7-7-1980

Results of the Alcoa Foundation-Suriname Expeditions. III. Chromosomal Data for Bats (Mammalia: Chiroptera) from Suriname

Rodney L. Honeycutt
Pepperdine University, rodney.honeycutt@pepperdine.edu

Hugh H. Genoways
University of Nebraska - Lincoln, h.h.genoways@gmail.com

Robert J. Baker
Texas Tech University, rjbaker@ttu.edu

Follow this and additional works at: http://digitalcommons.unl.edu/museummammalogy

Part of the Biodiversity Commons, Other Ecology and Evolutionary Biology Commons, and the Zoology Commons
RESULTS OF THE ALCOA FOUNDATION-SURINAME EXPEDITIONS. III. CHROMOSOMAL DATA FOR BATS (MAMMALIA: CHIROPTERA) FROM SURINAME

RODNEY L. HONEYCUTT¹

ROBERT J. BAKER¹
Research Associate, Section of Mammals

HUGH H. GENOWAYS
Curator, Section of Mammals

ABSTRACT

Standard karyotypic data are presented for 28 species involving 98 specimens. The karyotype of Micronycteris sylvestris, M. daviesi, Phylllostomus latifolius, and Tonatia schulzi are reported for the first time. Chromosomal variation is described for Rhinophylla pumilio and Rhogeessa tumida. Karyotypes for the other species examined were like those previously described in the literature.

INTRODUCTION

As part of a study of the mammalian fauna of Suriname, we have examined the karyotypes of 28 species of bats (Table 1). The specimens reported herein are part of the sample which formed the basis for the report by Williams and Genoways (1980) on bat records for Suriname. Where relevant, as in Rhogeessa tumida, they discuss the reasons for conclusions concerning specific identification. In many cases where karyotypes of species are indistinguishable from those previously described in the literature, we have simply presented data

¹Address: The Museum, Texas Tech University, Lubbock, Texas 79409.
Submitted for publication on 26 December 1979.
Fig. 1.—Representative karyotype of a male *Micronycteris daviesi* from Suriname: Saramacca; Raleigh Falls (CM 63573).

in Table 1 and Specimens Examined. In cases where comment is mer-

ited, data for species are discussed below.

**METHODS AND MATERIALS**

Standard karyotypes were prepared from *in vivo* bone marrow techniques (Baker, 1970), except for *Choeronyctis intermedius, Thyroptera tricolor, Tonatia schulzi*, and *Rhinophylla pumilio*, which were karyotyped from fibroblast cultures (Patton and Baker, 1978). A minimum of five spreads were examined per specimen. Microslides are depos-

Fig. 2.—Representative karyotype of a female *Micronycteris sylvestris* from Suriname: Brokopondo; Brownsberg Nature Park, 2 km W, 8 km S Brownsweg (CM 63589).
Fig. 3.—Representative karyotype of a female *Tonatia silvicola* from Suriname: Saracacuara; Raleigh Falls (CM 63681).

ited in The Museum, Texas Tech University, and voucher skins and skulls are deposited in the Section of Mammals, Carnegie Museum of Natural History.

**Species Accounts**

*Micronycteris daviesi* (Hill)

Fig. 1, 2n = 28; FN = 52

All autosomes are biarmed and 10 pairs are metacentric or sub-metacentric, whereas three pairs are subtelocentric. One medium-sized subtelocentric pair of autosomes has a secondary constriction on the short arm near the centromere. The X is a medium-sized subtelocentric and the Y is a small acrocentric. Superficially, this karyotype appears nearly identical to that described for *M. nicefori*, but *M. nicefori* has one additional pair of medium-sized subtelocentrics and no smaller sized subtelocentric elements.

*Micronycteris sylvestris* (Thomas)

Fig. 2, 2n = 22; FN = (36)

The karyotype of this species consists of nine pairs of biarmed and two pairs of small acrocentric elements. The biarmed elements fall into two size classes; five larger pairs have a centromere placement which is subtelocentric in nature and three smaller pairs which are submetacentric in nature. As only females were examined, the X could not be identified; however, it is probably one of the biarmed pairs which would make the FN = 36. This species has the lowest diploid number thus far reported for the genus (Baker, 1979). Prior to this report the lowest diploid number was 2n = 28 (*M. hirsuta*, *M. nicefori*, and *M.
minuta), and the lowest FN was 32 for M. hirsuta. Although M. hirsuta has a karyotype nearest to that of M. sylvestris in diploid and fundamental values, the two karyotypes are not similar in morphology as M. hirsuta has 10 pairs of acrocentrics in the cytotype with the lowest diploid value (28).
Tonatia silvicola (D'Orbigny)
Fig. 3, 2n = 34; FN = 60

The karyotype of T. silvicola, which was reported by Gardner (1977), is identical to that of our eleven specimens from Suriname representing four localities.

Tonatia schulzi Genoways and Williams
Fig. 4, 2n = 28; FN = 36

The karyotype of this recently described species (Genoways and Williams, 1980) consists of five pairs of biarmed elements and nine pairs of acrocentric elements. The X and Y are acrocentric. Two pairs of the biarmed elements are submetacentric and three are subtelocentric. The smallest pair of biarmed elements has a very small second arm. The nine pairs of acrocentrics form a gradual series from large to small. The karyotype of this species is unique to the genus in the large number of autosomal acrocentric elements and an acrocentric X element. Based on standard karyotypes, it is impossible to determine to which other species of the genus T. schulzi is most closely related.
Fig. 7.—Representative karyotype of a female *Choeroniscus intermedius* from Suriname: Nickerie; Grassalco (embryo from CM 63702).

**Phyllostomus latifolius** Thomas

Fig. 5, 2n = 32; FN = 60

The karyotype of this species is identical to that described for *P. hastatus*, *P. elongatus*, and *Phyloderma stenops*. All autosomes are biarmed except for the smallest pair which is acrocentric. The X appears to be a medium-sized submetacentric and the Y a small dot-like acrocentric.

Fig. 8.—Representative karyotype of a female *Lonchophylla thomasi* from Suriname: Brokopondo; Brownsberg Nature Park, 2 km W, 8 km S Brownsweg (CM 63713).
Fig. 9.—Representative karyotype of a female Vampyressa bidens from Suriname: Brokopondo; 1 ½ km W Rudi Kappelvliegveld (CM 63894).

Rhinophylla pumilio Peters
Fig. 6, 2n = 34; FN = 64

Baker and Bleier (1971) reported a 2n = 36, FN = 62 for specimens of this species from Leticia, Colombia. A female from 1 mi west Puerto Linares, Dept. of LaPaz, Bolivia, collected by David Webster, had a karyotype like that reported by Baker and Bleier (1971). Four specimens (a female and her male embryo, plus another male and female) from Suriname had a 2n = 34, with no acrocentrics (the Colombian and Bolivian specimens had three pairs of acrocentrics). A centric fusion of two acrocentric pairs found in the Colombian cytotypes could explain the reduction in diploid number and the reduction by two pairs in the number of acrocentrics in the karyotype. A pericentric inversion or short arm addition of heterochromatin could explain the additional differences between the two cytotypes.

Choeroniscus intermedius (J. A. Allen and Chapman)
Fig. 7, 2n = 20; FN = (36)

The karyotype of this mainland specimen of Choeroniscus intermedius is essentially like that described for the species from Trinidad (Baker, 1979). Koopman (1978) has discussed the relationship of the intermediate-sized members of the genus in South America and has recognized two species—intermedius and minor. Williams and Genoways (1980) have followed this arrangement but have questioned the distinctness of these taxa. If only one species is recognized, the name to be applied would be Choeroniscus minor (Peters).
Lonchophylla thomasi Allen

Fig. 8, 2n = 32; FN = 38

Two karyotypes have been described for this species. Baker (1973 and Plate 29 in Baker, 1979) reported a 2n = 30, FN = 34 for *L. thomasi*. Gardner (1977) reported a 2n = 32, FN = 38 for *L. thomasi*. The values reported by Gardner are identical to those for the karyotype of our six specimens. The difference between the two karyotypes is a minute pair of distinctly biarmed elements which are present in the 2n = 32 cytotype, but absent in the 2n = 30 cytotype. Gardner's specimens were from Peru, which means the 2n = 32 cytotype is found both to the east and west of where the 2n = 30 form was collected (Leticia, Colombia, from Baker, 1979).

Vampyressa bidens (Dobson)

Fig. 9, 2n = 26; FN = (48)

The karyotype of *Vampyressa bidens* was reported by Gardner (1977). However, he presented only a drawing of the karyotype. Karyotypes of our specimens are like those figured by Gardner and are shown in Fig. 9.
Fig. 11.—Representative karyotype of a female *Rhogeessa tumida* from Suriname: Nickerie; Sipaliwini Airstrip (CM 63934).

**Vampyressa brocki** Peterson

2n = 24; FN = 44

Baker et al. (1972b) reported the karyotype of this species based on examination of three females. Based on a heterochromatic pair in the two males from Suriname, the sex-chromosome system in this species appears to be XX/XY. Another sex-chromosome system has been reported for species in the genus (Baker, 1973) where the males have a diploid value of one less than that found in females.

**Thyroptera tricolor** (Spix)

Fig. 10, 2n = 40; FN = 38

Diploid and fundamental values were reported for this species by Baker (1970) based on a specimen from Trinidad. As a karyotype has not been published, one is shown in Fig. 10.

**Rhogeessa tumida** H. Allen

Fig. 11, 2n = 52; FN = (52)

Diploid values reported for *R. tumida* are 42, 34, 32, and 30 (Bickham and Baker, 1977), with the higher diploid numbers being found in Central America. All previously examined specimens of this species
Table 1.—Chromosomal data for bats from Suriname. Symbols are 2n, diploid number; FN, fundamental number; M, metacentric; SM, submetacentric; ST, subtelocentric; A, acrocentric.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>2n</th>
<th>FN</th>
<th>X</th>
<th>Y</th>
<th>Source of photograph of karyotype</th>
<th>Number of specimens reported in this study</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Emballonuridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Saccoptryx bilineata</em></td>
<td>26</td>
<td>36</td>
<td>ST</td>
<td>ST</td>
<td>Baker and Jordan, 1970</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Phyllostomatidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phyllostomatinae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chrotopterus auritus</em></td>
<td>28</td>
<td>52</td>
<td>SM</td>
<td>A</td>
<td>Yonenaga, 1968</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Micronycteris daviesi</em></td>
<td>28</td>
<td>52</td>
<td>SM</td>
<td>A</td>
<td>This paper</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Micronycteris megalotis</em></td>
<td>40</td>
<td>68</td>
<td>ST</td>
<td>A</td>
<td>Baker, 1979</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Micronycteris minuta</em></td>
<td>28</td>
<td>(50)</td>
<td>SM</td>
<td>A</td>
<td>Baker, 1979</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><em>Micronycteris nicefori</em></td>
<td>28</td>
<td>(52)</td>
<td>SM</td>
<td>A</td>
<td>Baker, 1979</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><em>Micronycteris sylvestris</em></td>
<td>22</td>
<td>(40)</td>
<td>SM</td>
<td>A</td>
<td>This paper</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><em>Mimon crenulatum</em></td>
<td>32</td>
<td>60</td>
<td>SM</td>
<td>A</td>
<td>Baker et al., 1972; Baker, 1979</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><em>Phyloderma stenops</em></td>
<td>32</td>
<td>58</td>
<td>SM</td>
<td>A</td>
<td>Baker, 1979</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><em>Phyllostomus latifolius</em></td>
<td>32</td>
<td>58</td>
<td>SM</td>
<td>A</td>
<td>This paper</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td><em>Tonatia schulzi</em></td>
<td>28</td>
<td>36</td>
<td>M</td>
<td>A</td>
<td>Baker, 1979</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><em>Tonatia bidens</em></td>
<td>16</td>
<td>20</td>
<td>M</td>
<td>A</td>
<td>Baker, 1979</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><em>Tonatia brasiliense</em></td>
<td>30</td>
<td>(56)</td>
<td>M</td>
<td>A</td>
<td>Baker, 1979</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Tonatia silvicola</em></td>
<td>34</td>
<td>60</td>
<td>SM</td>
<td>A</td>
<td>Baker, 1979</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><em>Trachops cirrhosus</em></td>
<td>30</td>
<td>(56)</td>
<td>SM</td>
<td>A</td>
<td>Baker, 1979</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Glossophaginiae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Anoura caudifer</em></td>
<td>30</td>
<td>56</td>
<td>SM</td>
<td>A</td>
<td>Baker, 1979</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Anoura geoffroyi</em></td>
<td>30</td>
<td>(56)</td>
<td>SM</td>
<td>A</td>
<td>Baker, 1979</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Choeronycterus intermedius</em></td>
<td>20</td>
<td>(36)</td>
<td></td>
<td></td>
<td>Baker, 1979</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Lionycteris spurrelli</em></td>
<td>28</td>
<td>(50)</td>
<td></td>
<td></td>
<td>Baker, 1979</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>Lonchophylla thomasi</em></td>
<td>32</td>
<td>38</td>
<td>ST</td>
<td>A</td>
<td>This paper</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Taxon</td>
<td>2n</td>
<td>FN</td>
<td>X</td>
<td>Y</td>
<td>Source of photograph of karyotype</td>
<td>Number of specimens reported in this study</td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----------------------------------</td>
<td>---------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Caroliinae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhinophylla pumilio</em></td>
<td>34</td>
<td>64</td>
<td></td>
<td></td>
<td>This paper</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Stenoderminae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Mesophylla macconnelli</em></td>
<td>21–22</td>
<td>20</td>
<td>A</td>
<td></td>
<td>Baker, 1979</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Urodema bilobatum</em></td>
<td>42</td>
<td>50</td>
<td>ST</td>
<td>SM</td>
<td>Baker and Lopez, 1970</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td><em>Vampyressa bidens</em></td>
<td>26</td>
<td>(48)</td>
<td>ST</td>
<td>A</td>
<td>This paper</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><em>Vampyressa brocki</em></td>
<td>24</td>
<td>44</td>
<td>ST</td>
<td>A</td>
<td>Baker, 1979</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><em>Vampyrops helleri</em></td>
<td>30</td>
<td>56</td>
<td>ST</td>
<td>SM</td>
<td>Baker, 1979</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Thyropteridae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Thyroptera tricolor</em></td>
<td>40</td>
<td>38</td>
<td></td>
<td></td>
<td>This paper</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vespertilionidae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Rhogeessa tumida</em></td>
<td>52</td>
<td>(52)</td>
<td></td>
<td></td>
<td>This paper</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
from South America (Trinidad and Venezuela) have a diploid number of 30. The Suriname specimen does not fit this pattern of geographic distribution of cytotypes. In fact, this specimen has a higher diploid number than has previously been reported for the family Vespertilionidae, and adds further support to the fact that *R. tumida* (as recognized by standard taxonomic methods) contains more chromosomal variation than any other species of bat.

In our opinion, what is currently recognized as *R. tumida* is actually several biological species which are difficult, if not impossible, to distinguish by examination of skins and skulls. Clearly, the factors that promote and/or allow chromosomal evolution are different in *R. tumida* than in most other species of bats (especially the family Vespertilionidae, Bickham, 1979). An understanding of the biology of this species should be extremely valuable in providing insights into the role of chromosomal change in evolution.

Based on G-band chromosome data from the 2n = 30 and 34 cytotypes, Bickham and Baker (1977) hypothesized that the primitive diploid number for the genus *Rhogeessa* was 2n = 50 with a karyotype like that characteristic of *Eptesicus fuscus*. The 2n = 52 cytotype from Suriname differs in gross chromosomal morphology from that proposed as primitive for the genus by a higher diploid number (by two) and a higher fundamental number (by four). Several different combinations of events could explain these differences; however, of all these events, those which produced the higher diploid number are the most difficult to explain from a cytogenetic standpoint.

**Specimens Examined**

Specimens examined from Suriname were as follows: *Saccopteryx bilineata*—Brokopondo: 3 km SW Rudi Kappelvliegveld, 320 m, 3°46'N, 56°10'W (♂, CM 63536). *Chrotopterus auritus*—Nickerie: Sipaliwini Airstrip (♂, CM 63571). Brokopondo: 3 km SW Rudi Kappelvliegveld, 320 m, 3°46'N, 56°10'W (♀, CM 63570). *Micronycteris daviesi*—Saramaca: Raleigh Falls, 4°44'N, 56°12'W (♂, CM 63573). *Micronycteris megalotis*—Brokopondo: 1 ½ km W Rudi Kappelvliegveld, 330 m, 3°47'N, 56°10'W (♂, CM 63575). *Micronycteris minuta*—Commewijne: Nieuwe Grond Plantation, 5°53'N, 54°54'W (♀, CM 63582). *Micronycteris nicefori*—Commewijne: Nieuwe Grond Plantation, 5°53'N, 54°54'W (♀, CM 63586). Brokopondo: 1 km N Rudi Kappelvliegveld, 300 m, 3°48'N, 56°08'W (♀, CM 63585). *Micronycteris sylvestris*—Brokopondo: Brownsberg Nature Park, 2 km W, 8 km S Brownsweg, 4°55'N, 55°11'W (♀, CM 63587–89, 63592–94, 63598). *Mimon crenulatum*—Commewijne: Nieuwe Grond Plantation, 5°53'N, 54°54'W (♀, CM 63608). Brokopondo: 3 km SW Rudi Kappelvliegveld, 320 m, 3°46'N, 45°10'W (♀, CM 63599, 63502–03, 63605; 4♂, CM 63600–01, 63604, 63606). *Phyllostomus stenops*—Saramaca: Raleigh Falls, 4°44'N, 56°12'W (♂, CM 63614). Brokopondo: Brownsberg Nature Park, 2 km W, 8 km S Brownsweg, 4°55'N, 55°11'W (♂, CM 63609); 3 km SW Rudi Kappelvliegveld, 320 m, 3°46'N, 45°10'W (♀, CM 63610). *Phyllostomus illusionis*—Brokopondo: Brownsberg Nature Park, 2 km W, 8 km S Brownsweg, 4°55'N, 55°11'W (♀, CM 63638; ♂, CM 63639); Rudi Kappelvliegveld, 320 m, 3°47'N, 56°08'W (♀, CM 63649); 1 km N Rudi Kappelvliegveld, 300 m, 3°48'N, 56°80'W (♀,
ACKNOWLEDGMENTS

Our field work in Suriname was supported by a grant from the Alcoa Foundation, Charles L. Griswold, President. We gratefully acknowledge this support. Laboratory phases of the study were supported by NSF grant DEB-76-20580 to Baker. Rodney L. Honeycutt was supported by a student-faculty grant from The Graduate School, Texas Tech University, Dr. J. Knox Jones, Jr., Dean.

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 most congenial companion. The personnel of Surinams 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. Jane A. Groen and Carleton J. Phillips assisted with the collection and preparation of specimens. Michael Haiduk and Lynn Robbins assisted in tissue culture work. We thank David Webster for obtaining the tissue samples on which observations of the karyotype of *Rhinophylla pumilio* from Bolivia were made.

**Literature Cited**


