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# *Carollia subrufa* (Chiroptera: Phyllostomidae)

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***Abstract:*** *Carollia subrufa* (Hahn, 1905) is a small phyllostomid commonly called the gray short-tailed bat or Hahn's short-tailed bat. Its head is short with a high, rounded braincase, well-developed nose leaf, and a series of face warts that form a U on the lower lip. *C. subrufa* is 1 of 6 species of *Carollia*. This bat is distributed from Jalisco, Mexico, to northwestern Costa Rica, mostly in the Pacific versant of Middle America to Nicaragua, and may reach Panama. *C. subrufa* is commonly found between sea level and 1,200 m in tropical dry deciduous forest and 2nd-growth woodland. From a conservation standpoint, it is a species of least concern. DOI: 10.1644/823.1.

***Key words:*** bat, Carollinae, gray short-tailed bat, Hahn's short-tailed bat, Microchiroptera, phyllostomid

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## *Carollia subrufa* (Hahn, 1905)
Hahn's Short-tailed Bat

*Hemiderma subrufum* Hahn, 1905:247. Type locality from [Tapanatepec] "Santa Ifigenia [= Santa Efigenia], Oaxaca, Mexico."
*Carollia subrufa*: Miller, 1924:54. First use of current name combination.
*Carollia castanea subrufa*: Felten, 1956:211. Name combination.
*C*[*arollia*]. *subruta* Schaldach, 1965:134. Incorrect subsequent spelling of *Carollia subrufa* Miller, 1924.

CONTEXT AND CONTENT. Order Chiroptera, suborder Microchiroptera, family Phyllostomidae, subfamily Carollinae. *Carollia subrufa* is a monotypic species, and throughout its range is the only species of *Carollia* present (Koopman 1993; Pine 1972).

## DIAGNOSIS

*Carollia brevicauda* differs from *C. subrufa* in having pelage that is long, thick, fine, and bicolored with a distinct broad basal band that is strongly demarcated from the succeeding broad dirty white band; forearm and toes of *C. brevicauda* are usually hairy. *C. sowelli* can be distinguished from *C. subrufa* because its pelage is long and thick, also forearm is hairy, and hair on nape of neck is broad and has a dark band (Baker et al. 2002). Until 1972, when *C. subrufa* was recognized as a species, specimens in collections were a mix of true *C. subrufa* and actual *C. sowelli* (Pine 1972). Compared with *C. subrufa, C. perspicilliata* has outer incisors obscured by cingula of canines, upper toothrow straight, and lower jaw V-shaped. *C. castanea* differs from *C. subrufa* by having labial outline of upper toothrow with notch, 2nd premolar is considered more lingual than labial edge of 1st molar, 2nd lower premolar is twice the height of 1st molar, and occlusal surface of 1st molar has a straight profile (Pine 1972).

## GENERAL CHARACTERS

*Carollia subrufa* is a small phyllostomid bat (Fig. 1). Upperparts are gray or gray brown and underparts slightly pale. Fur usually short, sparse, and clearly tricolored (Hahn

**Fig. 1.**—*Carollia subrufa* from the Oaxaca coast. Photograph by J. A. Guerrero.

1905). Basal hair region of 1–1.5 mm is dark-gray colored, middle hair region is 2–3 mm and whitish, and upper hair is gray brown. Ears are medium size, triangular, and pointed (Hall 1981). Nose leaf is well developed; horseshoe is free on both sides but fused below nostrils. Lower lip has a central wart surrounded by smaller warts in U-shaped pattern. Tail is present and short, about 30% length of naked tail membrane. Calcar is shorter than the foot. Forearms have sparse, short hairs. Wing and tail membranes are usually gray brown. Muzzle is short and narrow (Emmons and Feer 1997; Reid 1997).

Skull is short and small with a high, strongly rounded braincase (Fig. 2) and a short, broad rostrum (Hahn 1905). Auditory bullae are small and basisphenoid pits are deep. Palate is wide posteriorly and narrowed anteriorly, and posterior palatial projection is short and broad. Teeth are small and toothrows strongly diverge posteriorly (Hahn 1905). Cranial and wing measurements (mm) are (mean ± 2 *SE*; $n$ = 13 females, 6 males): greatest length of skull, 22.45 ± 0.77; condylobasal length, 18.16 ± 0.63; zygomatic breadth, 8.57 ± 0.58; postorbital constriction, 17.42 ± 0.62; breadth of braincase, 8.65 ± 0.28; mastoid breadth, 12.52 ± 0.52; interorbital breadth, 6.54 ± 0.32; width across molars, 4.15 ± 0.16; length of mandibular toothrow, 13.96 ± 1.86; length of maxillary toothrow, 6.6 ± 0.18; breadth across upper molars, 7.6 ± 0.22; length of metacarpal III, 38.7 ± 1.18; length of phalanx 1, 16.45 ± 1.25; length of phalanx 2, 21.23 ± 1.26; length of metacarpal IV, 35.4 ± 1.53; length of metacarpal V, 38.49 ± 1.73; length of tibia, 14.93 ± 1.42 (Hahn 1905; Hall 1981; McLellan 1984; Pine 1972; Swanepoel and Genoways 1979). Standard measurements (mm) are (mean ± 2 *SE*; $n$ = 4 females, 5 males): total length, 68.53 ± 4.29; length of foot, 11.34 ± 1.52; length of ear, 7.72 ± 1.42; length of forearm, 41.62 ± 1.32; mass, 15.37 ± 3.84 g (Goodwin and Greenhall 1961; Hall 1981; Owen et al. 1984; Pine 1968; Starrett and de la Torre 1964; Swanepoel and Genoways 1979; Villalpando and Álvarez 2000). A study of geographic variation showed a significant north to south cline of decreasing size in the species; also females showed a significantly greater size than males (McLellan 1984; Owen et al. 1984).


**Fig. 2.**—Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Carollia subrufa* (Instituto de Biología, Universidad Nacional Autónoma de México, 30255). Photograph by Nicte Ramírez.

## DISTRIBUTION

*Carollia subrufa* is distributed from Jalisco, Mexico, to northwestern Costa Rica, mostly in the Pacific versant of Middle America to Nicaragua, and may reach Panama (Fig. 3; Eisenberg 1989; Fleming 1988). Elevational range extends from sea level to 1,200 m (Reid 1997).

## FOSSIL RECORD

Isolated teeth and 2 dentary fragments of *Carollia* (either *C. subrufa* or *C. brevicauda*) found in Cebada Cave, Belize, probably date to the Holocene (Czaplewski et al. 2003). Unfortunately, the remains are too incomplete for specific identification.

## FORM AND FUNCTION

*Carollia subrufa* has a short brain case and smooth hemispheres. Pseudocentral sulci are well developed, as are the sulci anterior to the pseudocentral sulci. Pseudotemporal lobes are rounded ventrally, and the inferior colliculi are not exposed dorsally. Cerebellum is simple and has only primary lobes (McDaniel 1976).

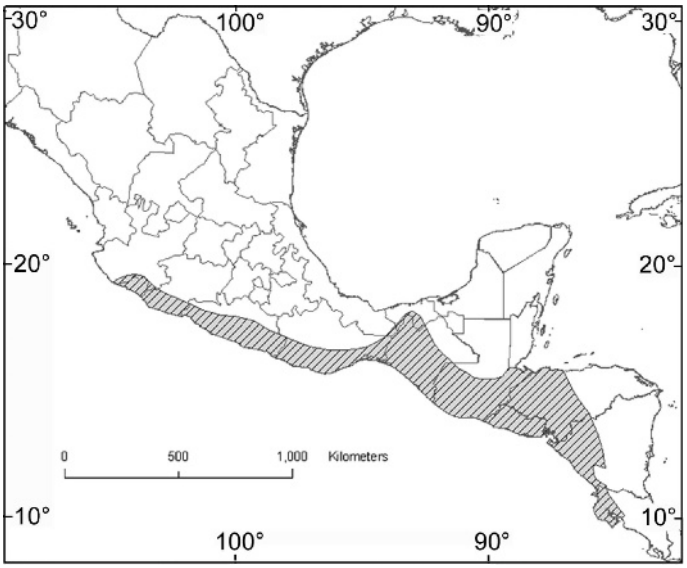


**Fig. 3.**—Distribution of *Carollia subrufa* in Mexico and Central America (Hall 1981).

Dental formula is i 2/2, c 1/1, p 2/2, m 3/3, total 32 (Villa-R. 1966). Upper inner incisor is large; 2nd incisor is much reduced and almost peglike. Lower incisors are small. Upper and lower premolars are robust and high-crowned. Upper molars are considerably modified from the primitive configuration. Usually the ectoloph is W-shaped but is reduced or indistinguishable. Stylar shelf is high. Lower molars are highly modified; and lingual cups (metaconid and entoconid) are much reduced. Tongue of *C. subrufa* is usually rounded at the apex (Phillips et al. 1977).

*Carollia subrufa*, like other phyllostomids, emits sounds through either the mouth or nostrils. The external ears allow it to scan the surrounding habitat and detect activity movements (Gould 1977).

## ONTOGENY AND REPRODUCTION

*Carollia subrufa* breeds all year (Felten 1956; Wilson 1979). In El Salvador, pregnant females were caught in February, March, and October, and young were reported in April, September, and October. In the same area, active males with scrotal testes were collected and gonads averaged 2.6 × 4.4 mm (Starrett and de la Torre 1964). In México, pregnant females were captured during April, May, and June (Pine 1972). Reproductively inactive females were captured in Puebla, México, during June (LaVal 1972).

## ECOLOGY

*Carollia subrufa* roosts in caves, empty wells, culverts, hollow trees, and buildings (Reid 1997). It roosted in hollow trees of *Ceiba pentandra* in El Salvador (Felten 1956). *C. subrufa* is a gregarious species and roosts with *Glossophaga soricina* and *Macrophyllum macrophyllum* (Seymour and Dickerman 1982). The species is absent in caves where *C. perspicilliata* is present (Fleming 1988).

Diet includes fruit, nectar, and insects. In Costa Rica, *C. subrufa* feeds on fruits of *Cecropia*, *Mutingia*, *Piper*, and *Solanum* (Fleming 1988). Fruit pulp, small insects, and a stalked inflorescence were collected from 2 males in El Salvador (Starrett and de la Torre 1964) and *C. subrufa* has been caught while feeding in a banana cropland (Gardner 1977). Flight cage experiments showed that *C. subrufa* prefers fruits of *Brosimum alicastrum*, *Cecropia peltata*, *Ficus morazaniana*, *F. ovalis*, *Mutingia calabura*, *Piper amalago*, *P. pseudo-fuligineum*, and *Visnia baccifera* (Bonaccorso and Gush 1987).

Ectoparasites for *C. subrufa* are *Chirnyssoides carolliae*, *Hooperella vesperuginis*, *Loomisia desmodus*, *Speiseria ambigua*, *Speleocola secunda*, *Strebla carolliae*, *Trichobius joblingi*, and *Whartonia nudosetosa* (Webb and Loomis 1977).

*Carollia subrufa* is a common species in tropical dry deciduous forest and 2nd-growth woodland. The International Union for the Conservation of Nature and Natural Resources lists *C. subrufa* as a species of Lower Risk/Least Concern (Hutson et al. 2001; International Union for the Conservation of Nature 2007).

## GENETICS

Fundamental number is 26, 2n = 20–21. *Carollia subrufa* has a subtelocentric X chromosome and acrocentric Y chromosome (Baker 1979). In a parsimony tree (using the mitochondrial marker cytochrome *b*) *C. subrufa* is considered a sister group of the *C. perspicillata–C. brevicauda–C. sowelli* complex (Baker et al. 2002).

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