

ANNALS of CARNEGIE MUSEUM

CARNEGIE MUSEUM OF NATURAL HISTORY

4400 FORBES AVENUE • PITTSBURGH, PENNSYLVANIA 15213

VOLUME 49

7 JULY 1980

ARTICLE 14

RESULTS OF THE ALCOA FOUNDATION-SURINAME EXPEDITIONS. I. A NEW SPECIES OF BAT OF THE GENUS *TONATIA* (MAMMALIA: PHYLLOSTOMATIDAE)

HUGH H. GENOWAYS

Curator, Section of Mammals

STEPHEN L. WILLIAMS

Collection Manager, Section of Mammals

ABSTRACT

A new species of the phyllostomatine genus *Tonatia* is described from Suriname. The species is characterized by medium size, the presence of small wart-like granulations of the dorsal surfaces of the forearm, digits, and hind limbs and on the ears and noseleaf, and possessing a unique karyotype. Two specimens of the species were taken in the rainforests of central Suriname.

INTRODUCTION

Among the 2,250 specimens of bats collected on recent Carnegie Museum of Natural History field expeditions to Suriname are 50 individuals of the phyllostomatine genus *Tonatia*. There appears to be five species represented in this material. The commonest species are *Tonatia silvicola* and *Tonatia bidens* (Genoways and Williams, 1979). We also have two individuals of small-sized *Tonatia*, which is considered to represent a single species, *brasiliense* (Gardner, 1976; Handley, 1976; Koopman, 1978; Genoways and Williams, 1979), and one specimen of the relatively rare species, *Tonatia carrikeri* (Husson, 1978). The two remaining specimens appear to combine characteristics

Submitted for publication 26 December 1979.

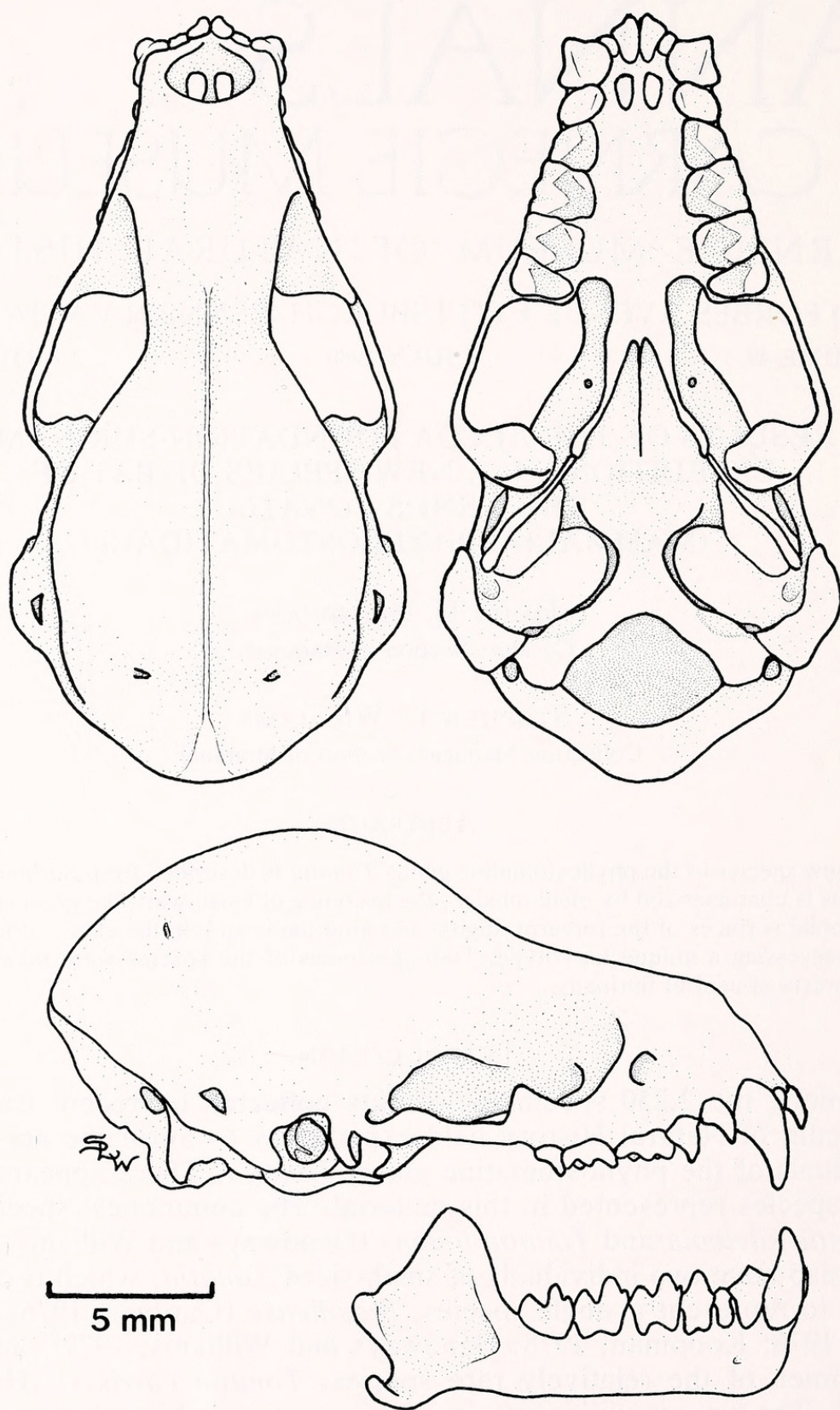


Fig. 1.—Dorsal, ventral, and lateral views of the cranium and lateral view of the lower jaw of the holotype of *Tonatia schulzi* (CM 63687).

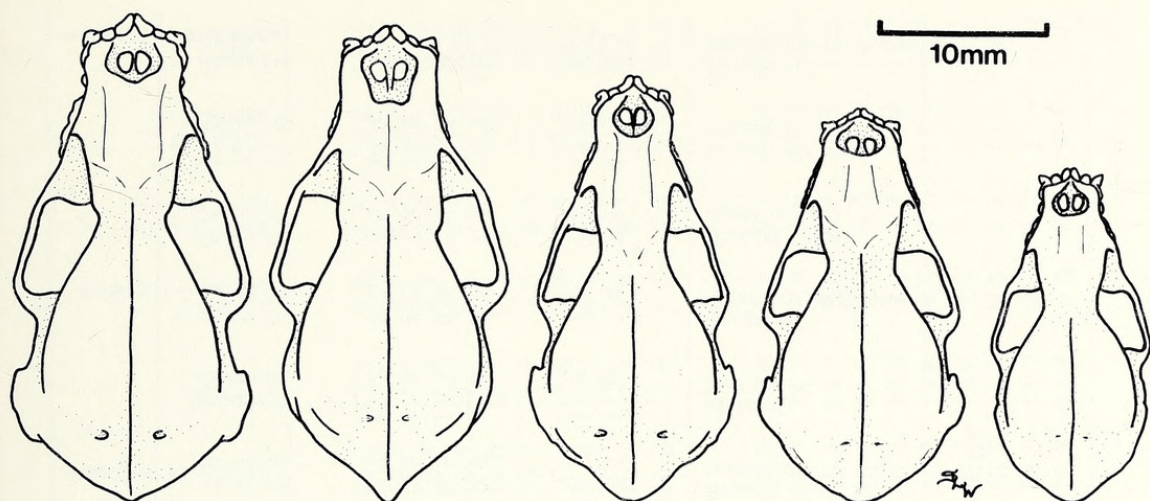


Fig. 2.—Dorsal views of the crania of five species of *Tonatia* from Suriname. From left to right, *T. silvicola* (CM 52779), *T. bidens* (CM 52776), *T. carrikeri* (CM 63668), *T. schulzi* (CM 63687), and *T. brasiliense* (CM 52777).

not found in other described species of the genus, of which we are aware, and are therefore considered to be an undescribed species. This new species is named and described below.

SYSTEMATICS

Tonatia schulzi, new species

Holotype.—Adult male, skin and skull, no. 63687 Carnegie Museum of Natural History (CM); from 3 km SW Rudi Kappelvliegfeld, 320 m, Brokopondo, Suriname (3°46'N, 56°10'W); obtained on 1 October 1979 by Stephen L. Williams; original no. 4951; karyotype no. TK 11270.

Distribution.—The species is known only from the type locality and the nearby locality, 1 km N Rudi Kappelvliegfeld, 300 m (3°48'N, 56°08'W). Both localities are within the Tafelberg Nature Reserve in central Suriname.

Diagnosis.—Size medium for the genus (Figs. 1, 2); venter slightly paler than dorsum but not white; forearm, digits, and hind limbs possessing small wart-like granulations on the dorsal surfaces; granulations also present on the ears and noseleaf; $2N = 28$, $FN = 36$.

Measurements.—External measurements of the holotype followed by those of the paratype are as follows: total length, 79, 78; length of tail, 12, 13; length of hind foot, 13, 14; length of ear, 28, 29; length of calcar, 15, 16; length of tragus, 11, 10; length of noseleaf, 9, 10; width of noseleaf, 6, 6. Length of forearm and cranial measurements for *T. schulzi* as compared with other species of *Tonatia* occurring in Suriname are given in Table 1.

Table 1.—External and cranial measurements of five species of *Tonatia*.

| Museum catalog number and sex | Locality | Length of forearm | Greatest length of skull | Condylobasal length | Zygomatic breadth | Postorbital breadth | Rostral breadth at canines | Breadth of braincase | Mastoid breadth | Length of Maxillary toothrow | Breadth across upper molars | Length of mandible | Length of mandibular toothrow |
|---|----------|----------------------|-----------------------------|------------------------|----------------------|------------------------|-------------------------------|-------------------------|--------------------|---------------------------------|--------------------------------|-----------------------|----------------------------------|
| <i>Tonatia schulzi</i> | | | | | | | | | | | | | |
| CM 63687 ♂ 3 km SW Rudi Kappelvliëgveld, Suriname | | 42.0 | 23.0 | 19.0 | 11.1 | 3.5 | 4.2 | 9.3 | 11.6 | 7.4 | 7.3 | 13.6 | 8.5 |
| CM 63686 ♂ 1 km N Rudi Kappelvliëgveld, Suriname | | 43.3 | 23.3 | 18.9 | 11.0 | 3.5 | 4.1 | 9.2 | 11.8 | 7.5 | 7.2 | 13.6 | 8.5 |
| <i>Tonatia carrikeri</i> | | | | | | | | | | | | | |
| AMNH 30181 ♂ Rio Mocho, Venezuela (holotype) | | 47.3 | 25.8 | 21.8 | 12.2 | 3.9 | 5.1 | 9.9 | 12.8 | 8.5 | 7.9 | 16.9 | 10.8 |
| AMNH 209322 ♂ Rio Itenez, Bolivia | | 45.1 | 24.5 | 20.2 | 11.1 | 3.6 | 4.6 | 9.5 | 11.3 | 8.0 | 7.6 | 15.0 | 9.2 |
| AMNH 30183 ♀ Rio Mocho, Venezuela | | 46.7 | 24.8 | 19.7 | 10.7 | 3.5 | 4.8 | 9.5 | 11.3 | 8.2 | 7.5 | 14.9 | 9.4 |
| CM 63668 ♀ Voltzberg, Suriname | | 45.8 | 25.0 | 20.3 | 11.2 | 3.8 | 4.4 | 9.7 | 12.2 | 8.1 | 7.6 | 14.6 | 9.2 |
| <i>Tonatia brasiliense</i> | | | | | | | | | | | | | |
| CM 52777 ♂ 7 km S, 18.5 km W Afobakka, Suriname | | 35.5 | 19.6 | 16.6 | 9.2 | 3.0 | 3.7 | 7.9 | 8.8 | 6.6 | 6.1 | 11.9 | 7.5 |
| AMNH 71619 ♂ Boca Curaray, Ecuador | | 33.9 | 19.4 | 16.5 | 9.0 | 3.0 | 4.1 | 7.7 | 8.8 | 6.9 | 6.2 | 12.4 | 7.6 |
| CM 63667 ♀ Nieuwe Grond Plantation, Suriname | | 34.5 | 19.5 | 16.3 | 9.3 | 3.0 | 3.6 | 7.8 | 8.9 | 6.7 | 6.4 | 12.0 | 7.3 |

Table 1.—Continued.

| Museum catalog number and sex | Locality | Length of forearm | Greatest length of skull | Condylobasal length | Zygomatic breadth | Postorbital breadth | Rostral breadth at canines | Breadth of braincase | Mastoid breadth | Length of Maxillary toothrow | Breadth across upper molars | Length of mandible | Length of Mandibular toothrow |
|-------------------------------|---|-------------------|--------------------------|---------------------|-------------------|---------------------|----------------------------|----------------------|-----------------|------------------------------|-----------------------------|--------------------|-------------------------------|
| <i>Tonatia bidens</i> | | | | | | | | | | | | | |
| CM 52775 ♂ | 3 km S, 20 km W Afobakka, Suriname | 56.5 | 26.8 | 23.3 | 13.2 | 5.3 | 5.1 | 10.0 | 12.5 | 9.2 | 8.3 | 17.2 | 10.1 |
| CM 52776 ♂ | Bigi Poika, Suriname | 55.1 | 27.7 | 23.1 | 13.8 | 5.6 | 5.5 | 10.4 | 12.3 | 9.5 | 8.5 | 17.5 | 10.5 |
| CM 63655 ♂ | 1.5 km W Rudi Kappelvliegfeld, Suriname | 54.5 | 27.5 | 23.1 | 13.7 | 5.3 | 5.4 | 10.3 | 12.6 | 9.4 | 8.5 | 17.2 | 10.3 |
| CM 63657 ♂ | 3 km SW Rudi Kappelvliegfeld, Suriname | 55.9 | 27.9 | 23.5 | 14.0 | 5.1 | 5.4 | 10.5 | 12.6 | 9.6 | 8.5 | 17.4 | 10.6 |
| CM 63666 ♂ | Voltzberg, Suriname | 56.7 | 28.0 | 23.6 | 13.9 | 5.3 | 5.2 | 10.0 | 12.7 | 9.2 | 8.7 | 17.6 | 10.6 |
| CM 63660 ♀ | Grassalco, Suriname | 56.4 | 27.2 | 23.5 | 13.7 | 5.4 | 5.4 | 10.2 | 12.4 | 9.6 | 8.3 | 17.3 | 10.5 |
| CM 63662 ♀ | Grassalco, Suriname | 52.7 | 27.0 | 22.5 | 13.3 | 5.3 | 5.3 | 10.5 | 12.6 | 9.0 | 8.0 | 16.8 | 10.2 |
| CM 63663 ♀ | Bitagron, Suriname | 55.7 | 27.5 | 23.6 | 13.6 | 5.5 | 5.4 | 10.4 | 12.4 | 9.5 | 8.6 | 17.0 | 10.4 |
| CM 63664 ♀ | Voltzberg, Suriname | 53.3 | 27.4 | 23.3 | 13.7 | 5.5 | 5.4 | 10.3 | 12.4 | 9.3 | 8.7 | 17.1 | 10.4 |
| CM 63665 ♀ | Voltzberg, Suriname | 55.6 | 27.5 | 22.9 | 13.6 | 5.5 | 5.3 | 10.2 | 12.9 | 9.1 | 8.4 | 17.6 | 10.2 |
| <i>Tonatia silvicola</i> | | | | | | | | | | | | | |
| CM 63670 ♂ | 8 km S, 2 km W Brownsweg, Suriname | 55.7 | 29.1 | 23.9 | 14.5 | 4.2 | 5.8 | 10.9 | 14.8 | 9.7 | 9.4 | 18.0 | 11.1 |
| CM 63674 ♂ | 8 km S, 2 km W Brownsweg, Suriname | 59.0 | 29.8 | 24.7 | 14.0 | 4.4 | 6.0 | 10.7 | 14.3 | 9.9 | 9.6 | 18.6 | 11.4 |
| CM 63677 ♂ | 8 km S, 2 km W Brownsweg, Suriname | 56.4 | 28.3 | 23.4 | 13.8 | 3.9 | 5.9 | 10.3 | 14.0 | 9.8 | 9.2 | 17.5 | 11.5 |
| CM 63683 ♂ | Voltzberg, Suriname | 57.1 | 29.1 | 24.0 | 13.7 | 4.1 | 5.7 | 10.4 | 14.5 | 10.1 | 9.0 | 18.0 | 11.2 |
| CM 63684 ♂ | Voltzberg, Suriname | 56.5 | 28.9 | 23.5 | 13.9 | 4.1 | 5.9 | 10.8 | 13.9 | 9.6 | 9.3 | 18.0 | 11.2 |
| CM 63679 ♀ | 8 km S, 2 km W Brownsweg, Suriname | 56.0 | 27.9 | 23.3 | 13.2 | 4.4 | 5.3 | 10.2 | 13.6 | 9.3 | 9.0 | 17.0 | 10.7 |
| CM 63672 ♀ | 8 km S, 2 km W Brownsweg, Suriname | 57.9 | 28.3 | 23.8 | 13.8 | 3.9 | 5.8 | 10.7 | 14.0 | 9.8 | 9.2 | 18.0 | 11.1 |
| CM 63678 ♀ | 8 km S, 2 km W Brownsweg, Suriname | 56.9 | 28.3 | 23.1 | 13.7 | 4.3 | 5.5 | 10.9 | 13.5 | 9.8 | 8.6 | 17.5 | 10.6 |
| CM 63681 ♀ | Raleigh Falls, Suriname | 55.0 | 27.9 | 23.0 | 13.6 | 4.0 | 5.5 | 10.5 | 13.9 | 9.3 | 9.1 | 17.4 | 11.0 |
| CM 63685 ♀ | Voltzberg, Suriname | 54.0 | 27.3 | 22.2 | 13.1 | 4.1 | 5.1 | 10.8 | 13.8 | 9.6 | 8.8 | 16.9 | 10.6 |

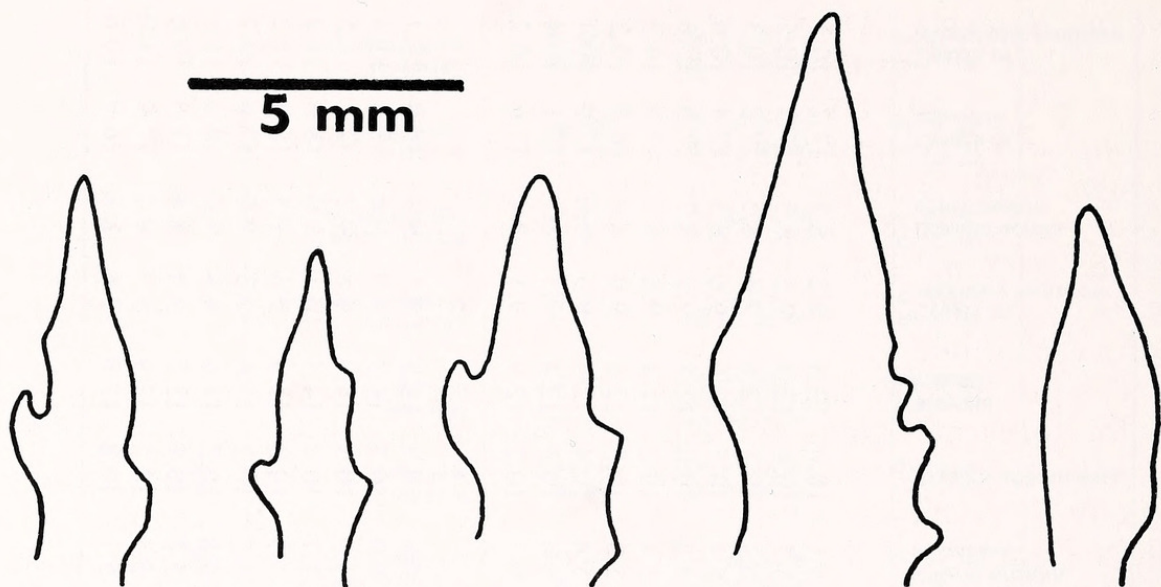


Fig. 3.—Tragus of five species of *Tonatia*. From left to right, *T. schulzi* (CM 63687), *T. brasiliense* (CM 63667), *T. carrikeri* (CM 63668), *T. silvicola* (CM 63674), and *T. bidens* (CM 63659). The left side of each illustration represents the inner margin of the tragus.

Description.—Hairs on the dorsum about 7 to 8 mm long; base of the hair pale, becoming almost white; remainder of the hair shaft Sepia in the holotype and Fuscous in the paratype (capitalized color terms from Ridgway, 1912) except for the extreme tip which is somewhat paler. Hairs on the venter about 6 mm long; basal white portion of hair half or more of the length of the shaft; overall coloration of the venter somewhat paler than dorsum being Drab to Grayish Olive. Postauricular patches thinly haired and paler than the remainder of the dorsum.

Small wart-like granulations present on the holotype on the dorsal surfaces of the bones of the wings and hind legs; including the thumbs, calcars, and all but the distal phalanges of each digit. Granulations visible on both surfaces of the ear and as a central vertical ridge on the noseleaf. Granulations definitely present on the paratype, but not as extensive as on the holotype; present on the forearms, metacarpels, tibiae, ears, and noseleaf. These granulations appear, at least superficially, to be similar to those found on *Neoplatymops mattogrossensis* (Peterson, 1965).

Tragus attenuated but with a distinct projection on the inner margin (Fig. 3). Warts on the lower lip arranged in an outer and inner U-shaped pattern. Single low bands running from each ear meet near the middle of the forehead. Calcar longer than the hind foot.

Size, both external and cranial, intermediate for the genus being closest to *T. carrikeri*. Dental formula 2/1, 1/1, 2/3, 3/3. Outer upper incisors reduced in size with the canines nearly touching the medial incisors; lower incisors not enlarged; middle lower premolar reduced in size but still in the line of the toothrow. A sagittal crest present in both specimens but not highly developed.

Karyotype consisting of five pairs of biarmed elements and nine pairs of acrocentric elements; X-chromosome and Y-chromosome acrocentric; $2N = 28$ and $FN = 36$ (see Honeycutt et al., 1980, for additional discussion and a figure of this karyotype).

Comparisons.—Size alone is nearly sufficient to distinguish *T. schulzi* from other members of the genus. It is much smaller than *T.*

bidens, *T. evotis* (Davis and Carter, 1978), and *T. silvicola* and much larger than *T. brasiliense*. The species nearest to *T. schulzi* in size is *T. carrikeri*; however, *carrikeri* seems to be somewhat larger than *schulzi* in most measurements (see Table 1 and Swanepoel and Genoways, 1979). *T. schulzi* is further distinguished from *carrikeri* by the color of the venter. In *carrikeri*, the underparts are pure white except on the chin and sides of the abdomen, whereas in *schulzi* the underparts are uniformly Drab to Grayish Olive although the bases of the hairs are white.

The presence of small wart-like granulations on the dorsal surfaces of the forearms, digits and hind legs and on the ears and noseleaf of *T. schulzi* is a characteristic found in no other member of the genus, or any other phyllostomatid bat. The tragus of *T. schulzi* appears to differ from that of the other four species of *Tonatia* in Suriname, with the projection on the inner edge of the tragus of *T. schulzi* being more prominent than on the other species (Fig. 3). The karyotype of *T. schulzi* ($2N = 28$, $FN = 36$) differs from *T. brasiliense* ($2N = 30$, $FN = 56$), *T. bidens* ($2N = 16$, $FN = 20$), *T. silvicola* ($2N = 34$, $FN = 60$), and *T. carrikeri* ($2N = 26$, $FN = 46$), but the karyotype of *T. evotis* is not known (Baker, 1979).

In addition to the characters above *T. schulzi* differs from *T. bidens* in the size of the lower incisors. *T. schulzi* resembles other members of the genus in having narrow lower incisors rather than the broad incisors of *T. bidens*. The sagittal crest is present in *T. schulzi* but it is not as highly developed as in *T. silvicola*.

Remarks.—*Tonatia schulzi* clearly has all of the generic characteristics of *Tonatia*. However, the numerous unique characteristics of the species make it impossible to determine its relationships within the genus. Not even karyological data can aid with determination of relationships at this time (Honeycutt et al., 1980).

The specimens were obtained in the Tafelberg Nature Reserve in central Suriname (Schulz et al., 1977). The vegetation around the base of Table Mountain consists of virgin lowland and lower montane rainforest except in the Kappel Savanna. Our localities were near the savannah but well within the rainforest. At 1 km N Rudi Kappelvlietveld, our nets were set on a hillside above a small stream. The overstory of the rainforest consisted of trees 100 or more feet tall. The understory was moderately dense consisting of ferns, palms, and broadleaved species. At 3 km SW Rudi Kappelvlietveld, the habitat was quite similar although there was no stream in the area and the understory was not quite as dense. At the first locality, the specimen was taken about 11 PM, whereas at the latter place, it was taken before 7 PM. Other species of bats that were collected with the holotype and paratype included *Saccopteryx bilineata*, *S. leptura*, *Pteronotus par-*

nellii, *Chrotopterus auritus*, *Micronycteris megalotis*, *M. nicefori*, *Mimon crenulatum*, *Phylloderma stenops*, *Phyllostomus discolor*, *P. elongatus*, *P. hastatus*, *P. latifolius*, *Tonatia bidens*, *Anoura caudifer*, *Lonchophylla thomasi*, *Carollia perspicillata*, *Rhinophylla pumilio*, two large species of *Artibeus* (currently under investigation to determine taxonomic relationship), *Uroderma bilobatum*, and *Vampyrops helleri*.

Etymology.—It is our pleasure to name this species in honor of Dr. Joop P. Schulz, Director of STINASU (Foundation for Nature Preservation in Suriname) in recognition of the work that he has done in establishing an extensive system of Nature Reserves in Suriname. We are particularly grateful to Dr. Schulz for the assistance that he has given us during our work in Suriname.

ACKNOWLEDGMENTS

Our fieldwork in Suriname was supported by a grant from the Alcoa Foundation, Charles L. Griswold, President. We gratefully acknowledge this support.

We would like to thank Dr. Joop P. Schulz and Henry A. Reichart, STINASU, for their assistance during our work and for making the many facilities of STINASU available to us. Without their help, our work in Suriname would have been impossible. Ferdinand L. J. Baal, Department of Forestry, issued our permits. Mr. Leo Roberts, STINASU, proved to be an excellent field guide and a most congenial companion. The personnel of Surinaams Museum of Natural History, particularly Marga Werkhoven and Mr. I. Douglas, were helpful in making housing and laboratory facilities available for our use. Mr. E. W. Kensmil of the Airports and Civil Aviation was very helpful in providing some of our air transportation to the country's interior. Dr. Robert Power of the Universiteit van Suriname assisted in acquiring chemicals for our karyological studies.

Rodney L. Honeycutt, Jane A. Groen, and Carleton J. Phillips assisted with the collection and preparation of specimens. Robert J. Baker supplied the information on the karyotype of the species.

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