

Sturnira lilium. By Michael R. Gannon, Michael R. Willig, and J. Knox Jones, Jr.

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Sturnira lilium (É. Geoffroy St.-Hilaire, 1810)

Common Yellow-shouldered Bat

Phyllostoma lilium É. Geoffroy St.-Hilaire, 1810:181. Type locality restricted to Asunción, Paraguay, by Cabrera (1958:78).

Sturnira spectrum Gray, 1842:257. Type locality "Brazil."

Phyllostoma excisum Wagner, 1842:358. Type locality "Rio de Janeiro, Brazil."

Phyllostoma albescens Wagner, 1847:177. Type locality "Ypanema [Ipanema]," São Paulo, Brazil.

Phyllostoma fumarium Wagner, 1847:178. Type locality "possibly Brazil" (Carter and Dolan, 1978:50).

Sturnira lilium: Gervais, 1856:39. First use of current name combination.

Sturnira angeli de la Torre, 1966:271. Type locality "6 mi. NE Roseau (1000 ft.), St. Paul Parish, Dominica," Lesser Antilles.

Sturnira paulsoni de la Torre and Schwartz, 1966:301. Type locality "Lowrt, 1000 ft., St. Andrew Parish, St. Vincent," Lesser Antilles.

CONTEXT AND CONTENT. Order Chiroptera, Suborder Microchiroptera, Superfamily Phyllostomoidea, Family Phyllostomidae, Subfamily Stenodermatinae, Genus *Sturnira*, Subgenus *Sturnira*. The genus *Sturnira* contains 13 species, 11 of which belong to the subgenus *Sturnira* and two to the subgenus *Corvira*. *Sturnira lilium* has six subspecies (Jones and Carter, 1976):

S. l. angeli de la Torre, 1966:271, see above.

S. l. lilium É. Geoffroy St.-Hilaire, 1810:181, see above.

S. l. luciae Jones and Phillips, 1976:11. Type locality "½ mi. SE Bogius, 100 ft., Dauphin Parish, St. Lucia," Lesser Antilles.

S. l. parvidens Goldman, 1917:116. Type locality "Papayo (about 25 mi. northwest of Acapulco), Guerrero," México.

S. l. paulsoni de la Torre and Schwartz, 1966:301, see above.

S. l. zygomaticus Jones and Phillips, 1976:11. Type locality "Batalata, Martinique," Lesser Antilles.

DIAGNOSIS. *Sturnira lilium* can be distinguished from *S. bidens* and *S. nana* (subgenus *Corvira*) based upon dental characteristics; *S. lilium* usually has two functional incisors in each ramus, whereas the other two taxa usually have one. In *S. lilium*, the lingual cusps of m1 and m2 are well defined, and the entoconid and metaconid are separated by a vertical notch such that each molar is serrated. In contrast, in *S. erythromos*, *S. ludovici*, and *S. magna*, the lingual cusps of m1 and m2 are poorly defined, and the entoconid and metaconid are not separated by a vertical notch, and the lingual edge of each molar forms a continuous, sloping, unserrated edge. The maxillary arm of the zygomatic arch is bowed outward and the maxillary tooththrow is arched upward (not parallel) in *S. lilium*, whereas the maxillary arm of the zygomatic arch is not bowed outward and the maxillary tooththrow is parallel in *S. luisi*. In general, *S. lilium* is smaller (in mm; length of forearm, usually <45; greatest length of skull, 20 to 24; length of foot, 11.5 to 12.5) than *S. aratathomasi* (length of forearm, 58 to 60; greatest length of skull, about 30), *S. tildae* (length of forearm, 46 to 48; greatest length of skull, 24 to 26), *S. mordax* (length of forearm, 45 to 48; greatest length of skull, 25 to 27), *S. thomasi* (length of forearm, 46 to 48; length of foot, 13 to 16), and *S. bogotensis* (length of forearm, 44 or greater; length of foot, 15.0 to 15.5—Davis, 1980; de la Torre, 1961).

GENERAL CHARACTERS. *Sturnira lilium* (Fig. 1) is a medium-sized bat (total length, 62 to 65 mm; length of forearm, 36.6 to 45.0 mm) compared to congeners (Hall, 1981). The inter-femoral membrane is reduced and fringed with long hairs. The noseleaf is distinct, short, and broad; the ears tend to be short and

broad as well. The tragus is about one-third the length of the ear. A calcar is barely noticeable or absent, and there is no external tail. The fur is soft and dense. Pelage color is subject to such great variation due to sex, age, and geographic location that some color phases have been described as distinct species (Husson, 1962). General coat characters are given as follows: the dorsum varies from dark grayish to reddish brown; the head, neck, and shoulders are more yellowish; hairs are bicolored with dark-brown tips and yellowish shafts. The venter is paler than the dorsum. Patagia are brown throughout. Most males possess shoulder glands that produce a characteristic yellowish or reddish staining of the shoulder hairs, which appear as epaulettes. Cranial characteristics of *S. lilium* include a moderately high braincase and sagittal crest. The rostrum is more than one-half as long as the braincase (Fig. 2). The dental formula is i 2/2, c 1/1, p 2/2, m 3/3, total 32; the lower incisors are trilobate and the upper tooththrow is evenly curved (Husson, 1962).

Selected morphometric characters (in mm; mean followed by range in parentheses) for *S. l. angeli* (Dominica, *n* = 14—Jones and Phillips, 1976), *S. l. lilium* (São Paulo, Brazil, *n* = 40—Taddei, 1973), *S. l. luciae* (St. Lucia, *n* = 7—Jones and Phillips, 1976), *S. l. parvidens* (Oaxaca, Mexico, *n* = 9—Goodwin, 1969), *S. l. paulsoni* (St. Vincent, *n* = 3—Jones and Phillips, 1976), and *S. l. zygomaticus* (Martinique, *n* = 8—Jones and Phillips, 1976), respectively, are: length of forearm, 44.1 (43.3 to 45.0), 42.5 (40.5 to 44.5), 43.8 (42.7 to 44.8), 40.5 (37.0 to 42.5), 43.3 (42.6 to 44.2), 43.6 (42.8 to 44.5); greatest length of skull, 22.7 (22.4 to 23.1), 22.4 (21.5 to 23.7), 22.5 (22.1 to 23.0), 21.7 (20.5 to 22.5), 23.4 (23.4 to 23.5), 22.7 (22.4 to 23.0); zygomatic breadth, 13.0 (12.8 to 13.4), 14.0 (13.3 to 14.6), 13.2 (12.6 to 13.7), 13.2 (12.5 to 13.5), 13.5 (13.4 to 13.5), 13.5 (13.0 to 13.8); postorbital constriction, 5.8 (5.6 to 6.3), 6.0 (5.7 to 6.3), 5.9 (5.6 to 6.1), 5.6 (5.2 to 5.8), 5.9 (5.8 to 6.0), 5.9 (5.6 to 6.3); breadth of braincase, 10.0 (9.6 to 10.4), 10.5 (10.0 to 11.1), 9.9 (9.6 to 10.1), 9.8 (9.5 to 10.0), 10.1 (10.0 to 10.2), 10.2 (10.0 to 10.3); length of maxillary tooththrow, 6.4 (6.1 to 6.6), 7.3 (7.0 to 7.6), 6.4 (6.2 to 6.6), 6.4 (6.0 to 6.9), 6.4 (6.3 to 6.5), 6.6 (6.5 to 6.8). Husson (1962), Goodwin and Greenhall (1961), and Willig (1983) present additional morphometric data on specimens from Suriname, Trinidad, and northeastern Brazil, respectively.

In specimens examined from São Paulo, Brazil (Taddei, 1975), the sample means of males were larger than those of females for 17 external characters, but statistically significant variation was not detected; for cranial characters, males were significantly larger than females in 15 of 17 characters. Willig (1983) found one external character (total length) to exhibit statistically significant sexual variation in specimens from northeastern Brazil. For cranial measurements, both univariate (Willig, 1983) and multivariate (Willig et al., 1986) analyses indicated statistically significant secondary sexual variation, with males larger than females.



FIG. 1. Photograph of adult *Sturnira lilium* from Exu, Pernambuco, Brazil. Photograph by M. R. Willig.



FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of lower jaw of *Sturnira lilium* (Texas Tech Univ. 18426, adult female) from 2.5 km NW Dzitla, Yucatán, México. The greatest length of skull is 21.3 mm. Photograph by N. Olson.

DISTRIBUTION. Although found in both humid and semi-arid forests, *S. lilium* usually selects moist parts of forests and open areas (Handley, 1976). It is widely distributed (Fig. 3), occurring from northwestern México (Sonora), southward through Central America into tropical and subtropical South America, to northern Argentina and Uruguay; it also occurs in the Lesser Antilles north to Dominica and on Trinidad. Of the six recognized subspecies, four are isolated geographically on islands of the Lesser Antilles. *S. l. angeli* is known only from Dominica, *S. l. luciae* occurs only on St. Lucia, *S. l. paulsoni* is found only on St. Vincent, and *S. l. zygomaticus* is known only from Martinique. *S. l. parvidens* occurs from northern México through Middle America into Colombia and western Venezuela. *S. l. lilium* has a broad distribution; it occurs on Trinidad and is known from all nations of South America, except Chile (Koopman, 1982).

FOSSIL RECORD. *Sturnira lilium* has been recorded from late Pleistocene or subfossil deposits from Lagoa Santa, Minas Gerais,

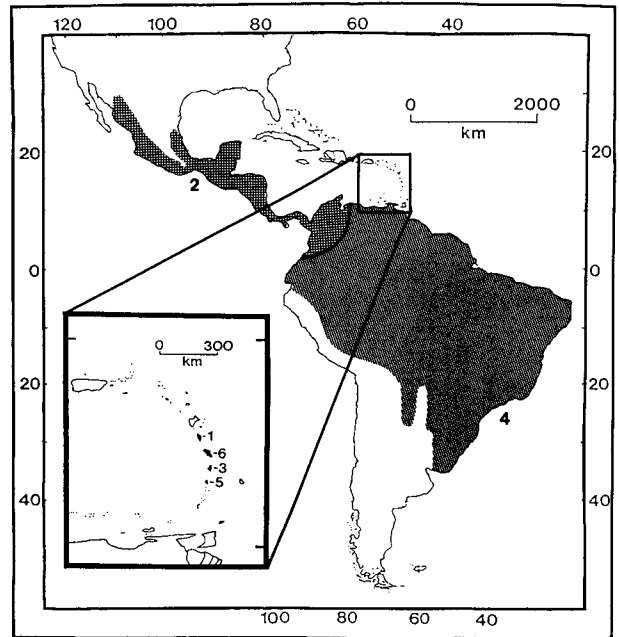


FIG. 3. Geographic distribution of *Sturnira lilium* in North and South America, with the Antillean Islands shown in inset (principally after Hall, 1981, and Koopman, 1982). Subspecies ranges are indicated by numbers: 1, *S. l. angeli*; 2, *S. l. lilium*; 3, *S. l. luciae*; 4, *S. l. parvidens*; 5, *S. l. paulsoni*; 6, *S. l. zygomaticus*.

Brazil (Winge, 1893), and from Loltún, on the Yucatán Peninsula of México (Alvarez, 1982).

FORM AND FUNCTION. *Sturnira lilium* shares stomach characteristics with *Uroderma* and *Artibeus*. As in other congeners, the cardiac vestibule of *S. lilium* is elongate and tapers so that the gastroesophageal junction lies superior to the gastroduodenal junction. The fundic caecum forms a spacious chamber and is separated from the cardiac vestibule by a fold of the stomach. The tubular (pyloric) portion is long and narrow (Forman et al., 1979).

The external brain morphology of several species of *Sturnira*, including *S. lilium*, is similar and characterized by deep and extremely smooth cerebral hemispheres. The pseudocentral sulci are more poorly developed than in other stenodermines. The cerebellum is simple and has a medial crest (McDaniel, 1976).

Sturnira lilium is a strict homeotherm and maintains an average body temperature of 36.4°C (34 to 38°C depending on ambient temperature). Individuals have been known to survive with body temperatures as high as 41°C (McManus, 1977).

Smith and Starrett (1979) reported aerodynamic characteristics of *Sturnira* in their analysis of phyllostomid wing morphometrics. In comparison to other stenodermines, members of this genus rank low in relative length of forearm, second phalynx of digit III, and first phalynx of digit V. They are high in lengths of third phalynx of digit III and fifth metacarpal. The aspect ratio for the genus averages 5.76. A transparent dactylopatagium minus allows these bats to observe movement in the vicinity of the roost even though the wings may be folded over the face (Vaughan, 1970).

Shoulder glands of males have a strong, sweet, musky odor that may have some function when individuals are reproductively active. The presence or absence of these glands may be correlated with reproductive maturity, reproductive state, or breeding season; they are generally absent in juveniles (Goodwin and Greenhall, 1961).

The spermatozoa of *S. lilium* possess large heads that are relatively narrow and oval. The acrosome is large, symmetrical, and shorter than the nucleus. The nucleus is oval and with the apex broadly rounded; the base is extremely narrow (Forman and Genoways, 1979).

ONTOGENY AND REPRODUCTION. Jones (1966) and Jones et al. (1973) suggested that *S. lilium* breeds throughout the year. Data from Panamá and Costa Rica (Fleming et al., 1972; Heithaus et al., 1975), however, indicate these populations may exhibit bimodal polyestry. Pregnant *S. lilium* have been taken in

every month of the year (Wilson, 1979). In Colombia, gravid individuals have been recorded in January, July, August, October, November, and December. Pregnant females have been reported from French Guiana in June and July. Pregnant individuals have been captured in Sinaloa, México, in May, June, and August, and in the Yucatán region of México in January, July, and August. Willig (1985) reported gravid females in northeastern Brazil from June through December. In Guatemala, pregnant females were taken in February, March, June, July, and August, as well as one both pregnant and lactating in May. Lactating females have been collected in Jalisco, México, in April and from June through October. In Costa Rica, they have been captured from January to May as well as in July and August, and from April to October in Colombia.

On Trinidad, four bats, each with one embryo (crown-rump lengths, 15, 20, 23, and 25 mm) were taken in August (Carter et al., 1981). Eleven males obtained there at the same time exhibited a mean testicular length of 3.7 mm (range, 1 to 6). Jones et al. (1973) reported four males from the Yucatán Peninsula of México with testes measuring 4 mm in January, and one with 5.5 mm testes in February. Glass and Encarnação (1982) reported testicular measurements (length by width in mm) of a male from Brazil in March (6 by 4) and two in May (2 by 3, 5 by 4). Testes of seven adult males taken in August from St. Lucia and St. Vincent islands averaged 6.4 mm in length; four adults taken on Dominica in August and early September had testes lengths of 4, 7, 7, and 8 mm. Subadults taken then had testes measuring 2.5, 3, 3, and 4 mm (Jones and Phillips, 1976).

ECOLOGY AND BEHAVIOR. This bat roosts in several types of structures, both natural and man-made. These include caves, buildings, and hollow trees (Allen, 1911; Goodwin and Greenhall, 1961; Handley, 1976).

Sturnira lilium feeds on a variety of fruits as well as on insects and pollen, although specific diets have not been well documented (Gardner, 1977). It has been observed in Argentina feeding on the fruit of the date palm (*Phoenix*) and is attracted to bananas (*Musa*—Villa-R. and Villa Cornejo, 1969, 1971), and wild figs (*Ficus*) in Sonora (Cockrum and Bradshaw, 1963). Specimens from Trinidad contained unidentified seeds in the stomach (Goodwin and Greenhall, 1961). Ruschi (1953) and Gaumer (1917) both reported diets of fruit and insects for *S. lilium* from Brazil and Yucatán, México, respectively. Willig (1983) reported that *Visma* was an important dietary constituent in edaphic Cerrado sites of northeastern Brazil. Based upon ecomorphometric analyses, Willig (1986) suggested that *S. lilium* may avoid competing with *Carollia perspicillata* (a similar-sized frugivore that also consumes *Visma*) by differentially foraging on less-ripe fruits. Gardner (1977) collected Peruvian individuals, the feces of which contained seeds of *Cecropia* and *Piper*. *S. lilium* also may feed on pollen or nectar, as numerous individuals from Costa Rica have been found carrying several types of pollen (Heithaus et al., 1974, 1975; Howell and Burch, 1974).

Sturnira lilium is found in a variety of habitats. It occurs throughout the forested areas in Venezuela except at high (above 1,000 m) elevations and in dry regions; it was most frequently captured near streams or other moist areas (Handley, 1976). In Columbia, *S. lilium* was captured in dry tropical forests, humid subtropical forests, and lowland rainforests (Thomas, 1972). In the Lesser Antilles, specimens have been taken in rainforests, in cultivated banana and cacao groves, and near streams (Jones and Phillips, 1976). Other bats captured with *S. lilium* included representatives of each phyllostomid subfamily as well as emballonurids, noctilionids, mormoopids, natalids, furipterids, vespertilionids, thyropterids, and molossid (Mares et al., 1981; Thomas, 1972; Willig, 1983).

Ubelaker et al. (1977) listed the nematodes *Litomosoides caliensis* (Colombia), *Capillaria pusilla* (Brazil), and *Filaria serpiculum* (Brazil) as endoparasites of *S. lilium*. Ectoparasites include: mites—*Cameronieta elongatus* (Venezuela), *Chirnyssoides brasiliensis* (Brazil), *Chiroptonyssus haematophagus* (Venezuela), *Eudusbabekia lepidoseta* (Nicaragua), *Eutrombicula goeldii* (Venezuela), *Hooperella vesperuginis* (Nicaragua), *Loomisia desmodus* (Venezuela), *Macronyssus* (Venezuela), *Microtrombicula sturnirae* (México and Nicaragua), *Parakosa tadarida* (Venezuela), *Paralabidocarpus artibeii* (Nicaragua), *Parichoronyssus euthystrernum* (Venezuela), *Periglischrus acutisternus* (Venezuela), *P. caligus* (Venezuela), *P. herrerae* (Venezuela), *P. iheringi* (México, Venezuela), *P. ojustii* (Panamá, Trinidad, and Venezuela), *P. vargasi* (México), *Radfordiella* (Venezuela); batflies—*Aspadoptera dela-*

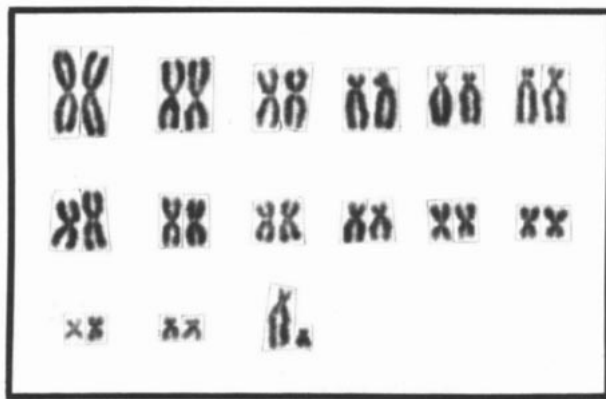


FIG. 4. Karyotype of male *Sturnira lilium*. Courtesy of R. J. Baker.

torrei (Guatemala, Venezuela, and Panamá), *A. falcata* (Venezuela), *A. phyllostomatis* (Paraguay), *Exastinion clovisi* (locality not given), *Megistopoda proxima* (Colombia, Venezuela, and Panamá), *Trichobioides perspicillatus* (Panamá); ticks—*Ornithodoros hasei* (Venezuela), *Nycteriglyphus sturnirae* (Brazil), *Ixodes* (Venezuela—Herrin and Tipton, 1975; Saunders, 1975; Webb and Loomis, 1977; Wenzel, 1975). Wenzel (1975) also listed 16 additional parasites of *S. lilium* from Venezuela that he considered uncommon or occasional.

GENETICS. The karyotype (Fig. 4) of *S. lilium* ($2n = 30$, $FN = 56$) is identical to that of all other congeners (*S. bidens*, *S. erythromos*, *S. ludovici*, *S. magna*, *S. mordax*, *S. nana*, *S. thomasi*, and *S. tildae*) thus far examined (Baker, 1979; Baker et al., 1982). The X chromosome is submetacentric and the Y chromosome is submetacentric (Baker, 1979). G-banding patterns are similar to those of *Artibeus jamaicensis* (Baker et al., 1979).

REMARKS. The generic name *Sturnira* is derived from the Latin *sturnirus* ("starling") in honor of the H. M. S. Starling, an escort vessel of the expedition on which the type specimen of *Sturnira spectrum* Gray, 1842, was obtained on the eastern coast of Brazil (Tamsitt and Hauser, 1985). The specific name *lilium*, also from the Latin, means "lily," or "liliform," possibly in reference to the noseleaf of this bat.

Dobson (1878) and Cabrera (1958) listed *Phyllostoma spiculatum* Illiger, 1825, as a synonym of *Sturnira lilium*. Cabrera (1958) also listed *Phyllostoma vampyrus* Schinz, 1845, *Stenoderma* (*Sturnira*) *excisum* Pelzeln, 1883, *Stenoderma chilense* Gay, 1847, *Nyctiplanus rotundatus* Gray, 1849, and *Phyllostoma chrysocomos* Wagner, 1855, as synonyms. We have not been able to verify these references.

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