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Distribution of Tsetse in Kurmuk District Blue Nile Province/ Sudan

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Summary

Using traps, screen and calf patrols the distribution of G.f. fuscipes and G.m. submorsitans was studied for the first time in the Kurmuk District during February 1984. G.f. fusscipes is restricted to some 20 km of River Khor Yabus west of the Ethiopian Broder. G.m. submorsitans has a focal distribution in the region, being restricted to seasonal water courses. The habitat and possible host of these two species have been described. The impact of tsetse on livestock production and public health has also been discussed together with future studies leading to control of Glossina in this part of the District.

Introduction

Sven species of trsetse have been recoginzed in the Sudan: G.m. sumborsitans, G. f. fuscipes, G. tachinoides, G. pallidipes, G. longipennis, G. fuscipleuris and G. fusca (Yagi and Abdel Razig, 1971). Out of the seven species only submorsitans existing west of the Nile has been objectively studied. The main aim of those studies was to control bovine trypanosomiasis in Bahr El Ghazal, Kordofan and South Drfur Provinces (Abdel Razing, Yegi end Howel 1968: Yagi and Abdel Razing, 1963; Hall, Khier, Rahman and Noga, 1983, 1984).

On the ether hand tsetse situation east of the Nile as well as comprehensive control measurese have never been adopted despite the presence of animal trypanosomiasis.

The Veterinary Research Administration /Soba/ Sudan has recently designed a project to study the tsetse and trypansomiasis situation in Kassala and Blue Nile Provinces with emphasis on the adjacent/ Ethiopian bordrs, Blue Nile River, Dinder national Game Park, Fung area including the Kurmuk district in the Southern parts of the Blue Nile Provinc. Neverthelens the Upper Nile Province has to be excluded because of the current riots which break out occasionally.

In the present paper it is intended to report firstly the distribution of tsetse in Kurmuk District, Blue Nile Province. This area has been chosen because it had a record of G.m. sumborsitans and G.f. fuscipes (yagi and Abdel Razig, 1971).

Materials and Methods

Experimental area: Investigations were carried out during the dry period 11 to 26 February 1984 arround River Khor (R.K.) Yabus, Kurmuk District, Blue Nile Province. The area lies between lat.s 9° : 30 – 10° : 15 N and longit.s 34 : °15 – 34° : 33 É (Maps 1,2). R.K. Yabus is a short permanent river which drains from the Western Ethiopian High–Lands and disappears after 40km into the flood plains of the Upper nile Province/ Sudan.

North of R.K. Yabus, the topegraphy is generally rocky, with hills increasing in numbers and altitude towards the Ethiopian border. Deep seasonal water coursee (Khors) formed from the run–off of the hill catchments interesect the area in an east to wests or northwest directions. The soil is of the dark cotton-cracking clay in the plains but becomes harder at thebase and uphills and silty arround the seasonal water courses.

The rainy season starts in April with most of the effective rains falling until September. The temperature appears to vary with altitude. Thus, in February at Muguf, situated higher on the Ethiopian border, the average temperatures measured on the dry bulb, were 15.9°C and 35.0c° at 6:00 hr, and 12 hr, respectively. The corresponding figures at the relatively lower R.K. Yabus were 22.2°C and 38. 1°C.

The vegetative cover varies with the type of soil : R.K. Yabus is bordered by a narrow strip of a gallery forest predominated by the trees of the Ficus spp., Tamarindus spp; Ziziphus spinachriata, Cordia spp. and a few small mango plots.

The Anogeissus and Terminalia spp. were still green on the river side at the time of the study. Grasses of the Andropogon, Cynodon dactylon and Hyperrhenia spp. Constitute the undergrowth of the riverine forest. The woodland in the plains is formed of Acacia seyal, Balanites spp., Commiphora sp. and Combretum spp. In the seasonal water courses, dry bamboc thickets (El-ganna) together with a few Anogeissus spp. and Tamarindus spp. outgrow other trees species. At the bases of the hills, A. seyal, balanites Adensonia digitata and commiphora spp. are predominant. Up–hill the woodland is mainly of the Commiphora spp.

Domestic animals other than indiginous goats are scarce. There are a few numbers of migratory sheep and a few Umberaro cattle herds at R.K. Yabus and Muguf. Wild animals consisting mainly of baboon, red and green monkeys and warthogs are present in all stations. At jebel Banga fresh spoors of roan antelope, duiker, oribi, hyena and warthog were observed.

The main tribes are Wataweit, Berta, Broon, Comma and Ganga. Most of the members of these tribes subsist on shifting cultivation of Durra (Sorghum vulgarae) and sesame (Sesamum orientale). Herding of animals which was

ten years ago an important secioeconomic activity has been abandoned because of the recent tsetse or (Umm bogeni) infestation of the area. Local tribesmen believe that Um Bogeni infested their land following a concurrent influx of big game such as giraffe, elephant and buffaloes arround 1975. Gradually the game became relatively scarce, but the tsetse remained. Since then, it has not been possible to raise cattle, sheep, donkeys or even dogs.

Survey techniques: Transect fly rounds were made with black blanket screen and a red calf (80 kg) as described by Mohamed–Ahmed, Ismail and Ishag (1985). Six biconical traps (Challier and Laveissiver, 1973) were used in conjunction with the flyrounds. Acetone (Analar, grade, BDH, England) was utilized as an odour–bait to attract and increase the catch of tsetse in three of the traps (Vale, 1974). Traps were installed 50m. apart. Catches in traps were collected at 24 hr. intervals except at Muguf where trap catches were collected every two hours.

Examination of captured flies: All captured flies were identified, counted, sexed, examined for tenerality and later dissected for age and trypanosome infection rate. Dissection for trypanosome infection rate was carried out as described by Mohamed–Ahmed and Dairri, (1987). Males were aged by the wing–fray method (Jackeon, 1946) and females were aged by the ovarian technique (Saunders, 1962; Challier, 1965). Very few tsetse were caught during this work, but results are considered still worth reporting as the first planned study in the area which may establish a base line data for further studies.

Results

The distribution and numbers of G.f. fuscipes, G.m. submorsitans captured at each survey station is shown in table 1 and Map 3. G.f.fuscipes has a contionous distribution of approximately 209 km along R.K. Yabus from Gondolo to jebel Bnga situated at the Sudanese/ Ethiopian border. The fly is strictly confined to the vegetation overhanging the running stream, but absent in the adjoining seasonal water courses and that part of the stream lying west of Gondolo.

G.m. submorsitans were not caught at R.K Yabus nor G.f. fuscipes in seasonal water courses. This indicates that there is no overlap of these two species in the areas surveyed, at this time of the year.

Peformance of Survey Techniques: The data presented in Table 1 are too meager to allow for statistical comparisons of the three techniques employed in this survey. Nevertheless, there was some evidence at Gosha and Shabaga that traps could detect G.m. submorsitans or G.f. fuscipes where the screen patrols failed to do so, during the same period. Also unlike the screen tsetse caught in the traps or calf were approximately of equal male: female sex rations (Table 1). On the other hand acetone odour was observed to have no marked effect on the total numbers of flies caught; But odoured–traps were

often observed to attract and capture tsetse approximetely 1–2 hours earlier than the unodoured group (Table 2).
Dissection Results: These are shown in Tables 3 and 4. However the total numbers of G.f.fuscipes and Gm.submorsitans examined is too small to show distinct patterns of insemination, pregnancey, age–structure or trypanosome infections, yet these limited available data may be interpreted as an indication of the ability of these two spescies to survive, reproduce and become potential vectors of human and animal African trypanosomiases.

Discussion

The present work confirms the previous records that G.f. fuscipes and G.m.submorsitans exist in Kurmuk District (Buxtion, 1955; Yagi and Abdel Razig, 1971). However, it did not confirm the existnce of G.tachinoides as had been postulated (Yagi and Abdel Razig, 1971). The distribution of Gf.fuscipes aleng R.K. Yabus, its habitat and possible hosts have been described while those of G.m.submorsitans awaits further thorough investigations. It is thought that the belts of these two species are continuous with those of the Wellega Province in Ethiopia (Langridge, 1976). Langridge (1976) observed that the tsetse belts in Wellega Province are linked with the large tsetse belts that extends from Southern Sudan along Kaffa and Illubabor Province to the Abai (Blue nile River System in Ethiopia).

The continuity of the tsetse belts in Kurmuk District with those in Ethiopia and Southern Sudan is of great medical importance, because sleeping sickness is endemic in the latter two areas (Huchiinson, 1970) McConnel, hutrchinson and baker, 1970; Duku, 1979). It is believed that sleeping sickness may be introduced into the District through human or game movements. Such movements are frequent at the present time because of the existing instability in this part of the country.

If sleeping sickness is to occur in addition to the existing denial of livestock in the area, that may also mean the depopulation over this part of Kurmuk District. This may in turn encourage bush growth and game occupation of the land, thus creating a more favourable habitat for the advance and spread of tsetse. A similar advance and spread of Glossina to uninfested areas under rather similar ecological and soscial conditions had already been reported in central Africa at the turn of this century (Ford, 1971). Therefore, it is considered of utmost importance that further work leading to control or halt of tsetse advance must start immediately before the situation in Kurmuk district gets worst.

In view of the linear distribution of G.f.fuscipes along R.K. Yabus, eradication of this species is hypothetically quite possible by insceticiedes or bush clearing. Further reinvasion of the river from the larger tsetse belt in Ethiopia

can be prevented by the bush-cleared land or by incsecticide-imprignated targets/ traps (Hargrove, Vale and Cockbill, 1984). Conversely, control of G.m. submorsitans in the area appered to be more difficult because of the wider range of distribution (Map 3) and the lack of detailed studies. Nevertheless, it must be emphasized that, the control of G.f.fuscipes alone will be of rather unappreciable benefits because G.m.submorsitans is an equally efficient vector of both human and animal trypanosomiases.

Preliminary experimental evidence at Gosha and Shabaga areas (Table 1 and Map 3) showed that trapping is a better technicue for detection of tsetse than screen patrols alone. A similar evidence had recently been reported from Krogba, Southern Darfur Pfrovince (Mohamed-Ahmed et al, 1985). Therefore, it is recommended that traps, odour baits and animal baits be used in conjunction with screen patrols in future survey to detect low tsetse densities.

From the few flies dissected (Table 3,4) it is clear that the population of either of G.f.fuscipes, or G.m. submorsitans is normal: that is with respect to insemination, preganacy and longevity. Such populations may be considered to have the capacity to increase and spread into new areas underfavourable ecological conditions. This is probably true, as Broon tribesmen report that during the rainy season, tsetse can be seen as far west as Marringa on R.K. Yabus, and also northwards untill Babarus (Map 2).

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Table 1: The Performance of the Different survey Techniques at the Various stations in Kurmuk District.

Station	Number of days in each Station	Traps		Screen		Calf		Species of tsetse caught
		M	F	M	F	M	F	
Yabus	2	0	0	0	0	–	–	
Banga	1	–	–	8	2	–	–	G.f. fuscipes
Shabaga	2	18	18	0	0	–	–	G.f. fuscipes
Gosha	2	3	2	0	0	–	–	G.m. Submorsitans
Muguf	3	7	6	8	5	5	5	G.m. Submorsitans
K. Oss+	3h	–	–	1	–	–	–	G.m. submorsitans
K. Elganna+	3h	–	–	1	–		–	G.m. submorsitans
Ellali+	3h	–	–	1	–	–	–	G.m. submorsitans
Total flies caught	11	28	26	19	7	5	5	

-- Technique not used

+ Single morning screen patrols

F Female

M male

Table 2. Effect of Acetone on Capture of Tsetse in Kurmuk District.

Station	Days of experiment	No. of Tsetse caught		Species of Tsetse
		Acetone–baited traps (3)	Unbaited traps (3)	
Yabus	2	0	0	
Gosha	2	3	2	G.m.submorsitans
Shabaga	2	17	19	G.ffuscipes
Muguf	4	8	5	G.m.submortsitans
Total	10	28	26	

Table 3. Wing–fray Categories and Trypanosome infection rate of male G.m. submorsitans G.f.fuscipes in Kurmuk District.

Wing–fray category	No. of G.m. submorsitans	Trypanosome infection rate %	No. of G.f. fuscipes	Trypanosome infection %
1	3	0	2	0
2	5	0	7	0
3	5	0	4	0
4	2	0	2	0
5	0	–	1	0
6	0	–	0	–

Table 4. Dissection results of female G.f. fuscipes and G.m. submorsitans Captured in Kurmuk District.

Species of tsetse	Serial No. of flies	Insemination	uterine content	Age category	Estimsted age in days 6	Wing fray caegory	Trypanosome infection
G.f. fuscipes	1	–ve	empty	0 a	1	1	0
" " "	2	+ve	L1	3 b	31	1	0
" " "	3	+ve	egg	4 a	40	2	0
" " "	4	+ve	L1	1 b	12	1	0
" " "	5	+ve	L1	1 b	12	1	0
" " "	6	+ve	L3	5 b	55	3	0
G.M. submersitans	1	+ve	empty	0 a	1	1	0
" " "	2	+ve	empty	0 c	8	1	0
" " "	3	+ve	L1	3 b	31	2	0
" " "	4	+ve	egg	2 b	22	2	0
" " "	5	+ve	empty	0 b	6	1	0
" " "	6	+ve	L3	4 c	48	2	0
" " "	7	+ve	L3	5 c	59	4	0

L1 First stage larva
L3 Third stage larva