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## TAXONOMIC AND NOMENCLATORIAL NOTES ON BATS OF THE GENUS *GLOSSOPHAGA* IN NORTH AMERICA, WITH DESCRIPTION OF A NEW SPECIES

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Bats of the genus *Glossophaga* (Chiroptera, Phyllostomidae) occur over a vast area of tropical America, from northern México southward to southern Brazil, Paraguay, and northern Argentina, and on some Antillean islands as well. Two species, *longirostris* and *soricina*, long have been known from South America, but, excepting for the occurrence of *longirostris* on islands in the southern part of the Lesser Antilles, *soricina* was thought for many years to be the only representative of the genus in North America.

In 1962, A. L. Gardner described a second North American species, *Glossophaga commissarisi*, based on specimens from the Mexican states of Chiapas, Colima, and Nayarit. *G. commissarisi* now is known to occur from Sinaloa in western México southward to Panamá and into adjacent northwestern South America. Subsequent to its description, a third species, originally named as a subspecies of *soricina*, was discovered. This was "*Glossophaga soricina alticola*," named from Tlaxcala, México, by Davis (1944), and currently known from central México southward in the Pacific versant of Middle America to Costa Rica.

Thus, in a relatively short period, three species of *Glossophaga* came to be known from mainland North America and a fourth is described beyond. Nonetheless, the nomenclatorial status of these bats remained unsettled, owing to controversy over the true identity of the holotype of what currently is regarded as *Glossophaga*

*soricina leachii* (Gray, 1844), with type locality at Realejo, Nicaragua, the oldest name applicable to a member of the genus in the entire region.

#### MONOPHYLLUS LEACHII Gray, 1844

Gray's (1844) description of *Monophyllus leachii*, based on a specimen acquired during the voyage of H. M. S. Sulphur, is brief and yields little information as to its true identity. Examination of the holotype, British Museum (Natural History) no. 42.8.17.17, reveals clearly that it is assignable to the genus *Glossophaga*, but there remains the question as to which of the three currently recognized North American species (all of which now are known to occur in the vicinity of the type locality in northwestern Nicaragua) it represents.

One of us (Jones) examined the holotype of *leachii* in London in 1968 and several of our colleagues also have done so—namely Dillard C. Carter (see Carter and Dolan, 1978), Alfred L. Gardner, Charles O. Handley, Jr., James Dale Smith, and, on several occasions at our request, John Edwards Hill. All of these mammalogists have unselfishly shared their notes and ideas with us and it is upon these composite data, and our own recent studies, that the conclusions presented here are based. The deposition in 1967 in the British Museum by Jones, then at the Museum of Natural History, The University of Kansas, of reference specimens from Nicaragua of *alticola*, *commissarisi*, and *soricina* facilitated later comparisons.

Unfortunately, because all species of *Glossophaga* are similar and may be properly referred to as "sibling species," because some specimens can be assigned only on the basis of consideration of several characters, and because the skull of the holotype of *leachii* is partially broken (Fig. 1), straight-forward identification of the type is difficult. Rather, a process of elimination provides the best mechanism.

On the basis of the following characteristics of BM. 42.8.17.17, it is not representative of *G. commissarisi*: the forearm is relatively long, measurements of independent investigators ranging from 34.6 mm. to 36.4 (probably depending on whether or not the proximal ends of metacarpals are included in the measurement), and longer than the average in Nicaraguan *commissarisi*; the braincase rises relatively abruptly from the rostrum; pterygoid "wings" are present; the presphenoid ridge (even though the tip is broken off and missing) clearly is distinct and high, not flattened



FIG. 1.—Dorsal, ventral, and lateral views of skull, and view of lower jaw of holotype of *Monophyllus leachii*. Photographs courtesy of A. L. Gardner.

subterminally; the parastyle of M1 is reduced; the lower incisors are not peglike.

Thus, the holotype of *leachii* evidently represents either *G. soricina* or *G. alticola* as presently understood. We believe the preponderance of evidence points to the latter. Even though the premaxillae are somewhat elongate anteriorly for a typical specimen of *alticola*, they are distinctly shorter than in *soricina* and are evenly rounded terminally; and the upper incisors are not decidedly procumbent as in *soricina*, but only modestly so (Fig. 1). There is a distinct gap between the left and right pairs of lower incisors, a small gap between the teeth in each pair, and the lower incisor arcade does not fill the space between the canines as is typical of the robust teeth in *soricina*. As noted above, the braincase rises abruptly from the rostrum, which is characteristic of *alticola*, the parastyle of M1 is reduced (expanded anterolabially in *sori-*

*cina*), and the rostrum is relatively short. Finally, such cranial measurements as can be taken from the skull of the holotype match those for Nicaraguan *alticola* (for example, maxillary tooth-row 6.7 mm. as compared with 6.7-7.4 in 21 *alticola* from Nicaragua and 7.2-7.8 in a series of 20 Nicaraguan *soricina*). For the reasons documented above, we conclude that *Monophyllus leachii* Gray is the earliest name for the species presently known as *Glossophaga alticola*.

Another name that needs consideration in this context is *Glossophaga morenoi* Martínez and Villa-R., 1938. The original description of *morenoi* was brief, containing barely enough information to place it properly in the genus *Glossophaga*. Nevertheless, Villa-R. (1953, 1964, 1967) has argued that *morenoi* was an earlier name for the bat described by Davis (1944) as *Glossophaga soricina alticola*. Despite the fact that the holotype of *morenoi* has been lost, and thus the species cannot now be allocated certainly to any one of the currently recognized taxa, it is convenient to follow Villa-R. in recognizing it as conspecific with *alticola*, now *leachii*, thereby removing *morenoi* from future consideration as a name available for continental populations of *G. soricina*. While issue can be taken with Villa's application of *morenoi* (see Davis and Russell, 1954, and Alvarez, 1966, for example), his course of action probably is as logical as any other and we are inclined to accept it here. Thus our concept of the primary synonymy of *Glossophaga leachii* is as follows:

- Monophyllus leachii* Gray, Mammalia, in The zoology of the voyage of H. M. S. Sulphur . . . , 1:18, 1844. Type locality, Realejo, Chinandega, Nicaragua.  
*Glossophaga morenoi* Martínez and Villa-R., An. Inst. Biól., Univ. Nac. Autónoma México, 9:347, 1938. Type locality, Xiutepec (Jiutepec), Morelos, México.  
*Glossophaga soricina alticola* Davis, J. Mamm., 25:377, 1944. Type locality, 13 km. NE Tlaxcala, 7800 ft., Tlaxcala, México.

#### GLOSSOPHAGA SORICINA (Pallas, 1766)

Having disposed of the identity of *leachii* and its synonyms, we are left with the improbable situation of lacking a name for the North American continental subspecies of one of the most common and widespread phyllostomid bats. First, however, two names proposed for North American insular populations—*antillarum* from Jamaica (Rehn, 1902) and *mutica* from the Tres Mariás Islands (Merriam, 1898)—must be considered. *G. s. antillarum* is a unique subspecies of *soricina*, being readily distinguished from mainland populations by its large size and robust

skull. *G. s. mutica*, on the other hand, has been thought to be somewhat less distinctive as compared to mainland bats, and even has been regarded as of the same subspecies by some authorities (see Jones and Carter, 1976, for example). However, recent study of newly acquired material of *mutica* by one of us (Webster), along with the series on which the name was originally based, reveals that it is significantly ( $P \leq .05$ ) larger, both externally (forearm) and cranially (greatest length of skull, condylobasal length, length of rostrum, mastoid breadth, length of maxillary and mandibular tooththrows, and length of mandible), than specimens from the adjacent mainland of western México. We, therefore, recognize *G. s. mutica* as a valid subspecies and are obliged to provide a name for populations from the mainland, for which we propose:

*Glossophaga soricina handleyi*, new subspecies

*Holotype*.—Adult male, skin and skull, no. 25893, The Museum, Texas Tech University; from the grounds of Colegio Peninsular, Mérida, Yucatán, México; obtained on 1 April 1975 by J. B. Bowles, original no. 2262.

Selected measurements (mm.) of the type specimen are: total length, 63; length of tail, 8; length of hind foot, 11; length of ear from notch, 14; length of forearm (dry), 34.4; greatest length of skull, 21.0; condylobasal length, 19.5; zygomatic breadth, 9.3; mastoid breadth, 8.9; interorbital breadth, 4.1; length of maxillary tooththrow, 7.2; length of mandibular tooththrow (c-m<sup>3</sup>), 7.6; weight, 9.0 grams.

*Distribution*.—North American mainland from western (Sonora) and eastern (Tamaulipas) México (excluding most of the Mexican Plateau), southeastward at least to Panamá; probably occurring also in extreme northwestern South America, but limits of distribution there unknown.

*Comparisons*.—As noted above, *G. s. handleyi* differs from insular North American subspecies (*antillarum* and *mutica*) in being distinctly smaller, both externally and cranially. It differs in the same way from *G. s. valens* of western Ecuador and Perú. From the nominate subspecies, which occurs throughout most of the South American tropics, *G. s. handleyi* differs in averaging larger in all measurements. There appears to be little difference in color among populations of this species.

*Remarks*.—The population of *G. soricina* represented by the name proposed above needs no formal description inasmuch as it was recognized for many years under the subspecific name *leachii*,

herein made unavailable because it is applied to another species in the genus. Means by which *G. soricina* can be distinguished from other North American *Glossophaga* are given above and in the description of a new species that follows.

Patronymic recognition is accorded Charles O. Handley, Jr., for his helpful comments relative to the preceding discussion and in testimony to his long-time interest in American Chiroptera.

#### A NEW SPECIES OF GLOSSOPHAGA FROM SOUTHERN MEXICO

While examining specimens of *Glossophaga* deposited in the Museum of Southwestern Biology of the University of New Mexico, one of us (Webster) found seven bats (MSB 27555-27558, 27563-27565) from Oaxaca, México, that are not referable to any other nominal species of the genus. Earlier, Gardner (1962), in the original description of *G. commissarisi*, noted that he examined two individuals from Chiapas in the Los Angeles County Museum that resembled *G. longirostris*, and reexamination by us of these bats reveals that they are identical with those in the series listed above. Subsequently, specimens with similar characteristics, all previously identified as *Glossophaga soricina*, have been located at several other institutions. The new species is sympatric with *Glossophaga commissarisi*, *G. leachii*, and *G. soricina handleyi* in at least the dry lowlands of eastern Oaxaca and western Chiapas and is named and described as follows:

#### *Glossophaga mexicana*, new species

*Holotype*.—Adult female, skin and skull, no. 27563, Museum of Southwestern Biology, University of New Mexico; from Río Guamól, 34 mi. S (by Hwy. 190) La Ventosa Jct., Oaxaca, México; obtained on 27 July 1968 by M. A. Bogan, original no. 870.

Selected measurements (mm.) of the type specimen are: total length, 69; length of tail, 10; length of hind foot, 9.6; length of ear from notch, 13.8; length of forearm (dry), 35.2; greatest length of skull, 22.0; condylobasal length, 20.4; zygomatic breadth, 9.4; mastoid breadth, 9.4; interorbital breadth, 4.1; length of maxillary toothrow, 7.9; length of mandibular toothrow, 8.3.

*Distribution*.—Known certainly from the Pacific lowlands of eastern Oaxaca and western Chiapas, northward in the Isthmus of Tehuantepec at least as far as Mazatlán, Oaxaca; probably occurring elsewhere in the lowlands of southern México.

*Diagnosis*.—Externally similar to the other nominal species of *Glossophaga*; dorsal pelage bicolored, but with greater contrast

than in other species between the brownish tips and cream-colored bases of individual hairs; ventral pelage paler than that of dorsum, the individual hairs frosted terminally; skull long owing to elongate rostrum, sloping gradually from braincase to rostrum; upper incisors procumbent, inner pair larger; fourth upper premolar similar to third in occlusal view and only slightly expanded posterolingually; first upper molar with parastyle reduced, mesostyle slightly expanded labially, and metastyle long; second upper molar with well-developed parastyle and metastyle, parastyle directed labially; lower incisors reduced in size, subquadrangular in occlusal view, usually evenly spaced between canines, outer pair larger; lower premolars similar in size and shape; second and third lower molars with reduced talonids; pterygoid "wings" absent or much reduced, if present located caudad to posterior palatal emargination; presphenoid ridge flattened subterminally; basisphenoid pits moderately deep; mandibular symphyseal ridge reduced. See Fig. 2.

Selected average external and cranial measurements in mm. (extremes in parentheses) of 10 males, followed by those of 10 females, from eastern Oaxaca are: length of forearm (dry), 34.7 (33.5-36.5), 34.8 (33.7-35.5); greatest length of skull, 22.1 (21.6-22.7), 22.1 (21.7-22.4); condylobasal length, 20.5 (20.0-21.5), 20.7 (20.3-21.1); zygomatic breadth, 9.6 (9.4-10.1), 9.5 (9.2-9.6); mastoid breadth, 9.1 (8.9-9.5), 9.0 (8.7-9.4); interorbital breadth, 4.2 (4.1-4.3), 4.2 (4.0-4.3); length of maxillary tooththrow, 7.7 (7.4-7.8), 7.9 (7.6-8.0); length of mandibular tooththrow (c-m3), 8.2 (8.0-8.4), 8.3 (8.0-8.4).

*Comparisons.*—Superficially, *G. mexicana* resembles *G. longirostris* in length of rostrum, length of tooththrows, and slope of rostrum to braincase; however, *mexicana* is smaller than *longirostris* both externally and cranially, has reduced lower incisors (large and in contact in *longirostris*), a subterminally flattened presphenoid ridge (complete and high in *longirostris*), and a more pronounced mandibular symphyseal ridge. By way of example of the size difference between the two species, the forearm averages 34.6 (33.6-36.5) mm. in all our specimens of *mexicana* as opposed to 39.9 (38.6-41.6) in a series of 20 Colombian *longirostris*, and the condylobasal length averages 20.5 (20.0-21.5) as opposed to 22.6 (22.0-23.0).

*G. mexicana* differs from *G. commissarisi* and *G. leachii* in certain cranial dimensions, particularly in having a longer rostrum and longer maxillary and mandibular tooththrows. In addition,



FIG. 2.—Dorsal, ventral, and lateral views of skull, and dorsal and lateral views of lower jaw of holotype of *Glossophaga mexicana*.

*mexicana* has procumbent upper incisors, the inner pair the larger, whereas *commissarisi* and *leachii* have upper incisors that are equal in bulk and are not noticeably procumbent. *G. mexicana* is distinguishable from *G. soricina* in that the lower incisors are reduced, with gaps between teeth, not large and in contact as in *soricina*. Also, *mexicana* has reduced pterygoid "wings" (or lacks them entirely) and a presphenoid ridge that is flattened subterminally, whereas *soricina* has distinct pterygoid "wings" and a high presphenoid ridge. Additional comparative characters of the four species of continental North America are given in Table 1 and Figs. 3 and 4.

TABLE 1.—Selected cranial and dental features usually characteristic of continental North American species of Glossophaga.

Character	<i>G. commisarski</i>	<i>G. leechii</i>	<i>G. mexicana</i>	<i>G. soricina</i>
Upper incisors	Not noticeably procumbent, I2 equal in bulk to I1 (occlusal view)	Not noticeably procumbent, I2 equal in bulk to I1 (occlusal view)	Moderately procumbent to procumbent, I2 less than I1 in bulk (occlusal view)	Procumbent, I2 less than I1 in bulk (occlusal view)
Lower incisors	Peglike, evenly spaced, i2 larger than il	Reduced, evenly spaced, of essentially same size	Reduced, evenly spaced, i2 larger than il	Robust, in contact, of essentially same size
Pterygoid "wings"	Absent	Present	Absent or greatly reduced	Present
Presphenoid ridge	Flattened subterminally	Complete	Flattened subterminally	Complete
Basisphenoid pits	Deep	Deep	Moderately deep	Shallow
Anterior border of premaxillae	Evenly rounded	Evenly rounded	Elongate	Elongate

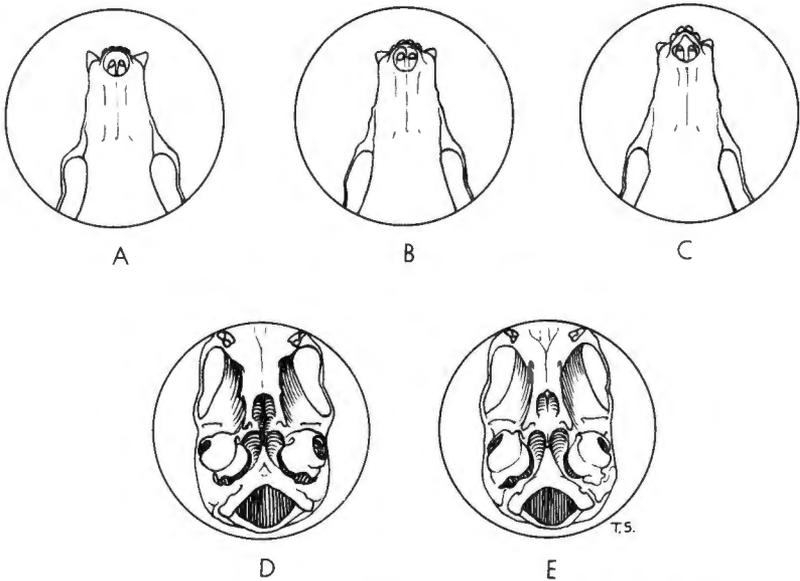


FIG. 3.—Some cranial features of North American *Glossophaga*: dorsal view of skulls of (A) *G. leachii*, (B) *G. commissarisi*, and (C) *G. soricina* illustrating elongation of premaxillae and procumbent incisors in *soricina* as compared to the other two species; ventral view of skull of (D) *G. leachii* and (E) *G. commissarisi*, showing pterygoid “wings” and complete presphenoid ridge of the former as compared to the latter. See text for discussion of these features relative to all species.

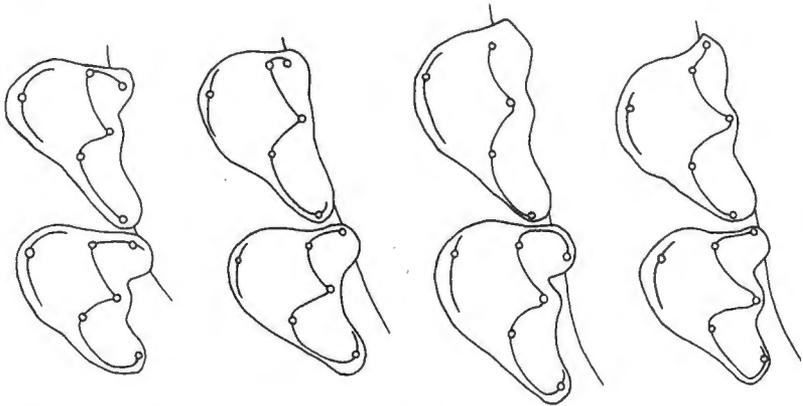


FIG. 4.—First and second upper molars of four species of *Glossophaga*. Left to right: *commissarisi*, *leachii*, *mexicana*, *soricina*.

*Remarks.*—*G. mexicana* has been collected from roosts in caves, hollow trees, road culverts, wells, and walls of buildings, and has been netted over rivers and in pine-oak forests. It presently is known altitudinally from sea level to approximately 1000 m. in elevation, but most specimens are from localities at less than 300 m.

Reproductive data are scanty. A female collected on 6 March in Chiapas carried a fetus (19 mm.), and a July-taken male had enlarged testes (8 by 6 mm.). Reproductively inactive females were collected in late March and early April.

*Specimens examined* (48).—CHIAPAS: 15 mi. ESE Tonalá, 2 (LACM). OAXACA: Diana Liesa Cave, 3 (AMNH); Guiengola (Polito), 2 (AMNH); Las Vacas, 3 (AMNH); Mogoñé, 1 (AMNH); Río Guamól, 34 mi. S (by Hwy. 190) La Ventosa Jct., 3 (MSB); Salina Cruz (La Ventosa), 2 (AMNH); 4 mi. NE Salina Cruz (La Ventosa), 1 (AMNH); San Bartolo, 5 (AMNH); San Carlos, 1 (AMNH); Santa María Guienagati, 1 (AMNH); Tapanatepec, 1 (AMNH); 2 mi. E Tapanatepec, 1 (KU); 4 mi. WNW Tapanatepec, 1 (AMNH); Tehuantepec, 729 km., 2 (AMNH); 9 mi. NW Tehuantepec, Hwy. 190, 4 (MSB); 20 mi. NW Tehuantepec, 1 (AMNH); 60 mi. NW Tehuantepec, 3 (AMNH); Tequisistlán, 3 (AMNH); Tequisistlán, Cerro Ocoatepec, 3 (AMNH); Unión Hidalgo, 2 (AMNH); Zacatepec, Mazatlán, 1 (AMNH); 9.5 mi. W Zanatepec at km. post 889, El Guamól, 1 (USNM); no locality, 1 (AMNH).

#### ACKNOWLEDGMENTS

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