

Notes on the dry season roosting and foraging behaviour of
Epomophorus gambianus and *Rousettus aegyptiacus*
(Chiroptera: Pteropodidae)

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(Accepted 11 March 1978)

(With 1 figure in the text)

We studied the movements and foraging behaviour of *Epomophorus gambianus* and *Rousettus aegyptiacus* during the dry season in Rhodesia. The nightly activity of both species was concentrated in the riparian forest where they fed on the fruits of *Diospyros senensis*. *Epomophorus gambianus* roosted during the day high in the thick canopy of *Trichelia emetica* or *Kigelia africana* along the river banks and began foraging, each one in a preferred *D. senensis* shrub, before 1845 hrs. *Rousettus aegyptiacus* arrived in the study area approximately one hour later and appeared to forage in groups. The temporal separation of the feeding times of the two species of bats may provide a basis for the partitioning of a single species food resource.

In spite of numerous publications on African fruit bats (e.g. Baker & Harris, 1957; Rosevear, 1965; Brosset, 1966; Jones, 1971, 1972; Ayensu, 1974; Kingdon, 1974), there are relatively few data concerning the feeding and roosting behaviour of pteropodids (see also Bradbury, 1977). We present here some observations on foraging behaviour and habitat use for *Rousettus aegyptiacus* (Geoffroy) and *Epomophorus gambianus* (Ogilby) in deciduous woodland during the dry season. Our observations were made at the Hostes Nicolle Institute of Wild Life Research in the Sengwa Wild Life Research Area, ca. 110 km west of Gokwe, Rhodesia (18°10'S; 28°13'E) between 7 and 28 June 1977.

We sampled several habitats including mopane and miombo woodlands, riparian forest, and areas over two large rivers (Sengwa and Lutope), using 9 or 12 m long, 35 mm mesh mist nets. For details of habitat and physiography see Cumming (1975). A total of 19 pteropodids was captured, including 10 *E. gambianus* (all adult females) and nine *R. aegyptiacus* (seven adult females, one subadult female and an adult male). Eighteen of the fruit bats were netted at one site along the Lutope River and in the adjacent riparian forest, generally in the vicinity of *Diospyros senensis* Kotzsch (Ebenaceae) shrubs, the major fruit species available during our study period. *Diospyros senensis*, a tall shrub or small tree restricted to the areas along rivers, has fruits that ripen synchronously and weigh an average of 1.9 g when husked. Although *Balanites maughamii* (Sprague) was also fruiting during our study, it was neither widespread nor common.

To monitor the movements of individual bats we used radio transmitters that were built in the Carleton University Science Workshop (8 g potted) and had a detection range of 2 km in flat terrain and 11 km from a high vantage point. We tagged two *E. gambianus* and one *R. aegyptiacus* by gluing the transmitter to the mid-dorsal fur. However, our data on movements are for *E. gambianus* alone since we lost contact with the *R. aegyptiacus*

after we had followed it 5 km from the release site on the first night. Locational fixes were made using a four element Yagi antenna and portable receiver. Daytime fixes served to locate roost sites, and nocturnal fixes (1845–1945 hrs), including two hours of continuous observation for each bat (2000–2200 hrs), were used to assess movements and behaviour associated with feeding.

Movements of the two tagged *Epomophorus* were concentrated around a series of roost trees bordering the river and one *D. senensis* shrub each. The latter were located in the

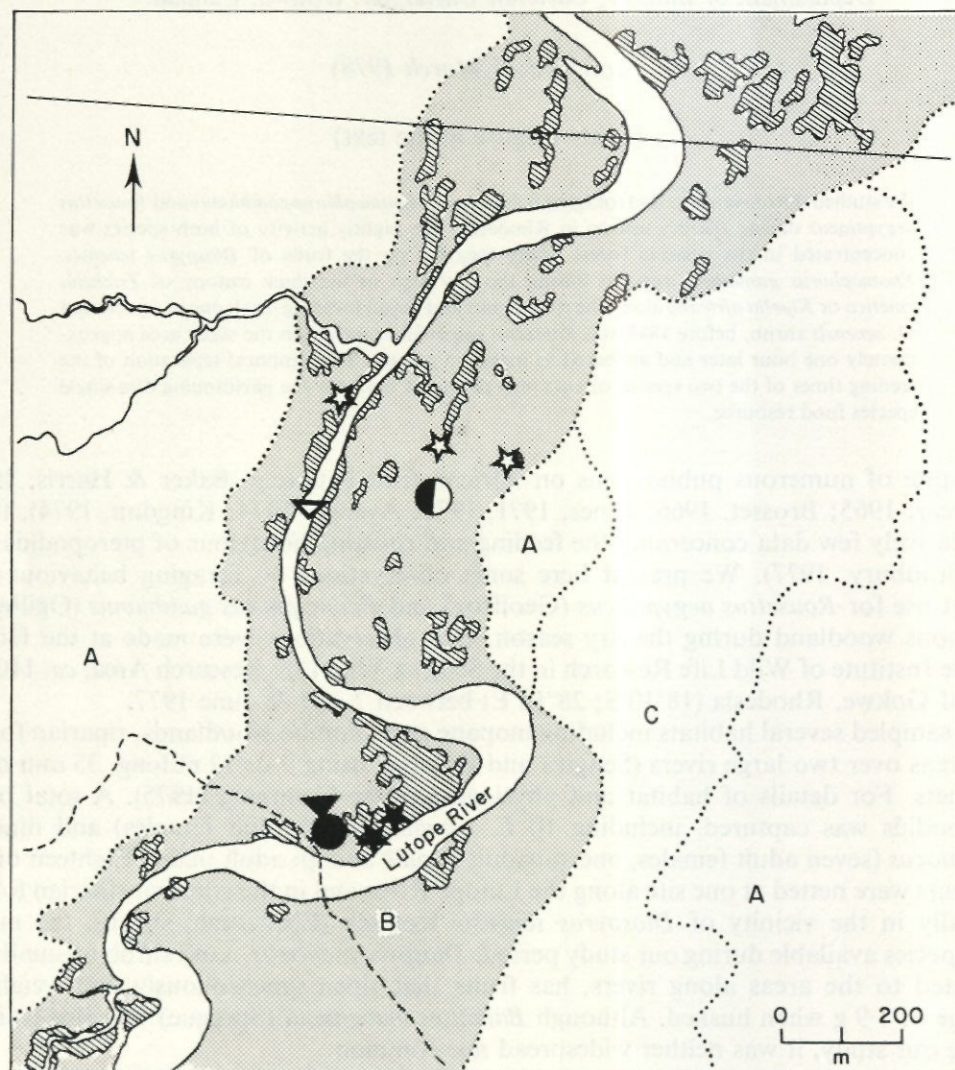


FIG. 1. Capture (▼), roosting (★☆) and feeding (●○) sites for two radio-tagged *Epomophorus gambianus* around the Lutope River, ca. 110 km west of Gokwe, Rhodesia. Habitats include: *Acacia* riparian woodland with *Trichelia* and *Kigelia* (hatched); riparian shrub and grassland with *Diospyros senensis* (dotted); *Colophospermum mopane* woodland (A); *Acacia* riparian communities (B); and *Brachystegia boehmii*–*Combretum*–*Hyparrhenia* wooded and bushy grassland (C).

open woodland which stretched about 300 m back from the river banks (Fig. 1). On the six days that we located roosts of *E. gambianus*, five different trees were used: three *Trichilia emetica* (Chiov.), and two *Kigelia africana* (Lam.). One bat used the same *T. emetica* on two consecutive days and then moved only 10 m to an adjacent *T. emetica* on the third day, whereas the other individual moved 150 and 400 m between two *K. africana* and one *T. emetica* over the three days. Both animals roosted high in the centre of the canopy, 10–15 m above the ground, and one bat that we visually located on two days roosted alone.

By fixes we determined that *E. gambianus* began foraging less than 45 min after dark (dusk at 1800 hrs). Each bat used the same *D. senensis* shrub exclusively on both nights. During one period of continuous observation, one bat spent 105 min in its feeding tree and 15 min in an adjacent *T. emetica* before returning to the *D. senensis*. The other bat spent 90 min in its feeding tree, 10 min in an adjacent *K. africana*, and 20 min again in the *D. senensis*. Since we never observed other *E. gambianus* in or near these two feeding trees, we suggest that this species may feed alone. Beneath the *D. senensis* shrubs we found scattered husks of fruits but no seeds, indicating that the bats had probably consumed the entire fruits.

Coincident with the sedentary feeding behaviour of *E. gambianus*, we observed few flying pteropodids between dusk and 2000 hrs. After this there was a marked increase in the activity of pteropodids, corresponding to the arrival of *Rousettus* which we identified by their characteristic clicking sounds produced during flight. We knew of no roosts (caves) within at least 11 km of the Lutope site, and the late arrival of the *Rousettus* was apparently due to the relatively long commuting distances. *Rousettus aegyptiacus* appeared to forage in groups and we often observed as many as five individuals flying into and from a single *D. senensis* shrub. The arrival of the *Rousettus* in areas where *Epomophorus* were feeding in *D. senensis* shrubs did not alter the behaviour of the latter bats, and we commonly watched both species feeding in the same fruit shrub.

There is a dramatic difference in species composition and habitat use in the fruit bat community of our study area between wet and dry seasons. The smaller *Epomophorus wahlbergi* and *E. crypturus* also occur in the area in the wet season, but at that time these species and the *E. gambianus* are more widespread, occurring in several habitats (Fenton, 1975). The presence of two similar-sized fruit bats (100 to 130 g) in the dry season using the same single species food base poses an interesting question in resource partitioning.

Sympatric Pteropodidae often show broad overlap in habitat use and food selection (Baker & Harris, 1957; Rosevear, 1965; Jones, 1971, 1972; Smithers, 1971; Smithers & Lobao Tello, 1976). However partitioning of food resources by these bats may occur through fine spatial or laminar separation of feeding sites within the same trees (Jones, 1972). For example, *Eidolon helvum* and *Epomops franqueti* are known to forage in the same trees but are separated spatially by their relative degrees of penetration into the foliage; the large *E. helvum* uses the peripheral branches and the smaller *E. franqueti* moves deeper into the foliage (Jones, 1972). The *Epomophorus gambianus* and *Rousettus aegyptiacus* which we observed in the same shrubs at the same time showed no such spatial separation. In our study, the use of different roosts (caves vs. foliage) at different distances from the localized food supply, resulted in some measure of temporal separation of feeding in that *E. gambianus* had unlimited access to the food resources for almost two hours prior to the arrival of *R. aegyptiacus*.

We are grateful to the Department of National Parks and Wild Life Management of Rhodesia for permitting us to work at the Institute and to use the facilities there. We are especially grateful to Rowan and Liz Martin for their hospitality during our stay, and we are particularly indebted to Rowan for sharing his extensive knowledge of telemetry with us. We thank Edson Mulilo and Zaccheus Mhlangu who assisted with the field work and all members of the community at the Institute for their assistance. Dr D. H. M. Cumming was particularly helpful in all aspects of the study and we thank Rudyerd Boulton of the Atlantica Ecological Research Station for lending us some equipment. D. H. M. Cumming, T. H. Fleming, T. H. Kunz and R. B. Martin read the manuscript and made helpful suggestions. This study was supported by National Research Council of Canada grants to M.B.F. and by the Science Faculty at Carleton University. D. H. M. Cumming kindly provided the habitat data for Figure 1.

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Observations on the locomotion of two British terrestrial planarians (*Platyhelminthes*, *Tricladida*)

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(Accepted 11 April 1978)

(With 2 plates and 1 figure in the text)

The locomotion of *Microplana terrestris* and of *M. britannicus* is described. Forward locomotion is normally by means of cilia which are confined to the ventral surface of the animals. *M. terrestris* may however involve stationary peristaltic waves in locomotion. In this case neither muscular nor ciliary forces can alone account for the locomotion and it is necessary that the two mechanisms are combined. Such stationary waves should be distinguished from retrograde and direct locomotory waves. Reversal in both species is by retrograde muscular waves.

Contents

	Page
Introduction	407
Materials and methods	408
Results	408
<i>Microplana terrestris</i>	408
<i>Microplana britannicus</i>	410
Discussion	410
Summary	415
References	415

Introduction

The terrestrial planarian fauna of Great Britain has been rarely observed and is poorly documented. According to Cloudsley-Thompson & Sankey (1961) there are four species. This paper records observations on two of them, *Microplana terrestris* (Müller) and *M. britannicus* (Percival).

Observations on the locomotion of terrestrial planarians are few, the principal work being that of Pantin (1950). Locomotion has been considered to be accomplished by a combination of ciliary forces, cilia being confined to the narrow ventral surface, and muscular contractions either of the ventral surface or of the whole body but with little detailed elaboration as to how the two may be combined. Pantin (1950) considers locomotion forces to be principally muscular in origin. Mucus is secreted from gland cells that are concentrated near the anterior end and a slime-trail is left by the animals.

In some species locomotion is supplemented by apparent peristaltic waves of muscular contraction which pass along the worm at the same rate as the worm moves forwards. Such waves thus remain stationary relative to the substratum and worms exhibiting these stationary waves leave a dotted slime-trail. Similar stationary waves are seen during locomotion of certain land snails and slugs (Jones, 1975). It will be shown in this paper that