A RECENT STUDY OF MALARIA.[1]

WHEN Drs. Stephens and Christophers, the Royal Society's Commission on Malaria, were in India, Captain James had the advantage of being associated with them, and the present volume contains the result of his own observations, both at that time and since. The writer first gives a detailed and eminently practical description of the methods he has found most useful for detecting the malarial parasite in the blood of patients, and for tracing its further development in mosquitoes. An important point to which he draws attention is that the hospitals and jails of India are seriously discounted as fields for the study of the malarial parasite by the fact that the great majority of the patients are under the influence of quinine, in which case the parasites are apt to be banished from the peripheral circulation. In the investigation of malaria among the general population the same fact holds for India as Koch, Stephens, and Christophers have independently found for Africa, namely, that in any place which is more or less malarious, a certain number of young children will have malaria parasites in their blood, and the percentage of young children so affected affords the most accurate test of the amount of malaria and the liability to infection existing there. The percentage of infected children, or, as it is called, the "endemic index," is therefore the first thing to determine when investigating a village for malaria. The variety of parasites present in the children's blood, and the number of cases of "large infection," are further points to be observed, for if there are a good number of large infections, there will be more likelihood of finding infected anopheles. A search is then made for adult anopheles in the houses, outhouses, and stables, the variety and relative abundance of each species is noted, and it is determined by dissection (1) what species of anopheles are carrying malaria at the time, and (2) the percentage of these infected with sporozoites. Thirdly, a careful and detailed investigation is made in order to determine the exact position and extent of the breeding grounds of each species of anopheles present, special attention being paid to the breeding grounds of the species found to be infected. In the words of Captain James, "Every pool, stream, and collection of water of any kind within a radius of half a mile of the village should be thoroughly searched for larvæ." The accurate knowledge of the conditions determining the prevalence of malaria in the place under examination thus obtained permits of a definite system of prophylaxis being formulated for that place. An important point emphasised by Captain James is that no general system of prophylaxis will apply to every place, but that the malarial individuality of each must be studied.

As a model of what a malarial survey should be, he quotes the survey of Ennur, made in February, 1902. Ennur is a village on the coast near Madras, and was formerly a health resort for Europeans, but is now deserted by them on account of the fact that it is scarcely possible to pass even a single night there without getting fever. The source of infection was found to be the native children, 55 per cent. of whom had malarial parasites in their blood. With regard to the variety of parasite present, 81 per cent. of the infected children showed quartan parasites only, 5 per cent. tertian only, and 14 per cent. mixed infection. No malignant tertian parasites were found. Investigation of the mosquitoes showed that only two species were present in the houses, viz. *A. Rossii*, which was in great abundance, and *A. Culefacies*, which was moderately so. Dissection, however, showed that, while not one of 240 specimens of *A. Rossii* examined was infected, no less than 8.7 per cent. of *A. Culefacies* contained sporozoites. Captain James concludes that *A. Culefacies* is the chief carrier of malaria at Ennur, and that the high infection rate of this species indicates the great liability to infection of anyone residing in the place. Extensive breeding grounds for mosquitoes surrounded the village, the nearest being within ten to twenty yards of the houses. *A. Culefacies* was found to be breeding almost exclusively in the "borrow pits" by the side of the railway, and in the tanks in the compounds of the deserted European bungalows.

The observations of Captain James on malarial infection of native children have resulted in an important addition to our knowledge of this subject, for by careful investigation he has shown that the same febrile disturbance takes place in children about the time of segmentation of the parasites in their blood as in the case of adults, and that there is, in short, no essential difference between child infections and those occurring in adults.

The chapter on the causes which influence the spread of malaria in different parts of India, in which the writer has been helped by Drs. Stephens and Christophers, is one of the most valuable in the book. The data therein cited clearly show the great general influence on the prevalence of malaria due to the particular species of anopheles present, and to the nearness and abundance of anopheles' breeding grounds. The number of species of anopheles in India is large, and previous description of them inadequate. A considerable and well-illustrated part of the present monograph therefore is devoted to the differentiation of the various species of Indian anopheles, and promises to be of high practical value in future malaria investigations. The remarks on the subject of the favourite breeding places of the various species of anopheles are also of importance, and show how thorough inquiry in this direction ought to be. Captain James's observations on the usual distance of flight of anopheles in India go to show that this rarely, if ever, exceeds half a mile, and therefore that at this distance from a focus of infection "we are practically safe from malaria." With regard to the influence of altitude, it has been found that under 4000 feet has no effect by itself on the prevalence of malaria in India.

In reference to the prevention of malaria, the following remarks of Captain James are significant:—"Complete protection from malaria (and Blackwater fever) may be ensured by any individual who is willing to take the trouble to pay scrupulous attention to the use of a good mosquito curtain at night, and to adequately protect himself from being bitten by mosquitoes during the evening hours. If these simple precautions are taken it is quite unnecessary to use quinine as a prophylactic. No other precautions than these have been used by any of us during our tours through some of the most malarious parts of India, and none of us has experienced a day's fever during this time. By the use of the same precautions also, and without taking any quinine, Dr. Stephens previously passed two years in the most malarious parts of Africa without a single attack of malaria." When such success attends the adoption of simple measures of defence against malarial mosquitoes, there is good reason for hoping that additional preventive measures, such as separation of the residences of Europeans by a distance of at least half a mile from the dwellings of natives, and, above all, destruction of the breeding grounds of anopheles, will do much to eliminate a disease the death-tribute to which has been already far too costly.

M. H. GORDON.

[1] "Malaria in India." By Captain S. P. James, M.B. (Lond.), I.M.S. Issued under the authority of the Government of India by the Sanitary Commissioner with the Government of India, Simla. Published by the office of the Superintendent of Government Printing, Calcutta, 1902. Pp. 106. Price Rs. 1-8, or 2s. 3d.