived at by the learned Plague Commissioners—to quote their own words: ".....In conformity with this, we are of opinion that no practical value attaches to the method of serum diagnosis in the case of plague."—I have made a few observations with a view of seeing, in the absence of agglutination or sedimentation reaction, if differences of any kind could be demonstrated in the serum of plague convalescents or plague patients from that of normal individuals or animals. The whole series of my experimental results depend on the phenomenon I constantly met with, that when a quantity of serum is infected with an appreciable amount of plague bacilli, and this well-infected serum be left alone for twenty or more hours, that while the bacillus pestis flourishes in the serums of normal individuals or of advanced and bad cases of plague, the bacillus pestis is destroyed in the serum of plague convalescents, and inhibited, at all events, in the serum of plague cases at an early stage of the disease, or of plague cases tending to recover.

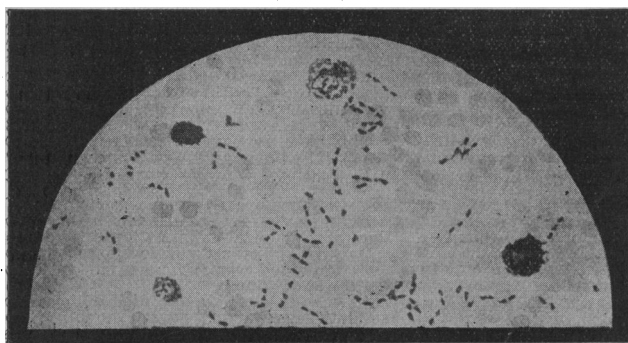


Fig. 1.—Twenty-four-hours drop culture. Normal blood serum infected with *B. pestis*. Vigorous growth in masses and short chains. ($\frac{1}{4}$ in. Zeiss and No. 3 Swift.)

METHOD.

The method I have throughout employed is as follows: A drop of the serum from plague patients and others, obtained twenty-four hours previously by digital puncture, is mixed with a drop of saline emulsion of bacillus pestis (one loopful of a three or four days agar culture to 30 c.c. of normal saline), and this well-infected mixture is made into a hanging-drop culture, and put away in the dark at the laboratory temperature. After twenty-four hours the drop culture is manipulated as follows: The coverslip is carefully removed from the slide and is allowed to dry in the air with the drop uppermost. As soon as the drop is just dry it is fixed, and

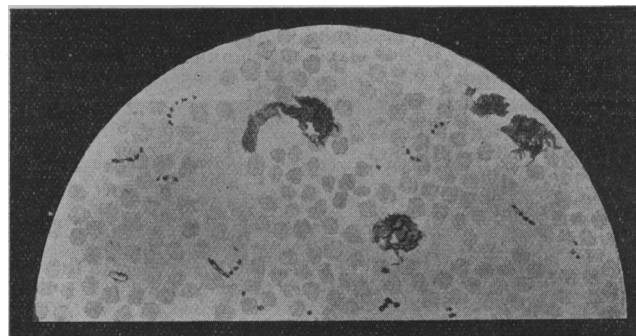


Fig. 2.—Twenty-four-hours drop culture. Bubonic plague case; serum obtained a few hours after the appearance of the bubo. Growth scanty, showing the effort of Nature to make the best fight. One involution form seen in the field as a curved rod.

at the same time rendered sterile with a drop of ether alcohol. The vaseline circumference sticking to the coverslip is removed with a bit of filter paper and the coverslip is now held in a Cornet forceps, and the traces of vaseline are removed by successive drop baths of xylol, chloroform, and absolute alcohol. Now the coverslip with hanging drop sticking to it is ready to be stained and mounted in the usual way for examination. I have used thionine blue with very good results. For rough examination $\frac{1}{2}$ objective with No. 3 eyepiece is quite sufficient to show the important differences.

With the ordinary sterile precautions I have not had a single contamination in my drop cultures (of which I have now made over 200), and, being a hanging drop, the culture can be examined as such from day to day for over a week or more, or removed when required to be fixed and stained for examination. It has been found important to examine the drop cultures of the same age throughout the series, and in my observations on the plague serums I have examined cultures of twenty-four hours usually, but when longer time was deemed necessary forty-eight hours' or seventy-two hours' cultures have been fixed for the whole series of drops to be examined for comparison.

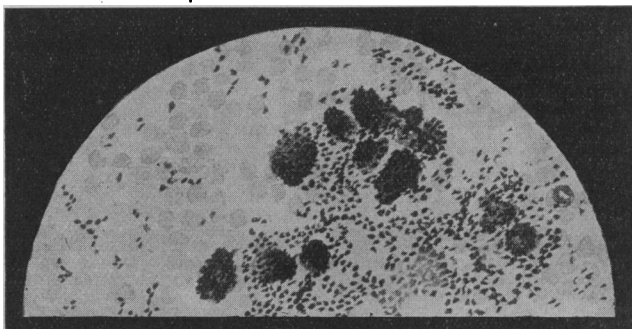


Fig. 3.—Twenty-four-hours drop culture of the serum of the same case as in Fig. 2, but on the fifth day of fever and fifteen hours before death, showing the failure in the production of adequate anti-toxin. Growth luxuriant.

From the experiments carried on in the way indicated above, I have up till now examined over twenty specimens of serums from plague convalescents and over thirty specimens of normal serums and about half a dozen in plague cases at the various stages of the disease. I herewith append drawings which speak for themselves. From these results I learn the following facts:

1. Serum of plague convalescents is remarkable for its bactericidal property to bacillus pestis. This property has been observed in convalescents of over six weeks, and has been maintained, though to a less extent, in two cases of plague patients who had plague twelve and eighteen months ago respectively, and whose blood I had an opportunity to examine now. The growth is absent; involution forms constantly found (Fig. 5, 585).

2. The serum of patients in the very early stages of the disease is certainly inhibitory to the growth of bacillus pestis. The bacilli are few and far between, found only on "hunting," and involution forms are constantly found (688, Fig. 4 and Fig. 2).

3. The serum of blood from normal individuals gives very