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Sturnira erythromos.

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Sturnira Gray, 1842

Phyllostoma, E. Geoffroy.St.-Hilaire, 1810:181. Type species. *Phyllostoma lilium* E. Geoffroy St.-Hilaire.
Sturnira Gray, 1842:257. Type species *Sturnira spectrum* Gray.
Nyctiplanus Gray, 1849:58. Type species *Nyctiplanus rotundatus* Gray.
Corvira Thomas, 1915:309. Type species *Corvira bidens* Thomas.
Sturnirops Goodwin, 1938:1. Type species *Sturnirops mordax* Goodwin.

CONTEXT AND CONTENT. Order Chiroptera, family Phyllostomidae, subfamily Stenodermatinae. Recent revisions (Lim 1993; Wetterer et al. 2000) do not support separation of the subfamily Sturnirinae, created to contain *Sturnira* as its single member (Miller 1907), but recognize the tribe Sturnirini within Stenodermatinae. The following key to currently recognized species of *Sturnira* is modified principally from Davis (1980) and de la Torre (1961) and includes characters and measurements from Contreras and Cadena (2000), Pacheco and Patterson (1991), and Simmons and Voss (1998).

1. 2 fully-developed, functional incisors on each ramus (subgenus *Sturnira*) 2
   1 incisor on each ramus, occasionally accompanied by a nonfunctional spicule in place of the missing incisor (subgenus *Corvira*) 3
2. Lingual cusps of m1 and m2 serrated, entoconid and metaconid distinct and separated by a notch 4
   Lingual cusps of m1 and m2 not serrated, entoconid and metaconid not separated by a notch, lingual edge of each molar a continuous, backwardly sloping ridge 5
3. Length of forearm 39–43; greatest length of skull ca. 21 mm ..... *Sturnira bidens*
   Length of forearm 34–36; greatest length of skull ca. 19 mm ..... *Sturnira nana*
4. Paraconulid present on m1 and m2 ..... *Sturnira mistratensis*
   Paraconulid absent on m1 and m2 6
5. Length of forearm ≥55 mm; greatest length of skull 28–29 mm ..... *Sturnira magna*
   Length of forearm <55 mm; greatest length of skull <28 mm 7
6. Length of forearm 58–60 mm; greatest length of skull ca. 30 mm ..... *Sturnira aratathomasi*
   Length of forearm <58 mm; greatest length of skull <30 mm 8
7. Middle upper incisors spatulate, bifid, and in contact near broad cutting edge; lower middle incisors trilobed ..... *Sturnira mordax*
   Middle upper incisors spear-shaped and in contact near middle of crown of tooth; lower middle incisors bilobed 9
8. Skull comparatively elongated, particularly in rostrum and interorbital region, with a narrowed braincase ..... *Sturnira thomasi*
   Skull not elongated or narrowed; braincase not narrowed 12
9. Palate flat; tooth rows arched outward 10
   Palate depressed; tooth rows straight 11
10. Forearm length 38–42 mm ..... *Sturnira erythromos*
    Forearm length 43–45.3 mm ..... *Sturnira bogotensis*
11. Upper tooth row subparallel ..... *Sturnira ludovici*
    Upper tooth rows divergent posteriorly ..... *Sturnira oporaphilum*
12. Maxillary arm of zygomatic arch straight, forming a continuous line with lateral surface of rostrum ..... *Sturnira luisi*
    Maxillary arm of zygomatic arch noticeably bowed outward, not forming a continuous line with lateral surface of rostrum 13
13. Deep notch separates tall metaconid and entoconid of m1 and m2; length of forearm 39–44 mm ..... *Sturnira lilium*
    Shallow notch separates low metaconid and entoconid of m1 and m2; length of forearm 44–48 mm ..... *Sturnira tildae*

FIG. 1. (Top) Head of *Sturnira erythromos* drawn from a fluid preserved specimen (Colección Mamíferos Lillo, CML 5633, male). Drawn by N. P. Giannini. (Bottom) Albino individual from NW Argentina. Photograph by R. M. Barquez.

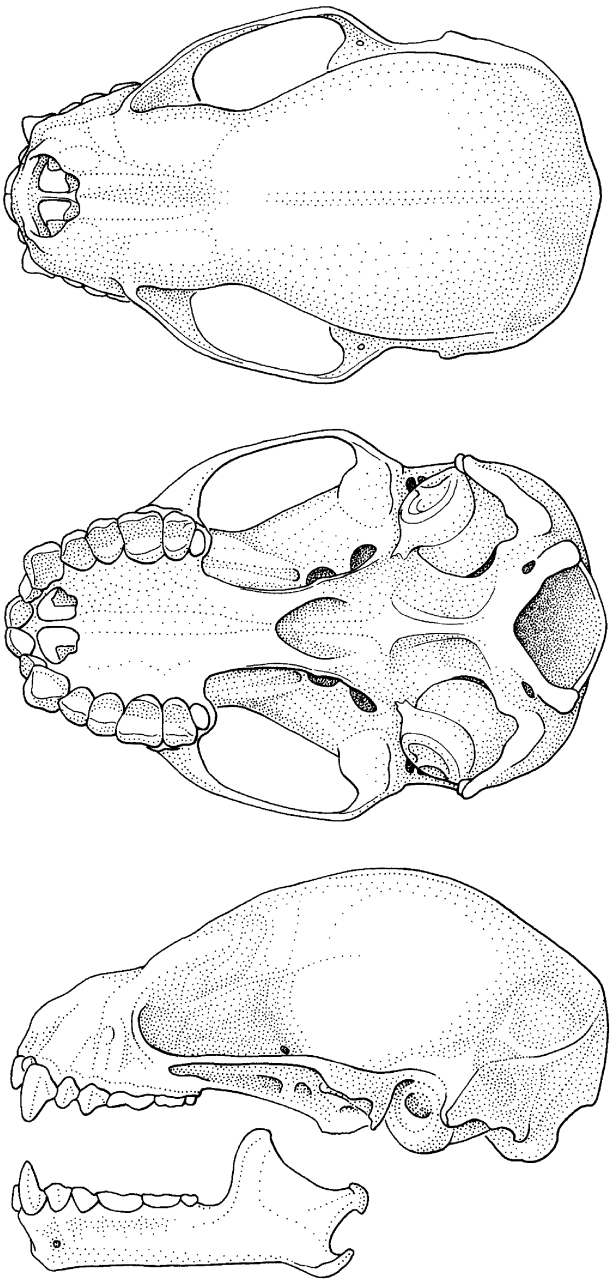

FIG. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of an adult *Sturnira erythromos* (Sam Noble Oklahoma Museum of Natural History Collection, SNOMNH 18701). Greatest length of cranium is 21.3 mm. Drawn by E. Guanuco.

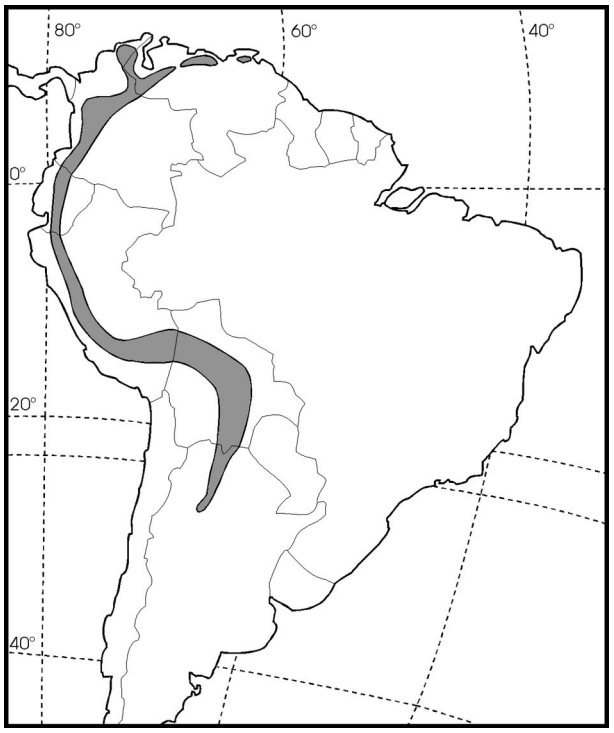

FIG. 3. Geographic distribution of *Sturnira erythromos* (shaded area).

Sturnira erythromos (Tschudi, 1844)

Small Yellow-shouldered Bat

Ph[*yllostoma*]. *erythromos* Tschudi, 1844:64. Type locality "Peru."
Sturnira erythromos: de la Torre, 1961:124. First use of current name combination.

CONTEXT AND CONTENT. As for genus. *Sturnira erythromos* is monotypic.

DIAGNOSIS. *Sturnira erythromos* (Fig. 1) is the smallest species of subgenus *Sturnira*. *S. erythromos* co-occurs with several other species of the genus throughout its range. Identification in Ecuador is difficult, where 9 (Albuja 1999) to 11 (Tirira 1999) species of *Sturnira* occur. The most closely related species, *S. bogotensis* and *S. ludovici*, are darkly colored and have lower molars with smooth inner edges. *S. erythromos* is smaller in size and has a curved (not straight) shape to upper tooth row (Davis 1980; Pacheco and Patterson 1992).

GENERAL CHARACTERS. Color is dark brown, darker on forehead. Body fur is soft. Hairs generally have inconspicuous color bands but in some individuals hairs have a basal, dark band; a central, paler band; and a dark tip. In juveniles, bands are not distinguishable and hairs are uniformly dark. Most specimens lack ochraceous shoulder patches (Barquez et al. 1999). Wing membranes are blackish. Skull (Fig. 2) has a short rostrum, which rises gradually to a large rounded braincase. Measurements (in mm, body mass in g) for adults from Argentina (Barquez et al. 1999) are given as mean ± *SD* (*n*) and range: body mass, 16.0 ± 2.45 (33) 12.0–23.0; total length, 55.3 ± 3.49 (36) 50.0–63.0; length of hindfoot, 10.9 ± 1.99 (36) 8.0–16.8; length of ear, 16.8 ± 1.36 (35) 13.0–18.7; length of forearm, 41.1 ± 1.02 (32) 38.7–43.0; condylobasal length, 18.7 ± 0.46 (35) 18.0–19.7; least interorbital breadth, 6.2 ± 0.36 (19) 5.4–6.9; zygomatic breadth, 12.6 ± 0.53 (26) 11.1–13.6; greatest length of skull, 20.5 ± 0.42 (36) 19.6–21.4; postorbital constriction, 5.8 ± 0.18 (35) 5.5–6.2; breadth of braincase, 9.8 ± 0.23 (35) 9.4–10.5; length of maxillary toothrow, 5.7 ± 0.21 (34) 5.1–6.2; palatal length, 8.2 ± 0.38 (35) 7.4–9.4; mastoidal breadth, 11.3 ± 0.23 (22) 11.0–11.9; length of mandibular toothrow, 5.8 ± 0.60 (34) 5.0–6.9; length of mandible, 13.3 ± 0.34 (32) 12.6–14.2; width across upper canines, 5.5 ± 0.18 (23) 5.3–6.0; width across upper molars, 7.3 ± 0.23 (21) 6.9–8.0. Larger lengths of forearm from Ecuador (39.2–48.0 for both sexes, $n = 10$—Albuja 1999) are probably misidentified *S. ludovici* or *S. oporaphilum*. In Peru, morphological variation did not correlate with latitude or elevation (Pacheco and Patterson 1992). *S. erythromos* is not sexually dimorphic (Pacheco and Patterson 1992).

DISTRIBUTION. *Sturnira erythromos* occurs mostly in the Andes of Venezuela, Colombia, Ecuador, Peru, Bolivia, and northwestern Argentina (Fig. 3; Alberico et al. 2000; Albuja 1999; Anderson 1993; Barquez et al. 1993, 1999; Jones and Carter 1979; Koopman 1978; Linares 1998; Pacheco et al. 1995). The southernmost distribution record is at La Banderita, Catamarca Province, Argentina (27°29′S, 66°06′W—Mares et al. 1997). Elevational range is 1135–2550 m in Venezuela (Linares 1998) and 1800–3500 m in Colombia (Alberico et al. 2000). *Sturnira erythromos* reaches 3400 m in Ecuador (Albuja 1999) and 3600 m in Peru (Koopman 1978). In Bolivia (Anderson 1997; Anderson et al. 1982), as well

as in Peru (Koopman 1978), most specimens were captured above 1285 m, but many specimens were found below 500 m in Argentina (Barquez et al. 1999). In Peru (Koopman 1978), Bolivia (Anderson 1993, 1997), and Argentina (Barquez et al. 1993, 1999; Díaz et al. 2000; Mares et al. 1996), *S. erythromos* occurs on the eastern slopes of the Andes. In Ecuador, the small, yellow-shouldered bat occupies both the eastern and western slopes (Albuja 1999). Detailed regional accounts of capture localities are in Alberico et al. (2000), Albuja (1999), Anderson (1993, 1997), Anderson et al. (1993), Barquez and Ojeda (1992), Barquez et al. (1999), Capllonch et al. (1997), Koopman (1978), Linares (1998), Mares et al. (1995, 1996, 1997), Muñoz (2001), Pacheco and Patterson (1992), and Pacheco et al. (1993). No fossils of *S. erythromos* are known.

FORM. *Sturnira erythromos* is a small, stocky bat without either a tail or a calcar bone and with an extremely reduced uropatagium. Head is rounded with a short, sparsely-haired muzzle. Noseleaf is broad and short, surrounded by a single row of several vibrissal papillae fused in a pad-like structure. Horseshoe is fused to upper lip. Chin has a central dermal papilla surrounded by many smaller lateral papillae. Ears are short (extending only slightly beyond head) and triangular, with a rounded tip. Tragus is small and simple in shape. Eyes are dark and rather large. Wings are long, pointed, and broad. They are attached to ankle. Internal borders of legs and feet (dorsally) are hairy.

Surface of skull is smooth, with no marked crests or ridges. Frontal sinuses are inflated and surround a posterior depression of nasals; postorbital constriction is inconspicuous. Zygomatic arches are complete but very thin. Upper tooth rows delineate a slightly curved palate, which is flat and has a narrow posterior extension that contacts pterygoids. Incisive foramina are large. Mandible is straight, with an acute, hook-like angular process and a strong transverse condylar process. Dental formula is: i 2/2, c 1/1, p 2/2, m 3/3, total 32. I1s are large and convergent; I2s are very small. Lower incisors are slender and bilobed. Both upper and lower canines are moderate in size and have a pronounced cingulum. Premolars are triangular in lateral view. Upper tooth row has a deep longitudinal groove from P2 to M3. Lower molars are smooth and non-serrated, especially the lingual edge. Upper and lower 3rd molars are minute (Barquez et al. 1999).

FUNCTION. *Sturnira erythromos* is physiologically adapted to cold montane environments (Soriano et al. 2002). The thermoneutral zone of this bat is between 25.5°C and 31°C. Within this interval, average (±*SE*) basal metabolic rate is 2.51 ± 0.14 ml O_2 g^{-1} h^{-1} (n = 34). At ambient temperatures below the lower critical value (specifically, 14–25.5°C), captive *S. erythromos* exhibited 2 distinct responses. Normothermic bats maintained an average (±*SE*) body temperature of 34.40 ± 0.45°C (n = 17). This response was at the expense of a linear increase in metabolic rate as ambient temperature declined. In contrast, hypothermic bats exhibited a linear dependence of body temperature on ambient temperature, with a metabolic rate lower than in normothermic bats at a given ambient temperature. Individuals facultatively shift from normothermia to hypothermia. Above upper critical temperature, metabolic rate increased linearly as function of ambient temperature for both normothermic and hypothermic bats, with an average body temperature of 39.5°C (measure of variance not given). Thermal conductance did not differ between normothermic and hypothermic bats below the thermoneutral zone, nor did it vary with ambient temperature, yielding an average (±*SE*) value of 0.26 ± 0.02 ml O_2 g^{-1} h^{-1} $°C^{-1}$ (n = 37). The values of these thermoregulatory parameters were independent of sex and age (Soriano et al. 2002).

REPRODUCTION. In Ecuador, females with fetuses of 26–29 mm in crown-rump length were found in September (Albuja 1999). In the Venezuelan Andes, individuals of both sexes were reproductively inactive during May (end of first rainy season), whereas 2 pregnant females and 1 male with enlarged testes were captured in December (end of second rainy season—Thomas 1972). In the Peruvian Andes, pregnant females were captured during August, with embryos measuring 2–18 mm in crown-rump length (Gardner and O'Neill 1969). Males from the same locality and collection dates had enlarged testes of 4.4 mm × 5.8 mm on average (n = 6—Gardner and O'Neill 1969). In northwestern Argentina, *S. erythromos* is monoestrous, starting reproductive activity in July, with a single parturition in November–January, and lactating females found until April (Autino and Barquez 1994; Capllonch et al. 1997). Additional records from Argentina include 1 female near parturition and a male with scrotal testes, in October in Tucumán Province, as well as juveniles with cartilaginous phalanges in June in Salta Province (Barquez et al. 1999). Litter size is 1.

ECOLOGY. *Sturnira erythromos* occurs mainly in tropical montane rain and cloud forests throughout its range. In Argentina (Barquez et al. 1993, 1999; Barquez and Ojeda 1992), Bolivia (Anderson 1993) and Venezuela (Soriano 2000; Soriano et al. 1999), it uses dry seasonal forests, likely on a seasonal basis. Southern populations reach extreme montane environments at the limits of alder forests and grasslands where snow is not uncommon. Altitudinal movements (Autino and Barquez 1994), or at least habitat shifts across mountain ranges (Giannini 1999), are probable given the marked seasonal fluctuations of captures along elevational gradients.

Sturnira erythromos feeds almost exclusively on fruits (Giannini 1999) and was categorized as a low-flying frugivore (Patterson et al. 1996; Soriano 2000). It specializes on chiropterochorous fruits of *Solanum* (Solanaceae) and *Piper* (Piperaceae—Giannini 1999). Other fruits may be included in minor proportions: Moraceae: *Morus nigra*; Rubiaceae: *Psychotria carthagenensis*, *Randia armata*; Solanaceae: *Vassobia breviflora*, *V. lorentzii*; and Ulmaceae: *Celtis iguanaeus* (Autino and Barquez 1994; Giannini 1999).

Sturnira erythromos was syntopic with *S. lilium* and *S. oporaphilum* in northwestern Argentina (Autino and Barquez 1994; Giannini 1999). All 3 were eating similar fruits in similar proportions, but differed in their altitudinal occupation of the rain and cloud forests, with *S. erythromos* more common at higher elevations. The same pattern occurs at a continental scale (Giannini 1999; Soriano et al. 2002). Additionally, *S. erythromos* was captured together with *S. aratathomasi*, *S. lilium*, and *S. ludovici* in the Venezuelan Andes (Thomas 1972).

Daily activity, as reflected by mist-net captures, was bimodal. A main peak occurred around midnight and was followed by a decrease in captures until a second, less pronounced peak at ca. 0630 h (Autino and Barquez 1994). *Sturnira erythromos* roosts on hollow trees (Soriano et al. 2002).

Two species of batflies, *Aspidoptera phyllostomatis* and *Megistopoda proxima* (Diptera: Streblidae), were found on Argentinian specimens of *S. erythromos* (Autino and Claps 2000; Autino et al. 1999). Streblids of the *M. proxima* complex were also present in Venezuelan *S. erythromos* with *Trichobius joblingi* and *T. petersoni* (Wenzel 1976). Also from Venezuela, the following acari (Acarina) were found on *S. erythromos*: chiggers *Hooperella vesperuginus*, *Parasecia* sp. F, and *Parasecia* sp. G (Trombiculidae—Brennan and Reed 1975); and mites *Periglischrus ojastii* (Spinturnicidae—Herrin and Tipton 1975), *Macronyssooides*, and *Macronyssus* (Macronyssidae—Saunders 1975).

GENETICS. Karyotype of *S. erythromos* is 2N = 30, FN = 56, with a subtelocentric X and an acrocentric Y (Baker 1979; Baker et al. 1982; Gardner and O'Neill 1969). In Peru, genetic distances among populations, as estimated from electrophoretic data, correlated with geographic distance (Pacheco and Patterson 1992). However, prominent geographical features such as the Marañón River and Huancabamba Depression did not influence genetic differences (Pacheco and Patterson 1992). An entirely albino specimen was obtained in Tucumán, Argentina in 2003.

CONSERVATION STATUS. *Sturnira erythromos* was considered a rare and therefore vulnerable species according to an index of rarity for Neotropical bats (Arita 1993). By contrast, this species was ranked in the category of abundant, non-endangered bat species in Argentina (Barquez et al. 1993). More recent evaluations ranked this bat as a species of "Preocupación menor" (not threatened) in Argentina (Díaz and Ojeda 2000).

REMARKS. *Sturnira bogotensis* was considered a subspecies of *S. erythromos* (de la Torre 1961), but Handley (1976), Koopman (1993), and Pacheco and Patterson (1991, 1992) gave specific status to each form. Cladistic analyses recovered *S. erythromos* and *S. bogotensis* as sister species (Pacheco and Patterson 1991; Villalobos and Valerio 2002). The genus name is a latinized version of Starling, a ship consort to the H. M. S. Sulphur on the 1836 voyage to Brazil when the type was collected (Palmer 1904). The

species name is a greek reference to the reddish color on the shoulders of some individuals of this species (Braun and Mares 1995).

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