MAMMALIAN SPECIES No. 577, pp. 1–5, 3 figs.

Micropteropus pusillus.

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Published 1 June 1998 by the American Society of Mammalogists

Micropteropus Matschie, 1899

Micropteropus Matschie, 1899:36, 57. (As subgenus of *Epomophorus* Bennett, 1836). Type species *Epomophorus pusillus* Peters, 1867, by subsequent designation.

CONTEXT AND CONTENT. Order Chiroptera, Suborder Megachiroptera, Family Pteropodidae, Subfamily Pteropodinae, Genus *Micropteropus* (Koopman, 1993). The genus *Micropteropus* contains two species (Bergmans, 1989). The following key is based on measurements (in mm) and observations from Hayman and Hill (1971) and Bergmans (1989):

Size smaller, length of forearm 46.4–55.7; greatest length of skull 26.8–31.0; halves of palatal ridges 4–6 united to ridge 3 and to each other ..... *M. pusillus*

Size larger, length of forearm 57.2–63.6; greatest length of skull 32.0–33.3; halves of palatal ridges 4–6 separated ..... *M. intermedius*

Micropteropus pusillus (Peters, 1867)

Peter's Dwarf Epauletted Fruit Bat

Epomophorus pusillus Peters, 1867:870. Type locality "Yoruba" [Nigeria].

CONTEXT AND CONTENT. Context as in the generic summary. No subspecies are currently recognized (Happold, 1987).

DIAGNOSIS. *Micropteropus* can be distinguished from other members of the Family Pteropodidae by a combination of traits: the presence of white shoulder patches in adult males; ears with small white tufts at their bases; three upper cheekteeth; a short and broad rostrum, in which the length is subequal to, or less than, the width across the lower edges of the lachrymal foramina; a rudimentary tail; forearms covered with fur for more than half their length; a postzygomatic palate as long as it is broad; and six palatal ridges, with the first ridge undivided, hastate, and pointing backwards, and the remaining ridges divided by a deep central groove (Andersen, 1912; Bergmans, 1988, 1989; Rosevear, 1965). The postdental palate is slightly raised posteriorly (Bergmans, 1988).

The form of the soft palate and overall size differentiate *M. pusillus* from *M. intermedius*. Both species possess a soft palate with six more or less prominent ridges. The first ridge is whole and the others are medially divided. The halves of the second and third ridges are weak, mutually united, and often mistaken for a single ridge. In *M. pusillus* the halves of the fourth to sixth ridges are more or less united with that of the third and to each other. The groove dividing the fifth and sixth ridges is often most distinct. In *M. intermedius*, however, the halves of the fourth to sixth ridges are clearly separated from one another. *M. pusillus*, the smaller of the two species, has a forearm length <56 mm and a skull length of ≤31.0 mm. *M. intermedius* has a forearm length >57 mm and a skull length of ≥32.0 mm (Bergmans, 1989).

GENERAL CHARACTERISTICS. The general appearance of *M. pusillus* is much like that of a small *Epomophorus*, except the muzzle is shorter and broader, and the lips are less extensible (Fig. 1). The head is round and the eyes are large. The ears are relatively large with convex margins broadly rounded at the tip. The wings are dull brown with a shape that is narrower and more pointed than is common among related genera (Rosevear, 1965). The interfemoral membrane is relatively easily seen in the center (3–6 mm) and laterally (Andersen, 1912). The tail is often imperceptible, yet some individuals have tails as long as 4 mm (Happold and Happold, 1978).

Micropteropus pusillus exhibits secondary sexual dimorphism. Adult males possess epaulettes, which are white tufts of erectile hair that grow within circular pocket-like folds of skin on the shoulders. The hairs can be everted from the pouch to form a white rosette. The rim of the pouch is surrounded by a narrow ring of dark brown hairs (Rosevear, 1965). Females lack epaulettes but have shallow pouches resembling those of subadult males. These pouches contain hairs in clusters slightly lighter than the surrounding fur. Ventrally, they may be outlined by a narrow zone of darker hairs (Bergmans, 1979). There is little difference in size between males and females. In Rio Muni, females averaged slightly longer than males in forearm length (Jones, 1971). In the Ivory Coast and Guinea, females showed the same trend, and their skull measurements were slightly less than in males (Bergmans, 1974; Van Orshoven and Van Bree, 1968).

The dorsal color is medium brown to russet brown, but the range of variation in color is not as wide as in *Epomophorus* or *Epomops*. The underside is paler than above because the ventral hair is considerably sparser, shorter, and of lighter tone (Rosevear, 1965). Andersen (1912) observed a single skin that was conspicuously lighter, buffy wood-brown above, and breast and ventrum drab, passing into a light gray on the sides. In Rio Muni, 12% of the specimens examined were pale buffy-brown; all pale specimens were female (Jones, 1971). The pelage is soft and thick, yet closely appressed on the underparts. The approximate length of fur in the middle of the back, the nape of the neck, and the ventrum is 9, 8, and 6 mm respectively (Andersen, 1912). The pelage covers the upper arm and half the forearm both dorsally and ventrally, extending beyond the limbs onto the wings. It also is present on a portion of the interfemoral membrane. The throat often is bare (Rosevear, 1965). White to pale yellow basal ear tufts appear both anterior and posterior to the ear (Happold, 1987).

Ranges of measurements (in g or mm; males and females, respectively) for external characters are as follows: mass, 24–35 (n = 21), 20–34 (n = 28); length of forearm, 46.4–54.7 (n = 149), 49.5–55.7 (n = 201); head and body length, 70–82 (n = 14), 67–85 (n = 17); length of ear, 13.5–16.6 (n = 14), 14.1–18.7 (n = 17); length of tibia, 20.2–23.2 (n = 5), 21.5–23.3 (n = 7); length of foot, 14–15 (n = 4), 13–15 (n = 8—Bergmans, 1979, 1989; Happold and Happold, 1978; Jones, 1971). The measurements of manus and pes (in mm; n = 8; sexes not specified; Andersen, 1912) are as follows: length of thumb, 22–24; length of metacarpal I, 7.5–8.5; length of phalanx I, 10.5–11.5; length of metacarpal II, 23.5–26.5; length of phalanx I, 4.5–6; length of phalanges II and III, 6–

FIG. 1. *Micropteropus pusillus*, courtesy of Merlin D. Tuttle, Bat Conservation International.

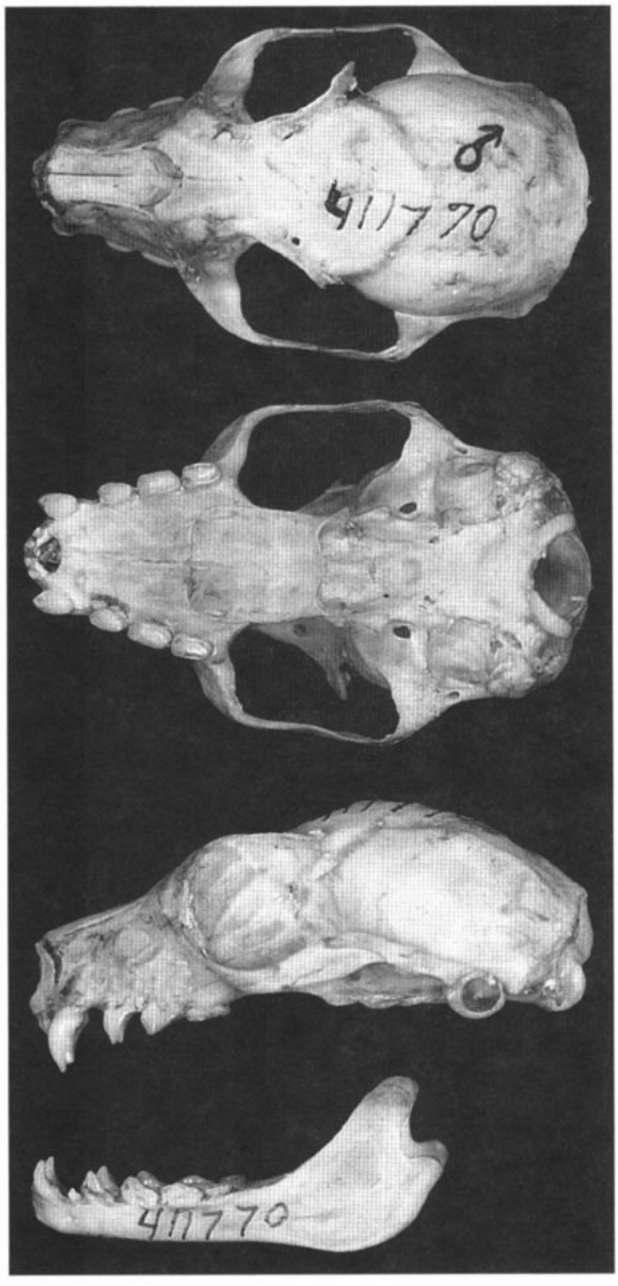

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of male *Micropteropus pusillus*, (USNM 411770). Greatest length of skull is 28.7 mm.

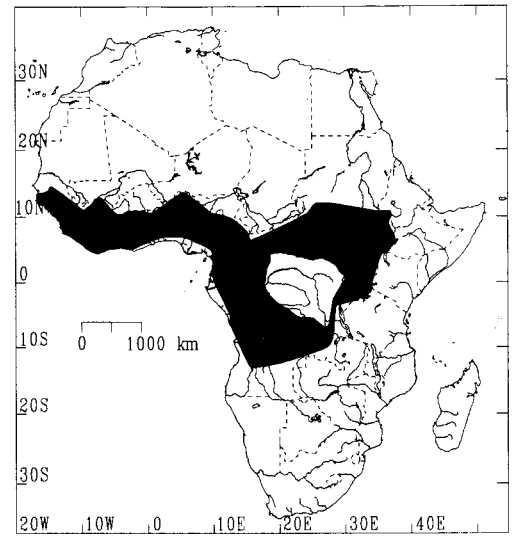

FIG. 3. The distribution of *Micropteropus pusillus* in Africa (modified from Bergmans, 1989).

7.5; length of metacarpal III, 34–38.5; length of phalanx I, 22–24; length of phalanx II, 30–33; length of metacarpal IV, 33.5–36; length of phalanx I, 16–17.5; length of phalanx II, 19–21.5; length of metacarpal V, 33.5–37; length of phalanx I, 16–17; length of phalanx II, 16.5–19.5; depth of interfemoral membrane in center, 3–6; length of foot, 16–17.5; and length of calcar; 4–4.5.

The skull is restricted in length by the short and broad rostrum (Fig. 2). The braincase is flattened with the basicranial axis only slightly deflected against the facial axis. The bony palate is relatively broad between the M1s and is immediately narrowed behind the zygomatic processes (Andersen, 1912). The postdental palate is not hollowed out to the same extent as in *Epomophorus*, and it is as long as broad instead of being very much longer than broad. The diastema between C1 and P3 is less pronounced than in *Epomophorus* (Rosevear, 1965). Ranges of measurements (in mm; males and females) for cranial characters are as follows: total length of skull, 27.8–30.6, 26.8–31.0; condylobasal length, 26.8–29.8, 26.0–30.3; width of braincase, 12.2–13.4, 12.2–13.1; length of rostrum, 9.1–10.9, 8.8–11.1; zygomatic width, 16.9–19.0, 16.7–19.1; palatal length, 14.6–16.5, 14.8–16.0; interorbital width, 4.8–5.6, 4.9–6.2; mandible length, 21.4–23.4; length of maxillary toothrow, 8.1–8.7, 8.0–8.5; length of mandibular toothrow, 9.2–9.9, 9.5–10.0; length between C1 and M1, 8.1–9.9; 8.0–10.1; and external width across crowns of M1, 9.1–10.5, 9.0–10.5 (Bergmans, 1979, 1989; Jones, 1971). Cranial measurements (in mm; $n = 8$; sexes not specified; Andersen, 1912) are the following: palation to incisive foramina, 13.2–14.0; palation to basion, 10.0–10.5; postdental palate, length, 5.8–6.0; front of orbit to tip of nasals, 8.0–8.8; lachrymal width, 8.5–9.2; external width across crowns of canines, 5.8–6.2; postorbital width, 8.2–8.8; width of mesopterygoid fossa, 4.7–5.0; width at middle of postdental palate, 5.5–6.0; posterior width between M1-M1, 7.8–8.5; anterior width between P4-P4, 5.7–6.7; width between bases of canines, 3.0–3.7; orbital diameter, 8.0–8.0; length of mandible from condyle, 22.0–23.7; coronoid height, 8.5–9.2; and width across crowns of c1–m2, 10.0–10.8. Dorsal and ventral lengths (in mm) of cervical vertebrae 3–7 are as follows: (3) 1.1, 1.3; (4) 1.0, 1.3; (5) 0.8, 1.4; (6) 0.7, 1.5; and (7) 1.0, 1.2 (Fenton and Crerar, 1984:402, table 1).

DISTRIBUTION. *Micropteropus pusillus* occurs in western, southwestern, and central Africa (Fig. 3). This species ranges from Senegal east to southern Sudan and Ethiopia, western Kenya, northwestern Tanzania, Uganda, Congo, and Angola (Hayman and Hill, 1971). The northern limit of the east-west belt of the Sudanian and Ethiopian highlands establishes the northern boundary of its range. Some localities in West Africa approach 14°N, but in Sudan and Ethiopia the species is not known north of 11°N. The eastern limit of the range is restricted by the Ethiopian highlands. Those are only penetrated by low-lying river valleys on the western side and by the central rift valley on the south, where the only known collecting locality is the easternmost point of the distribution. The southern part of the range remains within the North Zambesian woodland in northwest Angola, southern Zaire, and on the northwestern Zambian border (Bergmans, 1989). This species may occur in central Zaire, although Gallagher and Harrison (1977), in surveying the Zaire river basin, captured individuals at only one collecting locality in Kinshasa. Bergmans (1989) reported it from several localities in Congo, including Brazzaville. There is no fossil record.

FORM AND FUNCTION. The dental formula is i 2/2, c 1/1, p 2/3, m 1/2, total 28. The dentition is relatively weaker than that of *Epomophorus* and *Epomops*, probably due to the shortening of the rostrum (Andersen, 1912). The upper incisors are terete and pointed. The C1 is short and excavated posteriorly. The P3 is somewhat caniniform, and almost touching the P4. The lower incisors are slightly bilobed. The p2 and p3 are close together, the former about half the height of the latter. The m2 is slightly longer than wide (Hill and Carter, 1941). Tooth measurements (in mm, $n = 51$) include the following: P3 length, 1.4–2.0; P3 width, 0.9–1.25; P4

length, 1.7–2.2; P4 width, 1.0–1.5; M1 length, 1.6–2.2; M1 width, 1.0–1.6; p3 length, 1.3–1.9; p3 width, 0.9–1.2; p4 length, 1.2–2.1; p4 width, 0.8–1.3; m1 length, 1.5–2.2; m1 width, 0.8–2.2; m2 length, 1.1–2.2; and m2 width, 0.8–1.1 (Andersen, 1912; Bergmans, 1979; Van Orshoven and Van Bree, 1968).

The mean volume and weight of the brain are 798 mm^3 and 826 mg, respectively. The cingular sulcus is absent. *M. pusillus* has a larger brain than average for the sixteen pteropodine genera and the largest neocortex of the tribe Epomophorini (Baron et al., 1996). Mean volumes for the five fundamental parts of the brain (in mm^3; $n = 3$) are as follows: medulla oblongata, 63.5; mesencephalon, 48.4; cerebellum, 108; diencephalon, 67.7; and telencephalon, 491.8 (Baron et al., 1996:318, table 10). Additional measurements of the brain can be found in Baron et al. (1996).

Body temperature deviates 2–8°C from ambient temperatures, ranging from 30 to 40°C. As ambient temperatures decrease to a range of 4–29°C, body temperature is maintained above 24°C. At low temperatures, *M. pusillus* exhibits greater homeothermic tendencies than *Epomops* or *Eidolon*. Considerable shivering and abdominal heaving can occur at ambient temperatures from 10 to 20°C. Prolonged shivering may last up to 15 minutes after removal from low temperatures (Jones, 1972).

ONTOGENY AND REPRODUCTION. *Micropteropus pusillus* appears to be bimodally polyestrus, with two parturition periods occurring during the rainy seasons, followed by postpartum estrus and immediate embryonic development (Thomas and Marshall, 1984). In northeastern Zaire, this species gives birth in November or December and in late February (Verschuren, 1957). Two parturition periods take place in September or October and January or February in the Congo (Bergmans, 1979). In Ghana (Marshall and McWilliam, 1982) and in the Ivory Coast (Thomas and Marshall, 1984), births occur at the beginning and end of the rains in April and September or October. Jones (1972) reported that breeding occurs throughout the year but mostly in March, April, May, and November during the wet season. The gestation period is 5–6 months (Thomas and Marshall, 1984).

There are two lactation periods, coinciding with the major and minor rainy seasons. The first lactation period lasts from 7 to 8 weeks and the second period up to 13 weeks. In Sudan, the first lactation and weaning periods coincide with the increase in fruit availability during the wet season, but the second lactation period begins during the last rainy month, and weaning occurs at the start of the dry season (Thomas and Marshall, 1984). Lactation rather than weaning may determine the timing of reproduction for this species (Racey, 1982).

Seasonal hypertrophy and atrophy of the testes of adult males may occur in some areas (Jones, 1972). However, seasonal cycling of testis size is not found in the Ivory Coast. Males under 6 months of age have testes <3 mm in length and undeveloped epaulettes (Thomas and Marshall, 1984).

Immature bats can be differentiated from adult bats by the lack of fusion at the phalangeal epiphyses, the closeness of the cheek teeth, the duller, grayish-brown color of the pelage, the lack of suckled nipples in females, and the absence of shoulder epaulets or prominent testes in males (Bergmans, 1974; Marshall and McWilliam, 1982). Young females can mate at 6 months and give birth at 12 months. Males reach puberty by 7 months and become fully mature by 9 months (Thomas and Marshall, 1984). In Rio Muni, a female carrying an infant weighing 10.9 g was captured, as was a female with a fetus having a crown-rump length of 15 mm in May and a female with a fetus having a crown-rump length of 18 mm in November. A cleaned skull of a large fetus had ten upper and eight lower recurved milkteeth. The mean growth rate for individuals 20–25 g is 116 mg/day (Jones, 1971).

ECOLOGY. *Micropteropus pusillus* occurs in a variety of habitats. Typically, this species is found in savanna woodlands and is common around vegetation belts that fringe the forest (Hayman and Hill, 1971; Kingdon, 1974), but it also resides in rain and swamp forests, bushlands, and edaphic grasslands. Undisturbed forest areas have never yielded a single specimen of this species (Bergmans, 1989). It is often associated with dense foliage (Jones, 1972; Marshall and McWilliam, 1982), hanging singly or by twos between the leaves of dense bushes but never very high above the ground (Lang and Chapin, 1917). In Nigeria, the bats are nomadic with numbers fluctuating depending on the availability of food (Happold, 1987). *M. pusillus* is a year-round resident in other areas (Jones, 1972).

Micropteropus pusillus is an opportunistic forager of fruits and flowers, traveling widely each night in search of whatever is available (Marshall and McWilliam, 1982). Because of its small size, this species tends to feed on smaller and softer fruits than do larger bats (Happold, 1987). The fruits of *Ficus capensis* and *F. vallischoudae* appear to form the mainstay of their diet (Thomas, 1984*a*). Other fruits supplementing their diet include *Annona chrysophia* (Annonaceae), *A. senegalensis* (Annonaceae), *Butyrospermum paradoxum* (Sapotaceae), *Carica papaya* (Caricaceae), *Psidium guajava* (Myrtaceae), *Vitellaria parkii* (Sapotaceae), *Musa* (Musaceae), and *Mangifera indica* (Anacardiaceae—Green, 1983; Kingdon, 1974; Marshall and McWilliam, 1982). This bat may feed on fallen fruit as well; Eisentraut (1956) captured individuals with banana-baited traps set on the ground. It is a frequent visitor to mango groves and banana plantations (Mclellan, 1986; Rosevear, 1965). Moth scales have been found in the feces, but this observation does not prove that these bats pursue and capture moths. Instead, surface contamination of fruits by moth scales is more likely (Thomas, 1984*b*). Up to 3–5 fruits can be handled per night. The bat ingests 1.5–2.5 times its body mass. Body condition and constant mass is maintained on diets with as little as 2.6% protein. In captivity, *M. pusillus* barely surpasses this minimum protein requirement even when there is an excess of food available. The amount of protein in the diet is the limiting factor in determining the total amount of food ingested. This deficiency in protein from food sources may explain the exceedingly slow growth rate. There is no evidence of energy storage or regulated carbohydrate uptake from the stomach (Thomas, 1984*a*).

Flowers also constitute a large part of the dietary requirements of this small fruit bat. Wilson (1973) listed this bat as being 80% frugivorous and 20% nectarivorous. It has been seen to visit the flowers of *Anacardium occidentale* (Anacardiaceae), *Kigelia pinnata* (Bignoniaceae), *Spathodea campanulata* (Bignoniaceae), *Adansonia digitata* (Bombacaceae), *Ceiba pentandra* (Bombacaceae), *Maranthes polyandra* (Chrysobalanaceae), *Parinari polyandra* (Chrysobalanaceae), *Parkia clappertoniana* (Leguminosae), and *P. roxburghii* (Leguminosae—Green, 1983; Happold, 1987; Harris and Baker, 1959; Mickleburgh et al., 1992). *M. pusillus* visits *Anacardium occidentale* when the fleshy, swollen, edible pedicel, known as the cashew apple, is ripe and juicy. The cashew fruit, which is attached to the apple, is often left untouched (Ayensu, 1974).

Micropteropus pusillus pollinates the flowers of *Kigelia pinnata* (sausage tree—Harris and Baker, 1959). The flowers open at dusk and emit an unpleasant odor that supposedly attracts the bat (Ayensu, 1974). The sausage tree flowers hang on thick stalks and possess deep, wide corollas. The flowers are constructed in such a way that the male and female parts are confined to the basal portion of the flower. The bat lands on the lip of the flower and pushes its head into the floral cup to lap the nectar, in the process covering the top of its head and shoulders with pollen (Harris and Baker, 1959). The flowers close at approximately 2300 h, when the bats are no longer present (Kingdon, 1974). Even though *M. pusillus* can bring about pollination, it is not an essential visitor because the sausage tree sets fruit in some areas where the bat is not found (Harris and Baker, 1959). Another small epauletted pteropodid, *Nanonycteris veldkampi*, and hawk moths also have been observed to visit the sausage tree (Ayensu, 1974).

In Zaire, Verschuren (1957) noted that roosts of this bat had little cover and considerable exposure to the sun. Other reports have noted the bats hanging hidden between the leaves of dense bushes (Lang and Chapin, 1917). Nocturnal roosting may occur in adult males, but this event has never been observed (Jones, 1972).

Micropteropus pusillus, Eidolon helvum, Epomops franqueti, Myonycteris torquata, and *Hypsignathus monstrosus* all roost in the same types of vegetation (Jones, 1972; Kock, 1969). *Nycteris hispida* was occasionally collected at the same locality as *M. pusillus* (Jones, 1972). In the Ivory Coast, *Epomops buettikoferi* appears to compete for the same limiting resource, *Ficus capensis,* especially during the dry season when fruit availability is low. The resident population of *E. buettikoferi* requires all the available fruit supplies when the biomass of ripe *F. capensis* drops to a minimum. At such times, *M. pusillus* may suffer more than a 50% reduction in numbers. However, the population recovers through two birth/recruitment periods and extirpation does not occur because the

period of competition is too brief (Thomas, 1985). *Nanonycteris veldkampi* occupies relatively the same niche as *M. pusillus* in Ghana during the wet season when food is abundant. Direct competition is avoided because *N. veldkampi* appears to be better adapted for nectarivory, forages later in certain habitats, and forages at a greater height than *M. pusillus* (Marshall and McWilliam, 1982). There are no records of predation upon *M. pusillus*.

A species of mite, *Ancystropus aethiopicus*, was described in 1980 from specimens of *M. pusillus* (Dusábek and Bergmans, 1980). Marshall and McWilliam (1982) suggest that this bat is mostly free of ectoparasites in comparision with other pteropodids because roosting is mostly solitary rather than gregarious. Reported endoparasites are the worms *Hepacystis epomophori, Opsonyssys auricularis, Teinocoptes epomophori*, and *T. auricularis* (Anciaux de Faveaux, 1972). A virus known as Lagos-bat virus was isolated from *M. pusillus* in the Central African Republic in 1974 (Sureau et al., 1977). Also, a strain of Rift Valley virus was identified from this species in Guinea (Boiro et al., 1987).

BEHAVIOR. *Micropteropus pusillus* is seldom gregarious and mostly roosts alone or in twos, but may be found in groups of up to ten individuals (Kingdon, 1974). These groups are usually well-spaced throughout the roosting site (Marshall and McWilliam, 1982). Breeding pairs or pregnant females and young occasionally roost together (Kingdon, 1974). The wings normally are wrapped around the body and across the face. The eyes are closed, and the ears usually are erect and immobile (Jones, 1972). This bat is not easily disturbed; Kock (1969) was unsuccessful in flushing the species from their roosts by use of gunshots and flashlights. The tameness of this bat may be related to its cryptic appearance when hanging quietly on a branch, resembling a dead leaf (Kingdon, 1974). If greatly disturbed, the bat moves to a new roosting position by holding a branch with the thumb and swinging its feet onto the new location (Jones, 1972).

Adult males produce a frog-like call resembling that of *Epomops, Epomophorus*, and *Hypsignathus*. Kingdon (1974) described the call as a shrill, ringing note. The larynx is enlarged in males (Bergmans, 1989). Little is known about the mating behavior of this bat. Male displays like that of *Epomophorus* (Acharya, 1992; Boulay and Robbins, 1989) apparently occur in *M. pusillus*. The opening and vibrating of the epaulettes may serve as a mechanism for attracting females as well (Kingdon, 1974).

The flight of *M. pusillus* is rapid, agile, and erratic, resembling that of some insectivorous bats. This bat can maneuver beneath, between, and sometimes through patches of dense vegetation. Hovering at sources of food is common (Jones, 1972; Kingdon, 1974). Landing occurs in a head down position. The wing area (cm^2) is 111.06–178.27 for males, and 100.1–184.21 for females. The wing loading (g/cm^2) ranges from 0.095 to 0.154 for males, and from 0.109 to 0.160 for females (Jones, 1972). This bat has average wing loading compared to other pteropodids. Its mean aspect ratio is 8.7 (Norberg and Rayner, 1987). Jones (1972) captured an adult female with an attached young that weighed 10.9 g, representing 41.3% of the body weight of the mother. The wing loading for that particular female surpassed the maximum wing loading determined for adult females by 23.8% (Jones, 1972). This species flies very low to the ground. Flight levels above 3 m are rare (Eisentraut, 1956; Jones, 1972; Marshall and McWilliam, 1982). *M. pusillus* can forage over a wide area according to fruit and flower availability (Happold, 1987), traveling at least 4 km (Lack, 1978). Rain seems to inhibit flight (Marshall and McWilliam, 1982).

Micropteropus pusillus forages early in the evening, preferably before 2200 h (Marshall and McWilliam, 1982). This bat has been observed feeding only in captivity. Generally speaking, the bat lands head upwards on the fruit and remains there for a few seconds to a few minutes. On other occasions, *M. pusillus* will hover momentarily and bite the fruit. The food is masticated for about 30 s by a slow sucking action of the lips and mouth (Marshall and McWilliam, 1982). The juice and pulp of the fruit is ingested, while the fiber and pith are spat out in the form of small, dry pellets. Food is handled with the mouth, the thumbs, and a foot (Jones, 1972). These bats also can carry fruits to a feeding perch, which is used regularly (Fig. 1). *Butyrospermum paradoxum* fruits equal 53% of the body weight of *M. pusillus*, and the bats transport them by holding them between one leg and the belly while flying (Marshall and McWilliam, 1982). Reports of drinking behavior are scarce, although Kingdon (1974) noted this bat sipping water from a small pond, using delicate, highly-maneuverable flight. Waste materials are eliminated while the bat hangs from its feet, and fecal materials are passed over the front of the body (Jones, 1972).

Unless disturbed, *M. pusillus* spends most of the day and night sleeping, in captivity. They wake just after dusk, take their food, and return to their roost (Blackwell, 1966). When handled, the bats are docile, rarely struggle or bite, and are not vocal (Mclellan, 1986). However, Kingdon (1974) noticed that this bat made a little squawk when handled and tended not to do well in captivity. Foods eaten by this species in captivity range from bananas, plantains, avocados, papayas, figs, and *Butryospermum paradoxum* to the nectar of *Maranthes polyandra* (Jones, 1972; Marshall and McWilliam, 1982; Thomas, 1984*a*, 1985).

GENETICS. *Micropteropus pusillus* has a 2n = 35 and a FN = 64. Only males have been karyotyped. The karyotype is similar to that of *Epomops* and *Hypsignathus*; there are 13 pairs of metacentric or submetacentric elements, and one pair of medium-sized subtelocentric chromosomes is lacking. The males possess a different sex-determining system consisting of a medium-sized subtelocentric X, a small submetacentric Y1, and a smaller subtelocentric Y2 (Haiduk et al., 1980). This genetic anomaly distinguishes *Micropteropus* from related genera (Bergmans, 1988).

CONSERVATION STATUS. *Micropteropus pusillus* is not threatened (Mickleburgh et al., 1992). Its general status is unknown. However, they can occur in large numbers at fruiting trees and are common in Nigeria (Happold, 1987). Jones (1971) found this bat to be the most common pteropodid in Rio Muni, based on collecting efforts in or near Bata.

REMARKS. There is a slight discrepancy in the assignment of the type locality of this species. When Peters (1867) named *Micropteropus pusillus*, he stated that a specimen from Yoruba completely matched Tomes' description and figures of three specimens, two from Gambia and one from Gabon, that Tomes had identified as *Pteropus schöensis* Rüppell, 1842. However, Tomes' identification was in error. *Pteropus schöensis* was later synonymized with *Epomophorus labiatus* (Andersen, 1912). Andersen (1912) stated that Peters' new name of *Epomophorus pusillus* hung on Tomes' description and figures, not on the Yoruba specimen incidentally mentioned but not elucidated by Peters. However, Tomes' two specimens from Gambia were lost, as was the specimen from Gabon. Andersen designated the type locality as Gambia. Bergmans (1989) noted that Peters' Yoruba specimen was labeled as *Epomophorus pusillus* and refuted Andersen's claim that Peters only mentioned the Yoruba specimen. According to Bergmans, it is likely that Peters carefully examined the Yoruba specimen with Tomes' description and illustrations, and also with the actual type specimen of *Pteropus schöensis*. Bergmans decided that Peters must have thought it superfluous to repeat Tomes' description and figures. Andersen's type locality was rejected by Bergmans (1989), who accepted the aforementioned specimen from Yoruba.

The genus *Micropteropus* consisted of three species (*M. pusillus, M. intermedius*, and *M. grandis*) until Bergmans (1988) transferred *M. grandis* to the genus *Epomophorus*.

The number of palatal ridges of the soft palate in *M. pusillus* is somewhat controversial. Bergmans (1989) refuted past evidence that *M. pusillus* had five distinct ridges (Andersen, 1912; Matschie, 1899). Happold (1987), in his classification of the genus *Micropteropus*, noted that the number of palatal ridges varies from five to seven. Bergmans (1989) explained that there are, in fact, six prominent ridges, although the second and third are often joined.

The name *Micropteropus* is derived from the Greek *micros*, or small, and the generic name *Pteropus*, which means wing-footed, a reference to the wing's insertion on the second toe. The specific name *pusillus* is Latin meaning very small (Rosevear, 1965). There are several variations on the common name. Kingdon (1974) referred to *M. pusillus* as the dwarf epauletted bat. Rosevear (1965) called this bat the lesser epaulet bat.

LITERATURE CITED

ACHARYA, L. 1992. Epomophorus wahlbergi. Mammalian Species, 394:1–4

ANCIAUX DE FAVEAUX, M. 1972. Parasitologie des Chiropteres du continent africain. Ph.D. dissertation, University of Paris, France, 282 pp.

ANDERSEN, K. 1912. Catalogue of the Chiroptera in the collection

of the British Museum. I. Megachiroptera. Second ed. British Museum (Natural History), London, 854 pp.

AYENSU, E. A. 1974. Plant and bat interactions in West Africa. Annals of the Missouri Botanical Garden, 61:702–727.

BARON, G., H. STEPHAN, AND H. D. FRAHM. 1996. Comparative neurobiology in Chiroptera. I. Macromorphology, Brain Structures, Tables and Atlases. II. Brain characteristics in taxonomic units. III. Brain characteristics in functional, ecoethological adaptation, adaptive radiation and evolution. Birkhäuser Verlag, Basel, Switzerland, 1:1–532, 2:533–1074, 3:1075–1596.

BENNETT, E. T. 1836. On a remarkable pteropine bat from the Gambia. Proceedings of the Zoological Society of London, 1835:149–151.

BERGMANS, W. 1974. A taxonomical report on a collection of Megachiroptera (Mammalia) from the Ivory Coast. Revue de Zoologie Africaine, 88:18–48.

———. 1979. Taxonomy and zoogeography of the fruit bats of the People's Republic of Congo, with notes on their reproductive biology (Mammalia, Megachiroptera). Bijdragen tot de Dierkunde, 48:161–186.

———. 1988. Taxonomy and biogeography of African fruit bats (Mammalia: Megachiroptera). I. General introduction; materials and methods; results; the genus *Epomophorus* Bennett, 1836. Beaufortia, 38(5):75–146.

———. 1989. Taxonomy and biogeography of African fruit bats (Mammalia, Megachiroptera). 2. The genera *Micropteropus* Matschie, 1899, *Epomops* Gray, 1870, *Hypsignathus* H. Allen, 1861, *Nanonycteris* Matschie, 1899, and *Plerotes* Andersen, 1910. Beaufortia, 39(4):89–153.

BLACKWELL, K. 1966. A note on fruit bats in free-flight aviaries. The International Zoo Yearbook, 6:247.

BOIRO, I., O. K. KONSTANINOV, AND A. D. NUMEROV. 1987. Isolement du virus de las fiévre de la vallée du rift a partir de chéiroptéres en République de Guinée. Bulletin de la Société de Pathologie Exotique, 80:62–67.

BOULAY, M. C., AND C. B. ROBBINS. 1989. Epomophorus gambianus. Mammalian Species, 344:1–5.

DUSÁBEK, F., AND W. BERGMANS. 1980. Spinturnicid mites from some Nigerian bats (Acarina, Spinturniadae). Bulletin Zoologisch Museum Universiteit van Amersterdam, 7:65–72.

EISENTRAUT, M. 1956. Beitrag zur Chiropteren-Fauna von Kamerun (Westafrika). Zoologische Jahrbücher, 84:619–672.

FENTON, M. B., AND L. M. CRERAR. 1984. Cervical vertebrae in relation to roosting posture in bats. Journal of Mammalogy, 65: 395–403.

GALLAGHER, M. D., AND D. L. HARRISON. 1977. Report on the bats (Chiroptera) obtained by the Zaire River Expedition. Bonner Zoologische Beitrage, 28:19–32.

GREEN, A. A. 1983. Rodents and bats of Arli and Pendjari National Parks, Upper Volta and Benin. Nigerian Field, 47:185–194.

HAIDUK, M. W., L. W. ROBBINS, R. L. ROBBINS, AND D. A. SCHLITTER. 1980. Karotypic studies of seven species of African megachiropterans (Mammalia: Pteropodidae). Annals of the Carnegie Museum, 49:181–191.

HAPPOLD, D. C. D. 1987. Mammals of Nigeria. Clarendon Press, Oxford, 402 pp.

HAPPOLD, D. C. D., AND M. HAPPOLD. 1978. The fruitbats of western Nigeria. Nigerian Field, 43:30–127.

HARRIS, B. J., AND H. G. BAKER. 1959. Pollination of flowers by bats in Ghana. Nigerian Field, 14:151–159.

HAYMAN, R. W., AND J. E. HILL. 1971. Order Chiroptera. Pp. 1–73, *in* The mammals of Africa: an identification manual (J. Meester and H. W. Setzer, eds.). Smithsonian Institution Press, Washington, District of Columbia, not continuously paginated.

HILL, J. E., AND T. D. CARTER. 1941. The mammals of Angola, Africa. Bulletin of the Museum of Natural History, 78:1–211.

JONES, C. 1971. The bats of Rio Muni, West Africa. Journal of Mammalogy, 52:121–140.

———. 1972. Comparative ecology of three pteropid bats in Rio Muni, West Africa. Journal of Zoology (London), 167:353–370.

KINGDON, J. 1974. East African Mammals. Insectivores and bats. Academic Press, London, IIA:1–341.

KOCK, D. 1969. Die Fledermaus-Fauna des Sudan. (Mammalia: Chiroptera). Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft, 521:1–238.

KOOPMAN, K. F. 1993. Order Chiroptera. Pp. 137–241, *in* Mammal species of the world: a taxonomic and geographic reference (D. E. Wilson and D. M. Reeder, eds.). Second ed. Smithsonian Institution Press, Washington, District of Columbia, 1206 pp.

LACK, A. 1978. The ecology of the flowers of the savanna tree *Maranthes polyandra* and their visitors, with particular reference to bats. Journal of Ecology, 56:505–522.

LANG, H., AND J. P. CHAPIN. 1917. The American Museum Congo expedition collection of bats. II. Notes on the distribution and ecology of Central African Chiroptera. The Bulletin of the American Museum of Natural History, 37:497–563.

MARSHALL, A. G., AND A. N. MCWILLIAM. 1982. Ecological observations on epomophorine fruit-bats (Megachiroptera) in West African savanna woodland. Journal of Zoology (London), 198:53–67.

MATSCHIE, P. 1899. Die Fledermäuse des Berliner Museums für Naturkunde. I. Megachiroptera: I–VII, Berlin, 102 pp.

MCLELLAN, L. J. 1986. Notes on bats of Sudan. American Museum Novitates, 2839:1–12.

MICKLEBURGH, S. P., A. M. HUTSON, AND P. A. RACEY. 1992. Old World fruit bats: an action plan for their conservation. International Union for Conservation of Nature and Natural Resources, Gland, Switzerland, 252 pp.

NORBERG, U. M., AND J. M. V. RAYNER. 1987. Ecological morphology and flight in bats (Mammalia; Chiroptera): wing adaptations, flight performance, foraging strategy, and echolocation. Philosophical Transactions of the Royal Society of London, 316:335–427.

PETERS, W. C. H. 1867. Die Fortsetzung und der Schluss einer Übersicht der Flederhunde. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1867: 865–872.

RACEY, P. A. 1982. Ecology of bat reproduction. Pp. 57–104, *in* Ecology of bats (T. H. Kunz, ed.). Plenum Press, New York, 425 pp.

ROSEVEAR, D. R. 1965. The bats of West Africa. British Museum (Natural History), London, 418 pp.

SUREAU, P., ET AL. 1977. Isolement du virus Lagos-bat en Empire Centrafricain. Bulletin de la Société de pathologie exotique, 70:467–470.

THOMAS, D. W. 1984*a*. Fruit intake and energy budgets of frugivorous bats. Physiological Zoology, 57:457–467.

———. 1984*b*. Moth scales in feces of fruit bats: evidence of insectivory or fruit contamination? Journal of Mammalogy, 65: 484–485.

———. 1985. Apparent competition between two species of West African fruit bats. Bat Research News, 26:73.

THOMAS, D. W., AND A. G. MARSHALL. 1984. Reproduction and growth of three species of West African fruit bats. Journal of Zoology (London), 202:265–281.

VAN ORSHOVEN, J., AND D. J. H. VAN BREE. 1968. Quelques données sur six espèces de mégachiroptères de la République de Guinée. Beaufortia, 14:177–192.

VERSCHUREN, J. 1957. Écologie, biologie, et systematique des chiroptères. Éxploracion Parcs National Congo Belge. Institut Parcs National Congo Belge, Brussels, 471 pp.

WILSON, D. E. 1973. Bat faunas: a trophic comparison. Systematic Zoology, 22:14–29.

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