LEISHMANIASIS IN SOUTH WEST AFRICA: PRELIMINARY NOTES ON HOST RESERVOIR AND VECTOR STUDIES*

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SUMMARY

Studies were undertaken to determine the sandfly fauna of South West Africa with the view to finding possible vectors of leishmaniasis, and to locate a host reservoir. A possible vector species belonging to the Synphlebotomus group of sandflies, which have been incriminated as leishmania vectors in Kenya, has been found in South West Africa. All host reservoir studies have proved negative. Both of these aspects will be the subject for further investigations in the territory.

Two main forms of leishmaniasis occur in Africa; the visceral form or kala-azar, for which *Leishmania donovani* is responsible; and the cutaneous form or Oriental sore, the agent of which is *Leishmania tropica*. Both forms of leishmaniasis are widespread in Africa, though their distribution is somewhat scattered. The endemicity varies considerably in these areas, with the visceral form reaching epidemic proportions in Kenya and the Sudan.

Leishmaniasis was first reported from South West Africa in 1970.[1] All 4 cases had contracted cutaneous leishmaniasis, and all 4 occurred in White women. These cases appeared over a period of 3 years. Before this the nearest recorded case of leishmaniasis was from south-western Angola.[2] Cahill[3] has expressed some doubt as to whether the disease had been contracted in the territory.

Phlebotomine sandflies have been incriminated as vectors of leishmaniasis in various parts of the world. The sandflies (Phlebotominae) of the Old World are divided into two genera following Theodor,[4] Sergentomyia and Phlebotomus. The latter contains all the known vectors of human leishmaniasis. Within this genus the most important groups are the 'major' and 'Synphlebotomus' groups which are the vectors of kala-azar, and the sergenti and papatasii groups which are the vectors of cutaneous leishmaniasis. Most workers are of the opinion that Sergentomyia species play no role in the transmission of the human form of the disease because they are not suitable hosts for human leishmania species, their distribution does not accord with that of the disease in most cases, and also they are generally extremely reluctant to bite man.

The present study was designed as an initial survey of the sandfly fauna of the territory, with the view to finding a possible vector species and to locate a host reservoir. The period of study extended over 8 months, from February to September 1970.

MATERIALS AND METHODS

Phlebotomine sandflies were trapped on castor-oil-coated cards as recommended by various authors. These were inserted into the excavations of burrowing animals, soil cracks, the ventilation shafts of termite hills, tree holes, rock holes and other likely resting places of sandflies. In addition, free cards were placed outside these excavations, etc., and in bushes and piles of dead brushwood. All sandflies caught on these traps were removed with a camel-hair brush after the application of a few drops of alcohol onto each specimen. They were then stored in 70% alcohol and transported to the laboratory for mounting. All flies were cleared overnight in 10% KOH solution, and then transferred to Vizthum's fluid for several hours before mounting. Initially, all flies were mounted separately in Berlese's fluid under coverslips on glass slides. Later, when large numbers had to be mounted, they were separated into their sexes and phenae, as far as the latter permitted, and then mounted several at a time under separate coverslips on slides. Any specimens of particular interest could then be soaked off in water, and remounted separately.

In addition, a large number of animal tissues were examined for the histological presence of leishmania bodies. Smear preparations from a variety of tissues, including those from likely lesions, were examined in an attempt to locate a reservoir host. Animals examined included small reptiles, leguans, tree squirrels, ground squirrels, spring hares, hyraxes, mongooses, jackals and honey badgers.

RESULTS

Up till 1970, only 3 species of sandfly had been recorded from South West Africa.[5] These were *Sergentomyia namibensis, S. magna,* and *S. squamipleuris*. This list has now been considerably extended. Although collecting has been widespread, no area has been systematically collected from for any length of time. The areas surveyed include Windhoek and the areas to the north of it as far as the Angolan border, and areas as far east as the Caprivi Strip. The list of sandflies now recorded from the territory is as follows: *Phlebotomus rodhaini* (Parrot); *Sergentomyia meilloni* (Sinton); *S. namibensis* (De Meillon and Hardy); *S. bedfordi* (Newstead); *S. antennatus* (Newstead); *S. schoutedeni* (Adler, Theodor and Parrot); *S. zumpti* (Anonnenc); *S. schwetzi* (Adler, Theodor and Parrot); *S. magna* (Sinton); and *S. squamipleuris* (Newstead).

In addition to these records, there are at least two new Sergentomyia species to be described. Of special interest are the first records of Phlebotomus from the territory. Besides *P. rodhaini,* other records are of two males of a new species of 'Synphlebotomus'. One of these was collected from a termite hill in the Tsumeb district, and the other from a ground squirrel burrow in the Gobabis district. A single Synphlebotomus female was taken from a termite hill at Odibo in northern Ovamboland near the Angolan border. All these records will be given more detailed treatment in a taxonomic paper now in preparation.

This survey, and records from the Republic and Rhodesia, show that termite hills are an important microhabitat for sandflies. The classification of termite hills

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proposed by Wijers and Minter[6] applies to South West Africa. They are all of the mound type and are (*i*) the 'castellated' type, with several turrets at the apices of ventilation shafts; (*ii*) the 'eroded' type, formed by weathering processes from (*i*); and (*iii*) the 'closed' type, which lacks turrets and sometimes ventilation shafts.

Sandflies, in addition to inhabiting the ventilation shafts, also make considerable use of any burrows or holes in the sides of the mounds. Prominent sandfly inhabitants of termite hills in South West Africa are *S. zumpti* and *S. schwetzi*. *S. bedfordi* is a characteristic inhabitant of tree holes, although it may often be found in termite hills in small numbers. Additional resting places of these, and those of other species include the excavations of burrowing animals, rock holes, soil cracks, bushes and dead brushwood.

All tissue smears of possible host reservoirs were negative for leishmania bodies.

DISCUSSION

Both the low incidence and the scattered nature of leishmaniasis in South West Africa, and the paucity of records of possible vector species, preclude any extended discussion of the disease at present. The presence of Synphlebotomus in South West Africa, and the importance of termite hills as a microhabitat for sandflies in the territory may, however, be considered with respect to what has been called 'termite hill' kala-azar in Kenya.

Minter[7] found a striking association between termite hills, sandflies and leishmaniasis in all kala-azar areas in Kenya. Preceding this, Southgate and Oreido[8] concluded that in the Kitui kala-azar focus, there was a direct correlation between the proximity of homesteads to termite hills, and the incidence of kala-azar. In the Usueni sub-location of the same district, termite hills were found to be the natural habitat of Synphlebotomus sandflies, especially those of the low 'eroded' type on the outskirts of the thornbush.[6] Wijers[9] found that sandflies of the Synphlebotomus complex were present in all micro-foci investigated in the same locality, and that they were seldom found outside such micro-foci. It was subsequently shown on distributional evidence[7] and experimental evidence[10] that, of the sandflies of the Synphlebotomus complex, *Phlebotomus martini* (Parrot) is the main vector of kala-azar in Kenya, and that *Phlebotomus vansomerenae* (Heisch, Guggisberg and Teesdale) and *Phlebotomus celiae* (Minter) are involved as secondary vectors in certain areas.

Wijers[9] notes how in the Usueni sub-location, the people are in the habit of building their homesteads on the edge of the thornbush, or in clearings in the thornbush, thus bringing them into close proximity with the favourite habitat of Synphlebotomus sandflies. The population may thus be exposed to the bites of sandflies while resting and sleeping. The population may be further exposed to their bites when, for instance, children play in the vicinity of or on termite hills; while resting on them when conversing with friends; or chasing birds away from their crops; or using them as vantage points while herding domestic livestock.

So far nothing is known of the incidence of the disease among the indigenous peoples of South West Africa, and the fact that all 4 cases have been in Whites may indicate that the incidence of the disease is possibly higher than is at present realized. All 4 patients apparently contracted the disease in South West Africa, and one comes from within the distribution of a possible vector, viz. the Synphlebotomus specimens. The low incidence and widespread nature of the cases points to the disease being a zoonosis. Whether leishmaniasis had gone undetected before these cases, or whether it has been recently introduced, is a matter for debate. It was reported that in the fourth case the infection might possibly have been introduced by people from countries on the northern borders of South West Africa; or by Portuguese immigrants to the territory.[1] The case from Angola, according to Cahill,[3] may have been contracted in Portugal before the patient emigrated to Angola. In Kenya the disease was carried to the newer kala-azar area by troops returning from active service in the older northern endemic areas after World War II.[11] This then raises the question of the presence of a large number of troops in Angola, many of whom come from Portugal, where the disease is endemic. In the presence of a suitable vector and host reservoir (a single female of the Synphlebotomus complex has been found near the Angolan border) this may have serious epidemiological implications.

CONCLUSIONS

It is obvious that much remains to be done in establishing a clinical pattern of the disease in South West Africa, especially among the indigenous peoples. The fact that one possible vector species has been found in the territory merits further work into its distribution and incidence with particular emphasis on its suitability as a natural intermediate host. This does not preclude the fact that another species may be the active vector in South West Africa. The host reservoir studies will almost certainly be concentrated on rodents because of their primary importance as host reservoirs in other parts of Africa.[3,12]

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