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TWO NEW SUBSPECIES OF BATS OF THE GENUS *STURNIRA* FROM THE LESSER ANTILLES, WEST INDIES

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The last systematic review of the yellow-shouldered bats of the Neotropical genus *Sturnira* in the Lesser Antilles was in 1976 (Jones and Phillips, 1976). At that point in time, two species—*Sturnira lilium* and *Sturnira thomasi*—were known from these islands. *Sturnira lilium* was represented by five subspecies, beginning with Trinidad and moving northward, these subspecies were *lilium* on Trinidad (Goodwin and Greenhall, 1961), *paulsoni* on St. Vincent (de la Torre and Schwartz, 1966), *luciae* on St. Lucia (Jones and Phillips, 1976), *zygomatiscus* on Martinique (Jones and Phillips, 1976), and *angeli* on Dominica (de la Torre, 1966).

By way of contrast to *Sturnira lilium*, *S. thomasi* is endemic to the Antilles, with a single population described from the island of Guadeloupe. Interestingly, *S. thomasi* must either be rare or difficult to capture in mist nets (or both) because the original description of this species was based upon a single specimen (de la Torre and Schwartz, 1966). Koopman (1968) was "inclined to regard *paulsoni*, *angeli*, and even *thomasi* as successive modifications of *lilium* out of contact with other species of *Sturnira*." In the case of *S. thomasi*, this recommendation has not been supported by subsequent authors (Genoways and Jones, 1975; Jones and Phillips, 1976; Baker and Genoways, 1978; Baker et al., 1978; Owen, 1987; Koopman, 1989, 1993; Jones,

1989; Pacheco and Patterson, 1991; Pedersen et al., 1996). Genoways and Jones (1975) and Owen (1987) have reported an additional six specimens of *S. thomasi* from Guadeloupe.

The genus *Sturnira* thus was known from five islands in the Lesser Antilles with Guadeloupe being the furthest north. Of the Lesser Antillean islands to the south of Guadeloupe, according to Jones and Phillips (1976), representatives of the genus *Sturnira* were not known from Marie Galante, Barbados, The Grenadines, and Grenada. Subsequent to the paper by Jones and Phillips (1976), members of the genus have been captured on Grenada (reported herein) and Montserrat, which lies about 55 km to the northwest of Guadeloupe (Pedersen et al., 1996). Study of these specimens has convinced me that these populations represent two undescribed subspecies, which are characterized and named below.

In the two accounts below, all measurements are given in millimeters. Statistical analyses were performed using the *StatView*® software package (Sager, 1992). The paired t-test gave statistical significance of differences in group means. I am grateful to the following people for allowing me access to specimens housed in their research collection: the late Karl F. Koopman, American Museum of Natural History (AMNH); Rob-

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panions, who were involved in collecting these bats: Robert J. Baker, Carleton J. Phillips, Dorothy Pumo, and Scott Pedersen. Figure 1 was prepared by Angie Fox, Staff Artist, University of Nebraska State Museum.

DESCRIPTIONS

Sturnira lilium serotinus new subspecies

Holotype.— Adult male, skin and skull, UNSM 16493, from Birch Grove, St. Andrew Parish, Grenada; obtained by Hugh H. Genoways on 26 May 1987, original no. HHG 5609.

Etymology.— *serotinus* Latin, meaning happening late; referring to the fact that the description of this subspecies is happening late in comparison to other Antillean populations of *Sturnira lilium*.

Distribution.— Known only from Grenada (Fig. 1).

Diagnosis.— Forearm short for Antillean representatives of the species; cranium narrow (Table 1); the first upper molar with a small anterior labial shelf and a prominent metacone; second upper molar with a poorly-developed anterior labial shelf; third upper molar of average size; in the first lower molar the paraconid is located near the lingual edge of the tooth so that the paraconid, metaconid, and entoconid nearly form a linear lingual sequence; entoconid well developed into an elongate cone; third lower molar small with only two cuspids with the lingual the larger of the two; the pelage is a reddish to yellowish brown with the "yellow shoulders" present.

Comparisons.— Morphometrically, the specimens from Grenada have a length of forearm that is significantly smaller than those of the other Antillean populations (Table 1), but is matched by *S. l. lilium* from Trinidad. In length measurements of the cranium, the Grenada population matches those from the Antillean islands and Trinidad for greatest length of skull, and in length of maxillary tooththrow, the Grenada population does not significantly differ from populations of *S. lilium*

on Trinidad, Martinique, and Dominica, but is significantly longer than the tooththrow of specimens from St. Lucia and St. Vincent. In three measurements of the width of the cranium (postorbital constriction, mastoid breadth, and breadth across upper molars), the population on Grenada has a significantly narrower cranium than all populations except in breadth of mastoid of specimens from Martinique where there is no significant difference. In the fourth cranial breadth measurement, zygomatic breadth, the Grenada population was significantly smaller than *S. l. lilium* from Trinidad and *S. l. zygomaticus* from Martinique.

In characteristics of the first upper molar, the specimens from Grenada most closely resemble those from Trinidad in the reduction of the anterior labial shelf and next most closely resemble the Dominica and the Martinique populations, with the populations from St. Lucia and St. Vincent having the most highly developed anterior labial shelf. The third upper molars is smallest in the Dominican population and largest in the St. Lucian population, with populations from St. Vincent, Martinique, Grenada, and Trinidad on the averaging an intermediate size between these extremes (Jones and Phillips, 1976).

The morphology of the lower first molar groups the Grenada population with populations on St. Lucia and St. Vincent where the paraconid is located on the lingual edge of the tooth so that the paraconid, metaconid, and entoconid form a linear lingual sequence and the entoconid is enlarged as opposed to the condition found in populations from Trinidad, Martinique, and Dominica where the paraconid is located nearer to the center line of the tooth than the lingual margin so that the paraconid does not form a linear lingual sequence with the metaconid and entoconid and the entoconid is a low ridge. The third lower molar of the Grenada population was the smallest among the populations examined with only two cuspids present.

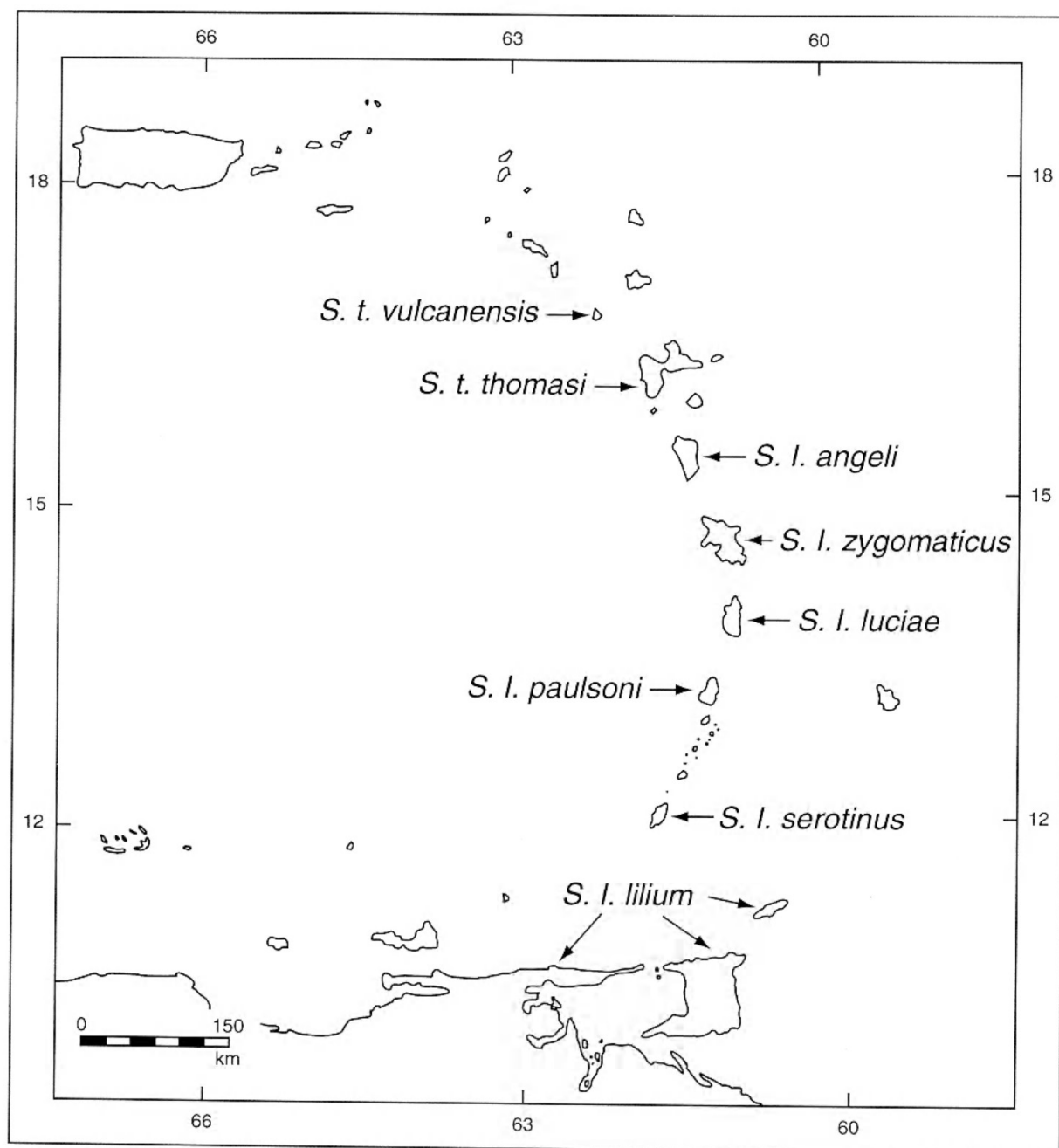


Figure 1. Map of the distribution of the subspecies of *Sturnira lilium* and *Sturnira thomasi* in the southern Lesser Antilles and northeastern South America.

The pelage of the Grenada population is a reddish to yellowish brown above and somewhat paler below. The "yellow shoulder" characteristic of the genus is present. Examining a series of *S. l. lilium* from

Trinidad, the range of color variation encompasses the variation seen in the Grenada sample.

Specimens examined (7).— Grenada: Birch Grove, St. Andrew Parish, 3 (2 UNSM, 1 TTU); 1/2

Table 1.—Forearm and cranial measurements of six subspecies of *Sturnira lilium* from the southern Lesser Antilles and Trinidad. Testing for significant differences between the means of *S. l. serotinus* and the other subspecies was performed using paired *t*-tests.

Measurements and statistics	<i>serotinus</i>	<i>lilium</i>	<i>paulsoni</i>	<i>luciae</i>	<i>zygomatus</i>	<i>angeli</i>
Length of forearm						
N	6	10	6	8	8	10
Mean	42.0	42.3	43.3*	43.9**	43.6**	43.6*
Range	40.1-42.6	40.8-44.3	42.6-44.2	42.7-44.8	42.8-45.0	41.7-45.2
± SE	± 0.39	± 0.35	± 0.23	± 0.25	± 0.29	± 0.37
Greatest length of skull						
N	6	10	6	8	8	10
Mean	22.7	23.0	23.1	22.6	22.7	23.1
Range	21.8-23.3	22.2-23.6	22.7-23.5	22.1-23.0	22.4-23.0	22.7-23.7
± SE	± 0.22	± 0.15	± 0.17	± 0.15	± 0.07	± 0.11
Zygomatic breadth						
N	6	10	6	8	8	10
Mean	13.0	13.5*	13.2	13.2	13.5*	13.0
Range	12.8-13.3	12.8-14.2	12.8-13.5	12.8-13.7	13.0-13.9	12.7-13.2
± SE	± 0.08	± 0.13	± 0.08	± 0.10	± 0.10	± 0.08
Postorbital constriction						
N	6	10	6	8	8	10
Mean	5.7	6.1***	5.9**	5.9**	6.0**	5.9*
Range	5.5-5.8	5.7-6.3	5.7-6.0	5.8-6.2	5.6-6.3	5.7-6.4
± SE	± 0.04	± 0.07	± 0.05	± 0.06	± 0.07	± 0.07
Mastoid breadth						
N	6	10	6	8	8	10
Mean	11.5	12.0**	11.8*	11.8*	11.7	11.8*
Range	11.1-11.7	11.6-12.7	11.6-12.1	11.2-12.1	11.3-11.9	11.5-12.1
± SE	± 0.10	± 0.11	± 0.09	± 0.10	± 0.08	± 0.08
Length of maxillary toothrow						
N	6	10	6	6	8	10
Mean	6.7	6.8	6.4***	6.4**	6.7	6.8
Range	6.6-6.8	6.4-7.1	6.3-6.5	6.2-6.6	6.5-6.8	6.5-7.0
± SE	± 0.03	± 0.07	± 0.03	± 0.07	± 0.05	± 0.08
Breadth across upper molars						
N	6	10	6	7	8	10
Mean	7.8	8.1***	8.0*	8.0**	8.3***	8.1***
Range	7.7-8.0	7.9-8.5	7.8-8.3	7.8-8.1	8.1-8.5	7.9-8.3
± SE	± 0.05	± 0.06	± 0.08	± 0.04	± 0.05	± 0.04

km E Vendôme, St. George Parish, 12°05' N, 61°42.5' W, 4 (CM).

Comparative specimens examined.—*Sturnira lilium angeli*: Clarke Hall Estate, 100 ft., St. Joseph

Parish, Dominica, 5 (KU); 1 mi from mouth of Layou River, St. Joseph Parish, Dominica, 2 (TTU); Mt. Joy Estate, St. Paul Parish, Dominica, 3 (TTU); Springfield, St. Paul Parish, Dominica, 2 (TTU). *Sturnira lilium*

lilium: Caura Valley, Trinidad, 1 (KU); Guayaguayare, Trinidad, 1 (KU); Las Cuevas, Trinidad, 2 (TTU); St. George, San Rafael, Trinidad, 8 (TTU). *Sturnira lilium luciae*: 1/2 mi. SE Bogius, 100 ft., Dauphin Parish, St. Lucia, 7 (KU); Union Agricultural Station, 100 ft., Gros-Islet Parish, St. Lucia, 1 (KU); 1 1/2 km E Marigot Bay, St. Lucia, 1 (UNSM). *Sturnira lilium paulsoni*: Clifton Hill, 400 ft., St. George Parish, St. Vincent, 6 (KU). *Sturnira lilium zygomatiscus*: Balata, Martinique, 10 (AMNH).

Comments.—The population of *Sturnira lilium* on Grenada can be distinguished from populations to the north in the Antilles by its shorter length of forearm and from populations both to the north and south in having a much narrower cranium, which is especially evident in postorbital constriction, mastoid breadth, and breadth across upper molars. It probably is more distinctive in these morphological characters than are other Antillean populations from each other. In characteristics of the maxillary and mandibular dentition, *S. l. serotinus* displays a unique combination of characteristics, but with the possible exception of the m3, these characteristics are within the range of characters displayed by the other Antillean populations. The m3 of *S. l. serotinus* appears to be smaller than in other populations with only two distinct cuspids; however, given the variability of this tooth, more individuals need to be examined before the validity of this characteristic can be determined.

The specimens from Grenada came from higher elevation (Vendôme at 300 m) and wet interior valleys of the island (Birch Grove). No specimen was taken in the dry coastal areas of the island despite considerable collecting effort in this area. Three specimens were captured in nets over a branch of the Balthazar River and an adjacent area behind the Police Station in Birch Grove. The vegetation in the area was a mixture of fruit and native trees. There was no canopy over the fairly broad river, which contains huge boulders with water braiding among them. At Vendôme, nets were set over a small stream as it emerged from Grand Étang Forest Reserve. The stream was one of the small upper tributaries of the Beauséjour River, which enters the Caribbean Sea approximately 5 km to the west-northwest. The habitat at this site was characterized by wet, dense montane forest, which became fairly open under the canopy away from disturbed areas. More informa-

tion on the natural history of the new taxon will appear in Genoways et al. (1998).

Sturnira thomasi vulcanensis
new subspecies

Holotype.—Adult female, skin, skull, and partial skeleton, UNSM 20062, from Paradise Estate, 1 kilometer S Harris [1000 m], St. George's Parish, Montserrat; obtained by Scott C. Pedersen on 14 May 1994, original no. SCP 261.

Etymology.—Vulcan was the Roman God of Fire or Volcanoes; *-ensis* Latin, meaning place, country, or land; thus, the name is intended to mean the place of fire or volcanoes referring to the Soufrière that has seriously damaged the natural habitats and the lives of the citizens of Montserrat with its recent eruptions.

Distribution.—Known only from Montserrat (Fig. 1).

Diagnosis.—The holotype was compared with two specimens of *Sturnira thomasi thomasi* and two specimens of Antillean *Sturnira lilium* to establish its specific identity. The holotype is morphologically similar to the *S. thomasi* in the characters used to differentiate *S. thomasi* and *S. lilium*, including a relatively large skull with a long, narrow cranium (Genoways and Jones, 1975; Jones and Phillips, 1976).

The holotype of *S. t. vulcanensis* differs from the specimens of *S. t. thomasi* from Guadeloupe in that its cranium is proportionally and absolutely narrower although of the same length (see measurements below) and all crests and ridges are less pronounced, especially noticeable in the sagittal crest. The pelage of the holotype is uniformly grayish brown dorsally and ventrally and lacks the "yellow shoulder" characteristic of the genus, whereas the pelage of specimens from Guadeloupe is reddish brown and reddish-yellow shoulder is clearly evident.

Forearm and cranial measurements of the holotype followed by measurements of two specimens from Guadeloupe are as follows: length of forearm, 44.7, 46.1, 47.7; greatest length of skull, 24.9, 24.9, 25.1; condylobasal length, 23.3, 22.9, 23.6; zygomatic

breadth, 11.6, 12.2, 12.5; mastoid breadth, 10.9, 11.7, 11.8; breadth of braincase, 9.3, 9.8, 9.6; breadth of interorbital constriction, 5.8, 5.9, 6.0; breadth of the postorbital constriction, 5.8, 5.5, 5.9; length of maxillary toothrow, 7.3, 6.9, 6.9; width across upper molars, 7.6, 8.0, 8.0; length of mandibular toothrow (i-m2), 8.4, 7.7, 7.8. The holotype lacks the m3 on both sides of the mandible as do both the specimens from Guadeloupe.

Specimen examined (1).—Montserrat: Paradise Estate, 1 km S Harris [1000 m], St. George's Parish, 1 (UNSM).

Comparative specimens examined.—*Sturnira thomasi thomasi*: 1 km W Vernou, Basse-Terre, Guadeloupe, 1 (TTU); 1 km S, 4 km W Vernou, Basse-Terre, Guadeloupe, 1 (TTU). *Sturnira lilium serotinus*: Birch Grove, St. Andrew Parish, Grenada, 2 (UNSM).

Comments.—This unique specimen was first reported by Pedersen et al. (1996). It was thought at that time that it would be best to await additional specimens

before formally describing this new taxon. However, with the natural disaster currently occurring on Montserrat because of volcanic eruptions, it is believed that it is best to get this taxon recorded and recognized in the scientific literature. Because this population was probably confined to the more mesic and older vegetation on the slopes of the Soufrière, there seems to be a reasonable chance that this new taxon is now extinct. The holotype was pregnant when captured so a breeding population did occur on the island at that time.

Sturnira possibly is relatively uncommon on many of the Antillean islands where it occurs and unlike some fruit bats possibly needs native humid forest instead of tropical agriculture to flourish. The morphological data all point to the fact that these bats apparently do not migrate very well and therefore gene flow is frequently interrupted. Low population levels on the various islands could contribute to the pattern in two ways: 1) no intraland pressure to disperse long distances and 2) greater possibility of local genetic drift and consequent subspecific geographic differences.

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