

A study on the ecology and trypanosome infection of Glossina morsitans submorsitans Newst in south Darfur, Sudan

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Résumé

RAHMAN (A.H.A.), ELKHIDIR (M.E.). Etude sur l'écologie et l'infestation trypanosomienne de Glossina morsitans submorsitans Newst. dans le sud Darfur, Soudan. Rev. Elev. Méd. vét. Pays trop., 1984, 37 (N° spécial) : 203-210

L'activité diurne de Glossina morsitans submorsitans s'est révélée importante pendant les heures matinales et avant le coucher du soleil et en diminution au fur et à mesure que la journée devient plus sèche et plus chaude.

Cette mouche se nourrit sur un large éventail d'espèces animales et sur l'homme. Comme sites de reproduction, elle utilise les trous dans la terre ou les troncs d'arbres, les formations racinaires aériennes, les morceaux de bois tombés et les rochers.

Le taux d'infestation trypanosomienne de cette sous-espèce a été de 7,2 p.100 dans un site et de 25,7 p.100 dans un autre.

Mots clés : Glossina morsitans submorsitans - Comportement - Ecologie - Vecteur - Trypanosomose - Soudan.

Summary

RAHMAN (A.H.A.), ELKHIDIR (M.E.). A study on the ecology and trypanosome infection of Glossina morsitans submorsitans Newst. in South Darfur, Sudan. Rev. Elev. Méd. vét. Pays trop., 1984, 37 (N° spécial) : 203-210

The study of diurnal activity of Glossina morsitans submorsitans revealed an active phase during the morning hours and before sunset, and a depression phase as the day becomes hotter and drier. This tsetse fly feed on a wide range of animal species and man. It utilizes holes (in ground or in tree trunks), buttress root formation, fallen logs and rocks as breeding sites. The trypanosome infection rate of this subspecies was 7.2 p.100 at a place and 25.7 p.100 at another.

Key words : Glossina morsitans submorsitans - Behaviour - Ecology - Vector - Trypanosomiasis - Sudan.

INTRODUCTION

The existence of tsetse flies in the Sudan was reported early in this century by ESNOR (3). LEWIS (9) reviewed the distribution of Glossina in the Sudan. UILENBERG (14) referred to the presence of Glossina morsitans in the Bahr El Arab area and his observations were later confirmed by A/RAZIG and YAGI (1). LANGRIDGE (8) and HALL et al. (5) studied the distribution of G. morsitans submorsitans in South Darfur Province. They referred to G. m. submorsitans as the only tsetse subspecies encountered in the area. Many studies on this subspecies of tsetse were carried out in various parts of Africa (10, 11, 7). The present ecology study is part of a project jointly funded by the Sudan Government and the British Overseas Development Administration (O.D.A.). It is the first study to be carried out on G. m. submorsitans in the Bahr El Arab area, South Darfur, Sudan.

Climate and Vegetation

The area under study was the Bahr El Arab area in South Darfur Province. It lies between latitude 9° to 10°N. and longitude 24° to 25° E. . This area is part of the ecological zone described by HARRISON (6), as Anogeissus, Isoberlina, Khaya senegalensis savannah woodland with a rainfall of 900 - 1 200 mm. The rainy season in the area starts in April and ends in October with heavy showers of rain usually falling in July, August to September. In the last three years the annual rainfall was 850, 720 and 650 respectively. The temperature varies from a maximum of 40°C to a minimum of 20°C. The dominant grass species were Andropogon gyanus, Hyparrhenia spp., Panicum spp., Eragrostis spp., Aristida spp. and Sporobolus festivus. Regarding the trees, the area is dominated by two types of woodland, a Bahr El Arab riverine woodland with laterite catena soil composed mostly of Anogeissus, Combretum spp., Khaya senegalensis, Ficus spp., Tamarindus indica, Vitex doniana and Kigelia africana. To the North of this area there is the other open woodland "Qoz Dango" where Combretum senegalensis, Albizzia amara, Sclerocarya birrea, Terminalia spp., Dalbergia and Anogeissus are the common trees.

MATERIALS AND METHODS

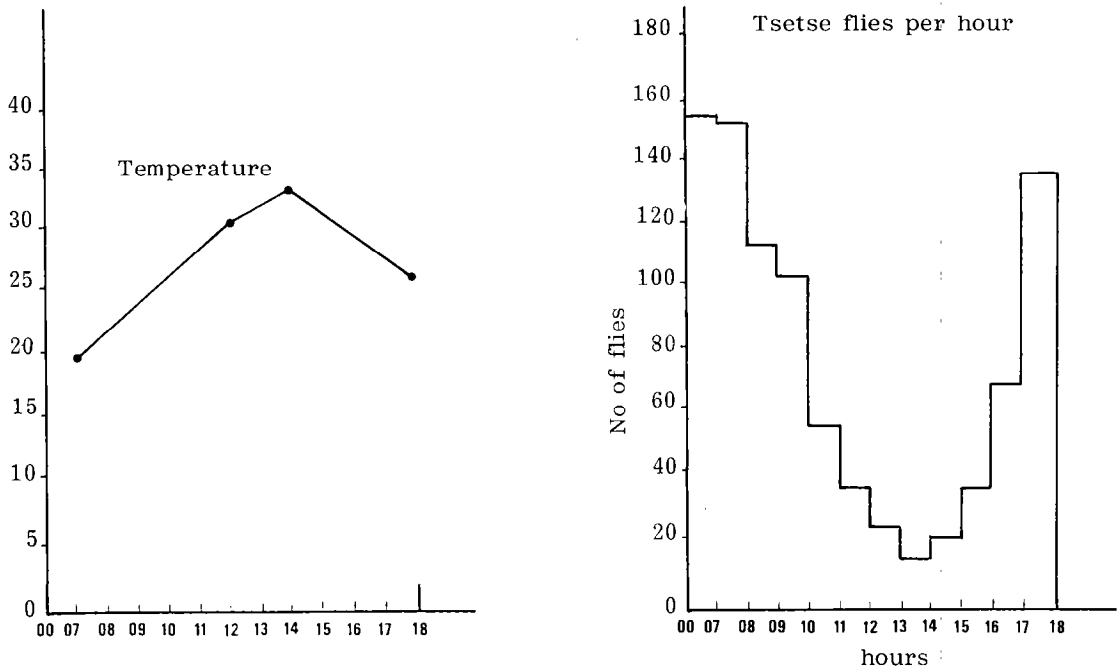
The search was carried out during the dry season of 1981.

Diurnal activity

Tsetse flies were caught at stationary screen bait made locally from blanket material and suspended between two poles. One fly catcher collected flies off the screen on a three hours rate duty and was then replaced by another. Catching

started at 7.00 hours and finished at 18.00 hours. The temperature was recorded by the catcher at 7.00, 12.00, 14.00 and 18.00 hours.

Fig. 1 - Diurnal activity of *Glossina morsitans submorsitans*



Food

To determine the availability of food for tsetse, data on all livestock and game animals seen or recent spoor of animals observed were recorded. Engorged tsetse flies caught at stationary screen bait or by hand nets during fly rounds were crushed on filter papers to determine the source of the blood meals. The blood meals identification was carried out at Silwood Park Blood Meal Analysis Unit of the Imperial College, London.

Breeding sites

All possible breeding sites of tsetse were examined for the presence of puparia or shells.

Trypanosome infections

For determination of trypanosome infection rate of *G. morsitans submorsitans*, the flies were caught using the stationary screen bait and the hand nets during fly rounds. This sampling took place at "El Radom" field station on the

Bahr El Arab where both cattle and game were present and at "Idairo" game reserve where only game animals were there. Tsetse flies thus caught were soon dissected to see if trypanosomes or their developmental forms were present in the mouth parts, the salivary glands or the gut.

RESULTS

All tsetse flies caught were identified as Glossina morsitans submorsitans.

From January to March, the number of G. m. submorsitans caught hourly during the day time and the temperature records were as shown in Figure 1.

Different animal species and man were identified as the source of G. m. submorsitans blood meal (Table I). The contribution of each species to the fly blood meal is shown as a percentage together with the frequency with which these species were seen or their spoors were observed (Table I).

TABLE I The source of blood meal of *Glossina morsitans submorsitans* and how often animals were seen in the Bahr El Arab area (DARFUR - Sudan)

Species	Percentage of contribution	Number of times seen
Source of blood meal :		
Baboons	1	43
Warthog	46	20
Duiker	3	12
Bushbuck	5	6
Roan antelopes	2	3
Donkey	4	1
Buffalo	0.5	2
Cow	4	10
Sheep & goat	3	10
Man	11.5	Record not taken
Reptiles	0.5	" " "
Birds	0.5	" " "
Reedbuck	2	6
Undifferentiated bovid	14	-
Undifferentiated primate	2	-
Undifferentiated mammal	1	-
Other species observed :		
Oribi	0	24
Hartebeest	0	11
Waterbuck	0	6
Cob	0	8
Lion	0	3
Hyaena	0	2

Five different sites were identified as the breeding sites of G. m. submorsitans in South Darfur : Holes in trunks of trees, under the buttress root

formation, under fallen logs, holes at the base of large trees and under rocks overhangs (Table II). Few puparia were found at a single breeding site.

TABLE N° II - Breeding sites of Glossina morsitans submorsitans in the Bahr El Arab area/South Darfur

N°	Site	Pupae	Shells
1	Holes in trunks of trees with soil	50	85
2	Holes at bases of large trees trunks	10	59
3	Under buttress root formation	12	48
4	Under fallen logs	1	9
5	Under rock overhangs (slanting rocks)	0	1

471 G. m. submorsitans from "El Radom" area were dissected, 34 flies of which were found to harbour trypanosomes. Out of 210 flies from "Idairo" game reserve area 54 were shown to be infected (Table III).

TABLE N° III - Trypanosome infection rates of G. m. submorsitans in the Bahr El Arab area/South Darfur

Area	Number of flies dissected	Number of flies infected	Total infection rate mean \pm S.D.
"Idairo" game reserve	210	54	25.7 \pm 4.2
"El Radom" field station	471	34	7.2 \pm 3.7

DISCUSSION

This work confirms previous work by LANGRIDGE (8) and HALL et al. (5) that Glossina morsitans submorsitans is the only tsetse encountered in the area. In this work, G. m. submorsitans seems to be active in the morning, then the activity declines as the day becomes hotter and drier reaching minimum activity during the hottest period of the day and then the fly becomes active again towards sunset. Similar results were obtained by PILSON and PILSON (13). It was noticed during this study that the activity pattern of the fly is similar to the activity of antelopes during the day time although BRADY (2) related mid-day tsetse activity depression to circadian components rather than to the depression in activity of antelopes.

Like previous reports (7), warthog and man provide most of the blood meal of G. m. submorsitans. Despite the frequency with which baboons were present they supply only 1 p.100 of the blood meal. Oribis were common but very rarely relied on as a source of blood meal.

It seemed that trunks of trees and cavities near the roots are the most suitable places for breeding of G. m. submorsitans. Those holes and cavities were cool and moist despite the hot dry conditions outside them. The reason for finding few puparia at a single breeding site might be the abundance of large trees in the area giving a wider choice for adult females to deposit their larvae. However, some other reasons like the presence of natural predators of larvae and pupae or even abortions of pregnant females should not be overruled.

The results showed a significant difference between trypanosome infection rate of G. m. submorsitans caught from the two localities ($P < 0.001$ using the χ square test) FORD (4) found significant differences in trypanosome infection rates between Yankari game reserve and other Glossina morsitans submorsitans infested areas in North Nigeria. He related this to the availability of Bovidae as hosts for tsetse in the game reserve opposed to other localities. This might be the case in the Bahr El Arab area since a lot of Bovidae were found at "Idairo" game reserve compared to the population at "El Radom" field station area. So, it could be inferred that trypanosome infection rates might be related to distribution of game, being high in areas with large numbers of Bovidae and low in areas where Bovidae are few, but not necessarily related to cattle as suggested by OSMAN and MUSA (12).

Since this study was done during the dry season, January to March, further studies on the ecology of G. m. submorsitans are yet to be done during the wet season of the year.

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Resumen

RAHMAN (H.A.), ELKHIDIR (M.E.). Estudio sobre la ecología y la infestación por tripanosomas de Glossina morsitans submorsitans Newst. en el sur Darfur, Sudan. Rev. Elev. Méd. vét. Pays trop., 1984, 37 (N° spécial) : 203-210

Se mostró importante la actividad diurna de Glossina morsitans submorsitans durante las horas matutinas y antes de la puesta del sol, y en disminución a medida que el día vuelve más seco y más caliente. Esta mosca se alimenta sobre numerosas especies animales y sobre el hombre. Como sitio de

reproducción, utiliza los hoyos en la tierra o los troncos de arboles, las raíces aéreas, los trozos de madera caídos y los peñascos.

Fué de 7,2 p.100 la tasa de infestación por tripanosomos de dicha subespecie en un sitio y de 25,7 p.100 en otro.

Palabras claves : Glossina morsitans submorsitans - Comportamiento - Ecología - Vector - Tripanosomosis - Sudan.

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