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B *Borrelia* infections

African Relapsing Fever

A. Epidemic louse-borne Relapsing Fever ^{1, 2}

Africa

Up to the middle of the nineteenth century epidemic African relapsing fever was mixed up with other diseases such as typhus, typhoid fever and certain forms of malaria. The most common name used was 'bilious typhoid'. The first description of cases was given by W. GRIESINGER (1853 and 1854) from Egypt. He described in detail the 'bilious typhoid', its symptoms, course and autopsy findings from observations of 132 patients and 101 autopsies. He also reported his observations regarding epidemiology: increased number of cases in winter and spring; patients belonging to the lowest classes, workmen, soldiers, people who must sleep crowded together in small rooms; transmission of the disease to people doing laundry work.

In his first publication GRIESINGER does not clearly state that he regards the 'bilious typhoid' as relapsing fever. Subsequently, however, in 1864 he takes the viewpoint that the 'bilious typhoid' is an especially grave form of febris recurrens of long duration. He also expressed the belief that epidemics observed in 1812 by Larrey in Egypt were due to the same disease.

Cosmopolitan louse-borne relapsing fever is widespread in Africa. Similarly as is the case of relapsing fever in Europe, epidemic outbreaks are connected with wars, famine, large troop movements, and various disruptions of the normal life of the people. Between 1921 and 1928 several severe epidemics occurred in West- and Central Africa.

¹ The name 'Relapsing Fever' was first given to an epidemic which occurred in Edinburgh in 1843–1848 and was described by Craigie and Henderson (teste SCOTT, 1942, vol. II, chapt. XIV, p. 781).

² The pathogenic agent is *Borrelia recurrentis*, synonyms are *B. obermeieri* and *B. novyi*.

B. Endemic African Tick Fever³

It occurs in the whole of Africa, except the Sahara.

The Somalis call both tick and infection by the Arabic word *gurud*. According to G. A. WALTON, 1962, in the Lake Victoria area *ebibo* is relapsing fever or the fever of the ticks.

The indigenous population in all the endemic areas of tick-borne relapsing fever from Somaliland to South Africa knew already for a long time that the bite of ticks is occasionally followed by fever and sickness. They also knew that people living in tick-infested areas suffered less from tick bites than newcomers who occasionally became seriously ill and might die (note 1).

In some places, for example in Nyasaland, the natives were apparently aware that they lose their tolerance or immunity against tick bites, if they temporarily change their place of residence and leave the tick-infested area. It has been reported (teste SCOTT, 1942) that in such a case people take some ticks with them and allow them to feed on them in order to preserve their immunity. A similar observation has been made by Prof. R. Geigy in Tansania (GEIGY, 1968).

The symptoms and the sickness following tick bites were described by D. LIVINGSTONE (1857) from Ambaca, Angola and from Tete, Mozambique. He himself was bitten by ticks. In Angola the tick was called *Tampan*, in Mozambique *Carapato* (note 2). The Portuguese commanders in both places warned LIVINGSTONE of the effect of tick bites. The Portuguese like the natives knew that people living in tick-infested areas developed a certain tolerance and as a rule did not become seriously ill (note 3). Several writers besides LIVINGSTONE, for example PINTO ROQUETE (1868), reported their observations that tick bites may be followed by fever. Many foreigners knew of a tick fever of unknown aetiology occurring in different parts of Africa.

America

Field studies and experiments have shown that the *Borrelia* of relapsing fever are as a rule strictly adapted to certain tick species and cannot be transmitted by other ticks. The tick fever of America, though transmitted by *Ornithodoros* species, *O. turicata*, *O. talaje* and others, does not produce cross-immunity with the African fever. It occurs in British Columbia, the western United States, Mexico, Central- and South America.

Lice, as is well known, live on the body or in the clothing of

³ The pathogenic agent is *Borrelia duttoni*, synonym *Spirochaeta duttoni*.

man, and therefore can easily be carried to other places. It is different with ticks which normally live in crevices in the huts of natives or in other hiding places. They are generally not carried by man. This behaviour together with the adaptation of *Borrelia* to certain tick species in different countries makes it improbable that slaves have transmitted African tick fever to the New World. In Central Africa the most important vector of tick fever is *Ornithodoros moubata* which transmits *Borrelia* in its saliva and the coxal fluid.

The discovery of *Borrelia* of African tick fever and the early studies of the disease are connected with the work of a number of investigators, among them C. CHRISTY (1903), A. R. COOK (1904), who in Uganda was the first to detect spirochaetes microscopically in the blood of patients suffering from this fever, P. H. ROSS and A. D. MILNE (1904), D. NABARRO and E. D. W. GREIG (1905), R. KOCH (1905). Independently J. E. DUTTON and J. L. TODD (1905) had studied tick fever in the Congo Free State and had found that it was caused by a spirochaete occurring in the blood and that the infection was transmitted by the bite of the tick *Ornithodoros moubata*. They infected experimentally healthy monkeys with the disease and showed that the infection is transmitted to the offspring of the ticks. During these experiments both investigators became infected with tick fever and J. E. Dutton died⁴.

Notes

1. Already in 1702 R. Drury, an explorer of Madagascar (quoted by Thézé and Lamoureux from the work of A. Grandidier) reported the existence of a pathogenic insect on the west coast of Madagascar. He stated that persons who are bitten by the 'Poro-pongy' are sick during six weeks or two months . . . but if one has been bitten and has been sick once, one has nothing to fear any more and one is no more inconvenienced by these insects how numerous they may be. E. BRUMPT, Précis de Parasitologie, cinquième édition, Paris, 1936. vol. I, p. 122.

2. "When sleeping in the house of the Commandant (of Ambaca, Angola) an insect, well known in the southern country by the name Tampan, bit my foot. It is a kind of tick, and chooses by preference the parts between the fingers or toes for inflicting its bite. It is seen

⁴ For details regarding the work of the early investigators, see: E. HINDLE, The Relapsing Fever of Tropical Africa. A Review. Parasitology vol. IV, pp. 183 to 203, 1911; for characteristics of Louse- and Tick-borne Relapsing Fevers, see GEIGY, 1968.

from the size of a pin's head to that of a pea, and is common in all the native huts in this country . It sucks the blood until quite full, and is then of a dark-blue colour, and its skin so tough and yielding that it is impossible to burst it by any amount of squeezing with the fingers. I had felt the effects of its bite in former years, and eschewed all native huts ever after, but as I was here again assailed in a European house, I shall detail the effects of the bite. These are a tingling sensation of mingled pain and itching, which commences ascending the limb until the poison imbibed reaches the abdomen, where it soon causes violent vomiting and purging. Where these effects do not follow, as we found afterwards at Tete, fever sets in; and I was assured by intelligent Portuguese there that death has sometimes been the result of this fever. — The only inconvenience I afterwards suffered from this bite was the continuance of the tingling sensation in the point bitten, for about a week." LIVINGSTONE, 1857, pp. 382–383.

"I was kindly received by the Commandant Tito Augusto d'Araujo Sicard, who did everything in his power to restore me from my emaciated condition; and as this was still the unhealthy period at Kilimane, he advised me to remain with him until the following month. He also generously presented my men with abundant provisions of millet; and by giving them lodgings in a house of his own, until they could erect their own huts, he preserved them from the bite of the Tampans, here named Carapatos. We had heard frightful accounts of this insect while among the Banyai, and Major Sicard assured me that to strangers its bite is more especially dangerous, as it sometimes causes fatal fever. It may please our homoeopathic friends to hear that, in curing the bite of the Tampan, the natives administer one of the insects bruised in the medicine employed." LIVINGSTONE, 1857, pp. 628–629.

3. "A Rios de Senna, on appelle fièvre de carrapato une pyrexie qui attaque les nouveaux arrivés plus fréquemment que les acclimatés de la province. Cette fièvre est souvent accompagnée de délire, on l'attribue généralement à la morsure d'un petit insecte commun dans cette localité et que dans le pays on appelle carrapato.

On dit et il passe pour certain que cet insecte, torréfié et réduit en poudre, administré dans un véhicule alcoolique guérit cette maladie avec facilité." ANTONIO PINTO ROQUETE, 1868, p. 166.

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