Zeitschrift: Acta Tropica
Herausgeber: Schweizerisches Tropeninstitut (Basel)
Band: 36 (1979)
Heft: 1

Artikel: The feeding habits and ecology of the tsetse fly "Glossina morsitans submorsitans" Newstead in relation to nagana transmission in The Gambia
Autor: Snow, W.F. / Boreham, P.F.L.
DOI: https://doi.org/10.5169/seals-312507

Acta Tropica *36*, 47–51 (1979)

[1] International Centre of Insect Physiology and Ecology, Coastal Field Station, P.O. Box 80804, Mombasa, Kenya
[2] Imperial College of Science and Technology, South Kensington, London SW7 2AZ, U.K.

The feeding habits and ecology of the tsetse fly *Glossina morsitans submorsitans* Newstead in relation to nagana transmission in The Gambia

W. F. Snow[1], P. F. L. Boreham[2]

Summary

The source of blood meals from 174 fed *Glossina morsitans submorsitans* Newstead, captured in malaise traps in Savanna woodland in The Gambia, were identified by the precipitin test. Warthog accounted for 90% of the meals and single bushbuck and ox feeds were identified. Nagana is a major problem in the area, but contact between tsetse and livestock is reduced by restricted grazing. In this situation, warthog, with a ubiquitous distribution, appear to be major maintenance hosts for *G. m. submorsitans* as well as a potential reservoir of trypanosomiasis.

Key words: Tsetse; feeding habits; The Gambia; nagana.

Introduction

The ecology of the two tsetse species occurring in The Gambia, *Glossina morsitans submorsitans* Newstead and *Glossina palpalis gambiensis* Vanderplank has been summarised by Nash (1948) whose analysis is still, in general terms, valid. *G. m. submorsitans* is common in areas of deciduous, Guinean savanna woodland throughout much of The Gambia, although absent from the south bank coastal areas of Kombo and Foni despite the presence of suitable habitats. Since Nash's (1948) survey, large areas of forest and woodland have been cleared for agricultural use, with a consequent reduction and fragmentation of *G. m. submorsitans* habitat in many areas (Snow, 1976). Mann (1975)

Correspondence: Dr. W. F. Snow, International Centre of Insect Physiology and Ecology, Coastal Field Station, P.O. Box 80804, Mombasa, Kenya

Table 1. Identification of blood-meals from *Glossina morsitans submorsitans* from Keneba, The Gambia

	Warthog	Bushbuck	Ox	Unidentified mammal	Negative	Total
Male	103 (90,4%)	1 (0,9%)	1 (0,9%)	9 (7,9%)	13	127
Female	37 (88,1%)	–	–	5 (11,9%)	31	73
Total	140 (89,7%)	1 (0,6%)	1 (0,6%)	14 (9,0%)	44	200

estimated that forest and woodland had been reduced from 60% to 8% of the vegetation cover of the country between 1946 and 1968 and this is perhaps a rough index of the decline in tsetse habitat. This is a continuing process. Human pressure has also had a marked effect on the number of large, wild animals in The Gambia with the result that although warthogs (*Phacochoerus aethiopicus*), baboons (*Papio anubis*) and monkeys (*Cercopithecus aethiops, Erythrocebus patas* and *Procolobus badius*) are still common, ungulates such as duiker (*Cephalophus* sp.) and bushbuck (*Tragelaphus scriptus*) are rare. Thus, man and his domestic animals, and warthog, represent the most important potential hosts for *G. m. submorsitans.*

Tsetse collection and bloodmeal identification

In West Kiang, about 80 km from the coast, substantial areas of *Combretum/Terminalia* woodland are still present and harbour large populations of *G. m. submorsitans.* Two malaise traps erected beside roads through woodland near the village of Keneba captured large numbers of tsetse (Snow, in press). One trap, 3 km to the north of Keneba, was in operation for 9 months (Jan.–Sept., 1977) and the second, 2 km east of the village, for two months (Aug.–Sept., 1977). Two hundred fed flies were collected from these traps and their bloodmeals analysed by the precipitin and haemagglutination inhibition test (Weitz, 1956). The results of these determinations are presented in Table 1. No difference was apparent between the two trap sites and the results from both have been pooled. As warthog was the only suid present in the area, feeds identified as "Suid" are included with specific determinations for warthog in the Table. At least 90% of the flies had fed on warthog, and probably most unidentified mammalian feeds were also from warthog but were too well digested to react to more specific antisera.

Discussion

Although warthog is an apparently favoured host of the *G. morsitans* group these results represent the highest percentage of warthog feeds yet recorded for

G. m. submorsitans. Between 40% and 60% feeds on warthog or other suids have been noted in previous reports (Jordan et al., 1962; Weitz, 1963). In Northern Nigeria, where wild Bovidae were relatively scarce, warthog feeds made up a greater proportion of *G. morsitans* feeds than in East Africa where bovids were abundant (Jordan et al., 1962). The position of warthog in the epidemiology of nagana in The Gambia has not been investigated, but their abundance may be important from two aspects. Firstly, the results of the blood-meal determinations show that they are major hosts of *G. m. submorsitans* and support large populations of this species throughout areas of woodland from which domestic animals are normally absent. Secondly, they may be important reservoirs for trypanosomes since *Trypanosoma vivax, T. congolense, T. brucei* and *T. suis* have all been isolated from warthogs (Hoare, 1972). No data on trypanosome infection rates in warthogs in The Gambia are available although low infection rates have been observed in other parts of Africa (Ashcroft, 1959). However, it has been suggested that if the importance of an animal species as a reservoir of trypanosomiasis is assessed by the product of infection rate and frequency of tsetse feeding on the species, then warthog are amongst the more important reservoir species in Africa (Ashcroft, 1959).

Trypanosomiasis in cattle in the Keneba area is a major problem with *T. congolense* predominating, although *T. vivax* and *T. brucei* are also found (Clifford and Sanyang, in press), The local Ndama strain of cattle shows a degree of trypanosome tolerance (Murray et al., in press, a) but this tolerance is far from absolute (Murray et al., in press, b). High calf mortality and failure to thrive is characteristic of herds in the area, which barely maintain their numbers (Clifford and Sanyang, in press). Prevalance of parasitaemia in cattle generally follows the fluctuations in tsetse numbers, with highest rates at the end of the rains and early dry season (Nov.–Jan.) when tsetse numbers are maximal, while at the end of the dry season (June), when the lowest numbers of tsetse are present, the prevalance of infection in cattle is low (Clifford and Sanyang, in press).

In the Keneba area, contact between tsetse and livestock is limited by local animal husbandry practices. The village is surrounded by an intensively cultivated area of approximately 5 km^2 which also contains some fallow areas and scrub covering old field systems. During the farming season, which coincides with the rains from June–November, grazing of domestic stock is strictly regulated. Oxen (about 40 were present in 1977) and donkeys (c20) are kept close to the village and grazed on fallow land. Sheep and goats (c400) are driven further from the village into the areas of scrub. The cattle (c150) are herded along well defined grazing trails which extend from tethering sites on fallow land near the village into the surrounding woodland. Daily movements are of the order of several kilometres and although the trails change from day to day, grazing is restricted to a particular sector during each farming season (e.g. to areas to the south and east of Keneba in 1977). During the dry season livestock movements are unsupervised and cattle may roam into the peripheral areas of woodland.

Thus, oxen, donkeys, sheep and goats tend not to enter the major areas of *G. m. submorsitans* habitat and cattle are very restricted in their contact with woodland areas. Parasitaemia rates reflect the different grazing patterns with at least 33% of cattle showing infections over an 18-month period whilst the great majority of sheep remain trypanosome free (Clifford and Sanyang, in press, and pers. comm.). During the late rains and early dry season, when tsetse numbers are maximal, the flies disperse into the cultivated area and may even occur within the village. In addition, livestock is occasionally moved between villages along roads through woodland where some contact with tsetse does occur. This type of movement may explain the ox feed recorded in Table 1 since the traps were sited in areas ungrazed by domestic stock. The pattern of controlled grazing and restricted movements of livestock contrasts with the ubiquitous distribution of warthog throughout the area.

In The Gambia, warthog warrant attention as an important maintenance host for *G. m. submorsitans* populations which, as vectors of trypanosomiasis, are a major limiting factor on cattle production in the country. Warthog control is carried out in a sporadic and unsystematic way to reduce crop damage, which may be considerable. This approach is unlikely to change at a local level in an Islamic society where, for religious reasons, the beast is inedible. Nevertheless in many areas of The Gambia *P. aethiopicus* and *G. m. submorsitans* co-exist to the detriment of livestock production.

Acknowledgments. W. F. Snow was supported by a programme grant from the Medical Research Council and would like to thank Dr. R. S. Bray for providing working facilities in The Gambia. P. F. L. Boreham acknowledges financial support from the Ministry of Overseas Development.

1 Ashcroft M. T.: The importance of African wild animals as reservoirs of trypanosomiasis. E. Afr. med. J. *36*, 289–297 (1959).
2 Clifford D. T., Sangang B.: An epidemiological study of trypanosomiasis in the N'dama cattle in The Gambia. Proc. 15th Meet. int. Scient. Comm. Trypanosom. Res. Cont. (Banjul), 1977 (in press).
3 Hoare C. A.: The trypanosomes of mammals, 749 p. Blackwell Scientific Publications, Oxford 1972.
4 Jordan A. M., Lee-Jones F., Weitz B.: The natural hosts of tsetse flies in Northern Nigeria. Ann. trop. Med. Parasit. *56*, 430–442 (1962).
5 Mann R. D.: The Gambia: land and vegetation degradation survey: the need for land reclaimation by comprehensive ecological methods. Gambian Dept. of Agriculture C/GAM/LRP/75 (1975).
6 Murray P. K., Murray M., Wallace M., Morrison W. I., McIntyre W. I. M.: Trypanosomiasis in Ndama and Zebu cattle. I. An experimental investigation of susceptibility to *Trypanosoma brucei, T. congolense* and mixed infections. Proc. 15th Meet. int. Scient. Comm. Trypanosom. Res. Cont. (Banjul), 1977 (in press, a).
7 Murray P. K., Murray M., Wallace M., Morrison W. I., McIntyre W. I. M.: Trypanosomiasis in Ndama and Zebu cattle. II. The influence of weight of infection on the severity of the disease. Ibidem (in press, b).

8 Nash T. A. M.: Tsetse flies in British West Africa. IV. The Gambia, p. 60. Her Majesty's Stationary Office, London 1948.
9 Snow W. F.: Consultancy on tsetse fly distribution and ecology in The Gambia undertaken by W. F. Snow, November 17th–December 21st, 1975. Unpublished report for FAO, UNDP and The Gambian Livestock Development Programme (1976).
10 Snow W. F.: The malaise trap as a method for sampling *Glossina morsitans submorsitans* Newstead: A preliminary note. Proc. 15th Meet. int. Scient. Comm. Trypanosom. Res. Cont. (Banjul), 1977 (in press).
11 Weitz B.: Identification of blood meals of blood-sucking arthropods. Bull. Wld Hlth Org. *15*, 473–490 (1956).
12 Weitz B.: The feeding habits of *Glossina.* Bull. Wld Hlth Org. *28*, 711–729 (1963).