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

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**Sturnira lilium (E. Geoffroy St.-Hilaire, 1810)**

Common Yellow-shouldered Bat

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

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

*Phyllostomus exigius Wagner, 1842:358. Type locality "Rio de Janeiro, Brazil."

*Phyllostomus achenense* Wagner, 1847:177. Type locality "Ypa-nema [Ipanema]." São Paulo, Brazil.

*Phyllostomus fumarius* Wagner, 1847:178. Type locality "possibly Brazil" (Carter and Dolan, 1978:50).

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


**CONTEXT AND CONTENT.** Order Chiroptera, Suborder Microchiroptera, Superfamily Phyllostomioidea, Family Phyllostomidae, Subfamily Stregodermatinae, Genus *Sturnira*, Subgenus *Sturna*. The genus *Sturnira* contains 13 species, 11 of which belong to the subgenus *Sturna* 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 E. Geoffroy St.-Hilaire, 1810:181, see above.
- S. l. paulsoni de la Torre and Schwartz, 1966:301, see above.

**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, the entoconid and metaconid are not separated by a vertical notch, and the lingual edge of each molar forms a continuous, sloping, unerupted edge. The maxillary arm of the zygomatic arch is bowed outward and the maxillary toothrow is arched upward (not parallel) in *S. lilium*, whereas the maxillary arm of the zygomatic arch is not bowed outward and the maxillary toothrow 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 intermolar 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 graysish 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 toothrow 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 toothrow, 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.

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**Figure 1.** Photograph of adult *Sturnira lilium* from Exu, Pernambuco, Brazil. Photograph by M. R. Willig.
DISTRIBUTION. Although found in both humid and semiarid forests, *S. lilium* usually selects moist parts of forests and open areas (Handley, 1976). It is widely distributed (Fig. 3), occurring from northwestern Mexico (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 Mexico 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, Brazil (Winge, 1893), and from Loltun, on the Yucatan Peninsula of Mexico (Alvarez, 1982).

**FORM AND FUNCTION.** *Sturnira lilium* shares stomach characteristics with *Uroderma* and *Artibeus*. As in other congers, the cardiac vestible of *S. lilium* is elongate and tapers so that the gastroesophageal junction lies superior to the gastroduodenal junction. The fundic caeca forms a spacious chamber and is separated from the cardiac vestible 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 stenodermatines. 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 stenodermatines, 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 dactylokapatagium 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 spermatocysts 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, 1.6 to 6.0). Jones et al. (1973) reported four males from the Yucatá Peninsula of México with testes measuring 4 mm in January, and one with 5.5 mm testes in February. Glass and Encarnación (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, 3 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 in 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 3.4 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 liliun 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 Guainer (1917) both reported diets of fruit and insects for S. liliun from Brazil and Yucatán, México, respectively. Willig (1983) reported that Visma was an important dietary constituent in edaphic Cerrado areas of northeastern Brazil. Based upon ecomorphometric analyses, Willig (1986) suggested that S. liliun 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. liliun 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).

Sturnura liliun 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 Colombia, S. liliun was captured in tropical forest, humid subtropical forests, and lowland rainforests (Thomas, 1972). In the Lesser Antilles, specimens have been taken in rainforests, in cultivated banana and caacu groves, and near streams (Jones and Phillips, 1976). Other bats captured with S. liliun included representatives of each phyllostomid subfamily as well as bambullonid, noctilionid, mormoopid, natalid, laripterid, vespertilionid, thyropterid, and molossid (Mares et al., 1981; Thomas, 1972; Willig, 1983).

Ubeltuk et al. (1977) listed the nematodes Litomosoides colienensis (Colombia), Capillaria pellis (Brazil), and Filarioidea spilium (Brazil) as endoparasites of S. liliun. Exoparasites include: mites — Cameronea elongata (Venezuela), Chryroyxus brasilien- siss (Brazil), Chirotyoonyx haematophagus (Venezuela), Eutrombiana lepidopus (Nicaragua), Endorhaphis pellis (Venezuela), Hooperella vesparia (Nicaragua), Loomisomyia dumas (Venezuela), Macrornyssus (Venezuela), Microtrombium sturii (México and Nicaragua), Parakorda tarda (Venezuela), Paralbicedus arbo (Nicaragua), Porichthynychus euythymurus (Venezuela), Periglischrus acutus (Venezuela), and P. caligus (Venezuela), P. herrerai (Venezuela), P. irgingi (México, Venezuela), P. jassyi (Panamá, Trinidad, and Venezuela), P. varga (México, Radfordia (Venezuela), batflies — Aepodoptera delata torrei (Guatemala, Venezuela, and Panamá), A. falca (Venezuela), A. phyllolomatos (Paraguay), Exostin fistulosa (locality not given), Megistopoda proxima (Colombia, Venezuela, and Panamá), Trichobrodes perspicillatus (Panamá), ticks — Ornithodoros (Venezuela), Nycterigryphus substaurita (Brazil), Iodes (Venezuela — Herrin and Tipton, 1975; Stauds, 1975; Webb and Loomis, 1977; Wenzel, 1975). Wenzel (1975) also listed 16 additional parasites of S. liliun from Venezuela that he considered uncommon or occasional.

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

REMARKS. The generic name Sturnira is derived from the Latin sturnus ("starling") in honor of the H. M. S. Starling, an escort vessel of the expedition on which the type specimen of Sturnira spectrata Grant, 1842, was obtained on the eastern coast of Brazil (Tarnsitt and Hauser, 1985). The specific name liliun, also from the Latin, means "lily," or "liliform," possibly in reference to the nostril of this bat.

Dobson (1873) and Cabrera (1958) listed Phyllostoma spec- culatum Illiger, 1825, as a synonym of Sturnira liliun. Cabrera (1958) also listed Phyllostoma vampyrus Schinz, 1845, Stenodera (Sturnira) excisum Poblan, 1883, Stenodera chilensis Gay, 1847, Nyctiplichus rotundatus Gray, 1849, and Phyllostoma chrysomomos Wagner, 1855, as synonyms. We have not been able to verify these references.

LITERATURE CITED


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