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The hosts and trypanosome infection rates of *Glossina pallidipes* in the Lambwe and Roo valleys

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Several thousand Glossina pallidipes *flies were dissected to determine trypanosome infection rates in the Lambwe Valley and to collect information on the hosts of this tsetse. A total of 1 450 (19.3%) flies had mature trypanosome infections but the rate varied between 9.6% and 30.9% in the Lambwe Valley. In the Roo Valley the rate was 19.7–28.6%. Blood-meal squashes from tsetse collected in the Roo Valley and Obaluanda areas and in the Ruma, Otuok, and Rari thickets showed that the important hosts were bushbuck and bushpig. Analyses showed that* T. brucei *subgroup infection rates in the Roo Valley near two small dams (3.7% and 4.0%) were higher than might have been expected; in another part of the Roo Valley the rate was only 0.8%. To account for such a large difference it is concluded that the dissecting techniques were probably at fault, leading to an overestimation of* T. brucei *subgroup infection rates in the Roo Valley tsetse. In the main Lambwe Valley there was a tendency for the tsetse trypanosome infection rates to increase towards the southern part of the valley where game animals were numerous and readily available to tsetse in the favourable thicket habitats.*

During the course of investigations on trypanosomiasis in the Lambwe Valley area of western Kenya, the opportunity was taken to dissect several thousand *Glossina pallidipes* in order to determine trypanosome infection rates and to collect information on the hosts of this tsetse. The results of these studies, which are relevant to the transmission of the pathogenic trypanosomes of man and domestic animals in the Lambwe area, are reported here.

MATERIALS AND METHODS

Between June 1968 and November 1970, 7 519 *G. pallidipes* were collected in the Lambwe and Roo valleys of South Nyanza District, Kenya, and the trypanosome infection rate was determined by the technique of Lloyd & Johnson (1924). The types and locations of the *G. pallidipes* habitats in this area have been described by Allsopp & Baldry (1972).

Some of the infected salivary glands obtained from dissected tsetse were teased in sterile physiological saline or phosphate-buffered saline and inoculated intraperitoneally into laboratory mice. During the final surveys *Trypanosoma brucei* subgroup isolates were identified by the blood incubation infectivity test of Rickman & Robson (1970).

During the same period, 923 blood-meal squashes were obtained from gorged resting *G. pallidipes* in various parts of the Lambwe area. These squashes were kindly analysed for host source by means of the passive haemagglutination-inhibition test (Weitz, 1956) by Dr P. F. L. Boreham, Imperial College Field Station, Silwood Park, England.

TRYPANOSOME INFECTIONS IN G. PALLIDIPES

Of the 7 519 *G. pallidipes* dissected, 1 450 (19.3%) had mature trypanosome infections. In the Lambwe Valley the infection rate varied between 9.6% and 30.9%; in the Roo Valley the rate was between 19.7% and 28.6%.

Infection rates in the 8 localities investigated are analysed in Table 1. Infections belonging to the *T. vivax*, *T. congolense*, and *T. brucei* subgroups were assumed to be attributable to *T. vivax*, *T. congolense*, and *T. brucei* and/or *T. rhodesiense*.

The organisms responsible for the 9 *T. brucei* subgroup infections found in the Rari thicket *G. pallidipes* population were isolated in mice and identified

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Table 1. Trypanosome infections in *G. pallidipes* in the Lambwe and Roo valleys

Locality	No. of flies dissected	Infected flies		Infections found					
				T. congolense subgroup		*T. vivax* subgroup		*T. brucei* subgroup	
		No.	%	No.	%	No.	%	No.	%
East Ruma	31	3	9.6	0	0	1	3.2	2	6.4
Obaluanda area	150	16	10.6	3	2.0	10	6.6	3	2.0
Riamkanga thickets	1 517	199	13.1	14	0.9	171	11.3	14	0.9
Ruma thicket	98	14	14.2	1	1.0	8	8.1	5	5.1
Otuok thicket	1 921	340	17.6	41	2.1	218	11.3	81	4.2
Rari thicket (April/May 1970)	652	131	20.1	22	3.3	107	16.4	2	0.3
Rari thicket (Sept./Nov. 1970)	1 000	309	30.9	72	7.2	230	23.0	7[a]	0.7
total	5 369	1 012	18.8	153	2.8	745	13.8	114	2.1
Roo Valley East	2 000	395	19.7	31	1.5	290	14.5	74	3.7
Roo Valley West	150	43	28.6	1	0.6	36	24.0	6	4.0
total	2 150	438	20.3	32	1.4	326	15.1	80	3.7
grand totals	7 519	1 450	19.3	185	2.4	1 071	14.2	194	2.5

[a] One infection was identified by the blood incubation infectivity test as *T. rhodesiense*.

by the blood incubation infectivity test. One isolate was identified as *T. rhodesiense* and 8 were identified as *T. brucei*, giving a 0.06% *T. rhodesiense* infection rate for the two surveys, or 0.1% for the September–November survey.

THE HOSTS OF G. PALLIDIPES

G. pallidipes blood meal squashes were collected from the Roo Valley and Obaluanda areas and from the Ruma, Otuok, and Rari thickets. The results of the analyses for determining the host source are presented in Table 2. It is clear that the most important hosts of *G. pallidipes* were bushbuck (*Tragelaphus scriptus*) and bushpig (*Potamochoerus porcus*).

Most of the blood-meal squashes of *G. pallidipes* were collected from sites well within dense thicket habitats where man and domestic livestock were rarely available to the tsetse population. Had it been possible to collect the squashes from smaller tsetse populations in areas where human activity was greater, it is probable that man and livestock would have been represented more prominently in the feeding pattern.

DISCUSSION

The high total trypanosome and *T. brucei* subgroup infection rates encountered in the Roo Valley are interesting. Most of the tsetse dissected were caught near two small dams, one located in the western part of the valley and the other in the eastern part. These dams were much frequented by man, domestic livestock, and game animals. The risk of trypanosome infection to man and livestock at these sites was therefore high, and probably explains in part the apparent ease with which *T. rhodesiense* became established in the area in the early 1960s, as reported by Baldry (1972).

However, the *T. brucei* subgroup infections in the Roo Valley *G. pallidipes* populations (3.7% and 4.0%) seem rather higher than might have been expected. At about the same time as the Roo Valley tsetse dissections were carried out, Goedbloed et al. (1971), working at Sindo in the Roo Valley West area, found that *T. brucei* subgroup infection rate was only 0.8% in about 7 500 flies dissected. To account for such a large difference within the same small locality, it must be concluded either that there was a very

Table 2. The hosts of *G. pallidipes* in the Lambwe area, 1968–70

Hosts	Blood meals		
	No.	Species (%)	Groups (%)
man	2	0.2	
man/monkey	1	0.1	
unidentified primates	3	0.3	
total primates	6		0.65
bushpig	166	17.9	
total suids	166		17.9
bushbuck	294	31.8	
bushbuck/roan antelope	2	0.2	
bushbuck/oribi	1	0.1	
bushbuck/buffalo	1	0.1	
bushbuck/duiker	1	0.1	
buffalo	24	2.6	
roan antelope	30	3.2	
reedbuck/waterbuck	1	0.1	
sheep/goats	1	0.1	
unidentified bovids	394	42.6	
total bovids	748		81.14
other mammals	2		0.21

marked difference in the epidemiological situation between the two collection areas, or that the dissection technique was at fault. When tsetse are heavily infected with *T. congolense* an inexperienced technician who dissects such flies may sometimes believe that he has isolated infected salivary glands when in fact the glands are non-infected but contaminated with a large number of trypanosomes liberated from a ruptured midgut. Such an error would increase the *T. brucei* subgroup infection rate and decrease the *T. congolense* subgroup infection rate. Occasionally, errors of this kind were detected in a later survey, when supposedly infected glands were inoculated into mice and gave rise to infections that were easily identified as *T. congolense*. It is therefore concluded that the *T. brucei* subgroup infection rates in the Roo Valley *G. pallidipes* populations, and possibly also those in the East Ruma and Otuok area, were overestimated. In other localities, e.g., Ruma and Riamkanga, where dissections were strictly supervised, such errors were assumed not to have occurred.

In the main Lambwe Valley there was a tendency for *G. pallidipes* trypanosome infection rates to increase towards the southern part of the valley. The relatively low overall infection rates found in the East Ruma and Obaluanda areas (9.6% and 10.6%, respectively) were considered to be the result of collecting tsetse from small restricted habitats in heavily settled areas where sedentary populations of game animals were not readily available to the flies.

Further south in the valley high-density populations of *G. pallidipes* infested very favourable thicket habitats where game animals of sedentary and migrant species were numerous and readily available to the flies. Among these tsetse populations infection rates were higher (13.1–17.6%). Along the Rari thicket where game was plentiful, an expanding livestock population resulted in a much increased infection rate in the *G. pallidipes* population from 20.1% to 30.9%.

The results of *G. pallidipes* blood-meal analyses agree very closely with those obtained elsewhere in East Africa, which show that the bushbuck and wild suids are the most important hosts of tsetse (Weitz, 1963). Buffalo (*Syncerus caffer*) and roan antelope (*Hippotragus equinus*) also appeared to be favoured hosts of *G. pallidipes*, although they were not always readily available to the tsetse populations.

RÉSUMÉ

HÔTES DE *GLOSSINA PALLIDIPES* ET TAUX D'INFECTION DE CETTE GLOSSINE PAR DES TRYPANOSOMES DANS LES VALLÉES DE LA LAMBWE ET DE LA ROO

De juin 1968 à novembre 1970, on a capturé et disséqué 7519 *Glossina pallidipes* dans les vallées de la Lambwe et de la Roo (district du Nyanza du Sud, Kenya). Au total, 1450 d'entre elles (19,3%) étaient porteuses de trypanosomes. Le taux d'infection variait de 9,6 à 30,9% dans la vallée de la Lambwe et de 19,7 à 28,6% dans la vallée de la Roo. Parmi les trypanosomes identifiés, 185 appartenaient au sous-groupe *Trypanosoma congolense*, 1071 au sous-groupe *T. vivax* et 194 au sous-groupe *T. brucei*.

Au cours de la même période, on a analysé les repas de sang de 923 *G. pallidipes* gorgées afin de déterminer leur origine. Le céphalophe (*Tragelaphus scriptus*) et le potamochère (*Potamochoerus porcus*) sont apparus comme les hôtes de choix de la glossine.

Les taux d'infection par des trypanosomes du sous-groupe *T. brucei* dans la vallée de la Roo semblent particulièrement élevés (3,7 et 4,0%), des enquêtes similaires ayant montré un taux de 0,8%. Selon les auteurs, cette discordance pourrait être due à une erreur de technique lors des dissections d'insectes.

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