MAMMALIAN SPECIES 822:1–6

Choeroniscus minor (Chiroptera: Phyllostomidae)

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Abstract: *Choeroniscus minor* (Peters, 1868) is a phyllostomid commonly called the lesser long-tongued bat. It is a medium-size bat with an elongated muzzle, a very long tongue, and other cranial and dental features indicative of its highly specialized adaptations for nectar feeding. Living solitary or in small numbers, it inhabits tropical rain forests from the Amazon Basin of Brazil across northern South America and Trinidad. It has a more extensive geographical distribution than either of its 2 congeners. It is not of special conservation concern but is relatively poorly represented in mammal collections worldwide. DOI: 10.1644/822.1.

Key words: Glossophaginae, lesser long-tongued bat, multiple Y-chromosomes, nectar feeders, New World tropical rain forest, phyllostomid, pterygoid wings

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Choeroniscus Thomas, 1928

Choeronycteris Peters: 1868:366. Part, not *Choeronycteris* Tschudi, 1844:72.

Choeroniscus Thomas, 1928:120. Type species *Choeronycteris minor* Peters, 1868:366, by original designation.

CONTEXT AND CONTENT. Order Chiroptera, suborder Microchiroptera, family Phyllostomidae, subfamily Glossophaginae, tribe Glossophagini (Simmons 2005). *Choeroniscus* contains 3 living species (Simmons 2005; Simmons and Voss 1998): *godmani* (Thomas, 1903), *minor* (Peters, 1868) [= *inca* Thomas, 1912; = *intermedius* Allen and Chapman, 1893], and *periosus* Handley, 1966.

A key to the species of *Choeroniscus*, based on cranial features (Jones and Carter 1976, Koopman 1993, 1994; Miller 1907; Solmsen 1994, 1998; Thomas 1928), follows:

1. Posterolateral margin of palate notched … *C. godmani*
   Posterolateral margin of palate unnotched …… 2
2. Condylobasal length ≥ 28 mm; rostrum long and robust …… *C. periosus*
   Condylobasal length < 28 mm; rostrum medium length …… C. *minor*

Choeroniscus minor (Peters, 1868)
Lesser Long-tongued Bat

Choeronycteris minor Peters, 1868:366. Type locality "Surinam."

Choeronycteris intermedia Allen and Chapman, 1893:207. Type locality "Princestown, Trinidad."

Choeronycteris inca Thomas, 1912:403. Type locality "Yahuarmayo, S.E. Peru."

Choeroniscus minor: Thomas, 1928:122. First use of current name combination.

CONTEXT AND CONTENT. Context as for genus. *Choeroniscus minor* is monotypic (Simmons 2005; Simmons and Voss 1998).

NOMENCLATURAL NOTES. The genus name *Choeroniscus* with *minor* as its type species was introduced in 1928 by Oldfield Thomas for the "normal headed species" that included *minor*, *intermedia*, *inca*, and *godmani*, thus separat-

Fig. 1.—An adult female *Choeroniscus minor* from Rio Cuyabeno, Ecuador, collected in 1982 by E. Patzelt (Zoologisches Museum Hamburg, T 1380). Used with permission of photographer, E. Patzelt.

ing these species from *Choeronycteris*. Comparative examination of material referred to the formerly differentiated species *Choeroniscus minor*, *C. inca,* and *C. intermedius* (Simmons and Voss 1998) revealed close correspondence and filled the morphometric gap between *minor* and *intermedius* that had been originally reported for a smaller series of both taxa (Koopman 1978). Specimens formerly regarded as *C. intermedius* fall at the lower end of an intraspecific size range, whereas *C. minor* and *C. inca* are at its upper end (Koopman 1978, 1993, 1994; Simmons and Voss 1998). The phylogenetic relationships above the species level remain subject to further scientific investigation. Based on a combination of morphological and molecular data, Carstens et al. (2002) divides the tribe Glossophagini into 2 groups, the choeronycterines and the glossophagines. *C. minor* is included within the former group along with *Anoura, Choeronycteris, Hylonycteris, Lichonycteris, Musonyctris,* and *Scleronycteris*.

The name ''*Choeroniscus*'' was probably chosen to separate the smaller genera of long-nosed nectar-feeders from the larger *Choeronycteris* by shortening the latter name in a latinized ending ''iscus.'' In their contribution on *Choeronycteris mexicana,* Arroyo-Cabrales et al. (1987) assumed the name was derived from the Greek *choiros* (pig) and *nycteris* (bat). However, considering the extreme specialization for nectar-uptake, that is, consuming liquid food, we instead prefer an interpretation based on the Greek root *choero*, which means drink in a sacral context, and the latinized ending (*iscus)* giving both genera the label drinking bat.

DIAGNOSIS

Condylobasal length of *Choeroniscus minor* is greater than in *C. godmani* and less than in *C. periosus*. The rostrum of *C. minor* is slender and of intermediate length within the rostral range of the Glossophaginae. Length (in mm) of maxillary toothrow is 8.2 in *C. minor* (mean of 6 females), 7.4 in *C. godmani* (2 females), and 10.6 in *C. periosus* (1 female—Solmsen 1998). The posterolateral margin of the palate in *C. minor* is not notched as it is in *C. godmani*, and the pterygoids are moderately inflated. The tragus of *C. minor* has a notched tip, whereas *C. godmani* has a tragus with a single pointed tip.

GENERAL CHARACTERS

Choeroniscus minor (Fig. 1) is of small to medium size with an elongated muzzle and a forearm length from 33 to 38 mm. It has a well-developed triangular nose leaf that is 4 mm in height with 3 sides nearly the same length (ca. 3 mm). Ears are rounded on top with their inner margins distinctly convex and outer margins slightly concave in their upper one-half. The tragus is short, slightly pointed, and notched at the tip. The uropatagium is well developed with a concave posterior margin; the tail remains enclosed for nearly the proximal one-half of the tail membrane, with its extreme tip visible on the dorsal surface of the membrane. The calcar is about 6 mm long, and the wing membrane inserts on the outer toe slightly more distally than the uropatagium on the opposite side. The pelage of *C. minor* is dense and generally dark to blackish brown, with slight differences between ventrum and dorsum. Fur extends on both sides of the arm beyond the elbow. Individual hairs are darker at the tips and yellow-brown at the base (Solmsen 1998).

Mean values (with range, *n*, sex, and locale) of body mass (g) and external morphological features (mm) are: body mass, 9.8 (8.0–12.0, 7 females) and 8.0 (7.0–8.8, 4 males, French Guiana); total length, 69.1 (65.0–70.0, 7 females) and 63.8 (61.0–68.0, 4 males, French Guiana); length of ear, 12.3 (11.0–13.0, 7 females) and 12.3 (12.0–12.5, 4 males, French Guiana), 10.8 (1 female, Ecuador), 7.0 (1 female, Manaus, Brazil), and 10.2 (1 female, Guyana); length of forearm, 34.3 (33.0–36.0, 7 females) and 34.3 (33.0–35.0, 4 males, French Guiana), 35.6 (35.3–36.0, 3 females) and 34.9 (34.8–35.0, 3 males, French Guiana), 34.3 (1 female, Ecuador), 34.1 (1 female, Manaus, Brazil), 36.9 (1 female, Guyana), and 34.8 (1 male, holotype, Suriname); length of tail, 7.8 (6.0–9.0, 7 females) and 8.0 (7.0–9.0, 4 males, French Guiana); length of hind foot, 9.0 (all 9.0, 7 females) and 9.1 (8.5–10.0, 4 males, French Guiana), 7.2 (1 female, Ecuador), 6.8 (1 female, Manaus, Brazil), 7.4 (1 female, Guyana), and 7.5 (1 male, Suriname); length of calcar, 5.0 (1 female, Ecuador), 6.8 (1 female, Manaus, Brazil), 5.0 (1 female, Guyana), and about 6.0 (1 male, Suriname). Data for specimens from French Guiana are from Simmons and Voss (1998); specimens from Brazil, Ecuador, and Guyana are from Solmsen (1998); those from Suriname are from Husson (1962).

The skull of *C. minor* (Fig. 2) displays a comparatively long rostrum that is just slightly shorter than its braincase. The level of the palatinal base is elevated against the skull base; a dorsal profile of the rostrum appears very straight and the braincase is vaulted, but without distinct indentation between rostrum and braincase. The neurocranium has no crests (Solmsen 1994).

Zygomatic arches are present in *C. minor* but are very delicate (Solmsen 1994). They are often destroyed during preparation of skull specimens, as they have been in the specimen shown in Fig. 2, and are consequently interpreted as being incomplete (Koopman 1994; Miller 1907). The palate is rectangular in basal view and not notched at the posterolateral margin. There are 3 palatal foramina. The unpaired, most frontal foramen between the 1st upper incisors is sometimes lacking, which results in a small V-shaped indentation in the premaxilla. The skull base has conspicuously elongated and distinctly inflated hamuli pterygoidei that almost reach the tympanic. Basisphenoid

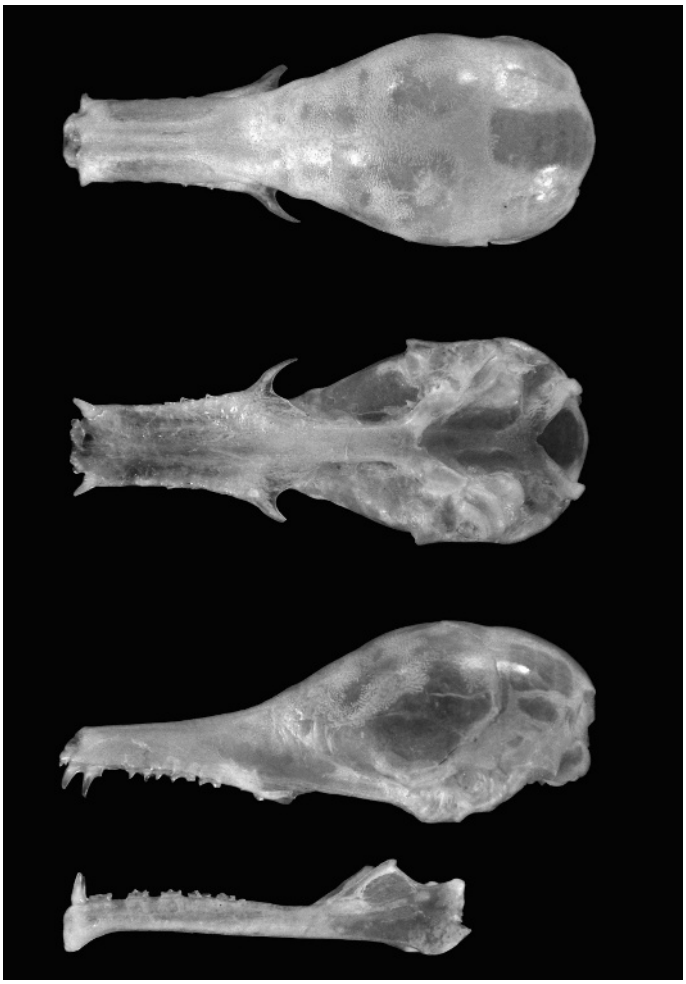

Fig. 2.—Dorsal, ventral, and lateral view of cranium and lateral view of mandible of an adult female *Choeroniscus minor* (ZMH [Zoologisches Museum Hamburg, Universität Hamburg] 9301), collected in 1982 by E. Patzelt from Rio Cuyabeno, Ecuador. Greatest length of skull is 22.50 mm. Photographs by H. Schliemann.

fossae are well defined, rather deep and long, and are separated from each other by a wide portion of the skull base. Mandible is long and narrow and the coronoid process is short, barely projecting beyond the articular process. The mentum has a marked symphyseal projection.

Means and ranges of cranial measurements (mm) are: greatest length of skull, 23.4 (22.6–24.0, 7 females) and 22.2 (21.8–22.4, 4 males, French Guiana), 24.1 (24.0–24.3, 3 females) and 22.3 (21.8–22.7, 3 males, French Guiana), 23.0 (1 female, Ecuador), 22.4 (20.1–23.3, 5 females) and 21.5 (1 male, Brazil), 24.4 (1 female, Guyana), and 22.0 (1 male, French Guiana); condylobasal length, 22.8 (21.7–23.6, 7 females) and 21.8 (21.2–21.9, 4 males, French Guiana), 22.2 (1 female, Ecuador), 22.3 (21.8–22.7, 5 females) and 21.0 (1 male, Brazil), 24.1 (1 female, Guyana), 21.4 (1 male, French Guiana); length of palate, 17.9 (1 female, Ecuador), 14.6 (13.3–15.3, 5 females) and 13.9 (1 male, Brazil), 16.1 (1 female, Guyana), 13.9 (1 male, French Guiana), and 14.0 (1 male, holotype, Suriname); width of braincase, 8.6 (8.4–8.9, 7 females) and 8.6 (8.5–8.9, 4 males, French Guiana), 8.6 (1 female, Ecuador), 8.5 (8.3–8.8, 5 females) and 8.4 (1 male, Brazil), 8.7 (1 female, Guyana), 8.8 (1 male, French Guiana), and 8.8 (1 male, holotype, Suriname); height of braincase, 7.6 (1 female, Ecuador), 7.7 (7.6–7.9, 5 females) and 7.7 (1 male, Brazil), and 7.2 (1 male, holotype, Suriname); zygomatic width, 8.4 (8.1–8.9, 7 females) and 8.3 (8.2–8.4; 3 males, French Guiana), 8.6 (8.4–8.7, 3 females) and 8.4 (1 male, Brazil), 8.7 (1 male, French Guiana), and 8.5 (1 male, holotype, Suriname); mastoid width, 8.6 (8.4–9.1, 7 females) and 8.4 (8.2–8.6; 4 males, French Guiana), 8.6 (1 female, Ecuador), 8.2 (6.6–8.7, 3 females), 8.4 (1 male, Brazil), 8.9 (1 female, Guyana), 8.7 (1 male, French Guiana), and 8.6 (1 male, holotype, Suriname); length of maxillary toothrow, 8.1 (7.9–8.5, 7 females) and 7.7 (7.5–8.0; 3 males, French Guiana), 9.7 (9.4–10.0, 3 females) and 8.5 (3 males, French Guiana), 8.0 (7.0–8.8, 5 females) and 7.9 (1 male, Brazil), 8.3 (1 female, Guyana), 7.9 (1 male, French Guiana), and 7.7 (1 male, holotype, Suriname); width across molars, 4.2 (4.0–4.4, 7 females) and 4.1 (4.0–4.2, 3 males, French Guiana), 4.7 (4.3–4.9, 3 females) and 4.4 (4.3–4.6, 3 males, French Guiana), 4.5 (1 female, Ecuador), 4.4 (4.1–4.5, 5 females) and 4.6 (1 male, Brazil), 4.8 (1 female, Guyana), 4.6 (1 male, French Guiana), and 4.6 (1 male, holotype, Suriname). Data for specimens from French Guiana are from Brosset and Charles-Dominique (1990) and from Simmons and Voss (1998). Data for specimens from Brazil, Ecuador, and Guyana are from Solmsen (1998) and those from Suriname are from Husson (1962).

Females exceed males in body size, thus presenting a marked sexual dimorphism in several characters (Brosset and Charles-Dominique 1990; Goodwin and Greenhall 1961; LaVal 1969; Simmons and Voss 1998). Additionally, a series of *C. minor* from French Guiana shows a remarkable intraspecific variation in size, skull shape, and dental morphology. Dental characters, in particular, are highly variable with no consistent pattern or correlation with body size or with rostral proportions.

DISTRIBUTION

The distribution of *Choeroniscus minor* is restricted to northern South America; this distribution is more extensive than that of any of its congeners (Fig. 3). *C. minor* occurs in Brazil from the Mato Grosso, the Cerrado, and the southeastern Atlantic forests, to the mouth of the Amazon and the Amazon lowland (de Souza Aguiar et al. 2004; Gregorin and Ditchfield 2005; Koopman 1981, 1994; Marinho-Filho 1996; Solmsen 1998; Tuttle 1970). Its distribution extends northward through the Guianas and Suriname (Brosset and Charles-Dominique 1990; Husson 1962; Peters 1868; Simmons and Voss 1998) to eastern Venezuela (Koopman 1994; Ochoa and Fernández 1982; Sanborn 1954) and

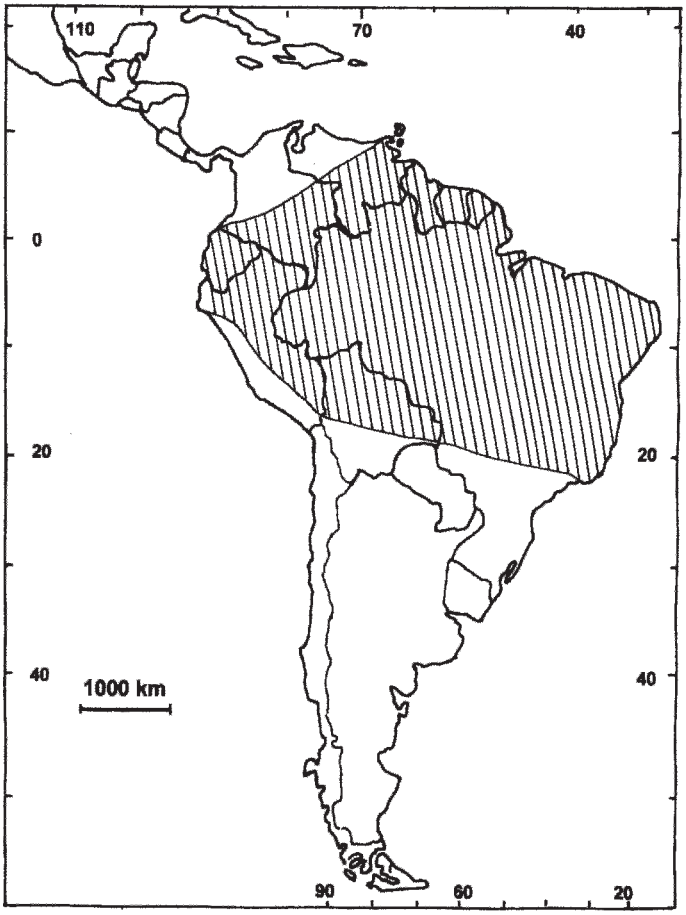

Fig. 3.—Geographic distribution of *Choeroniscus minor*.

Trinidad (Genoways et al. 1973; Simmons and Voss 1998). To the west, it extends into central Colombia (Tamsitt et al. 1965) and coastal Ecuador (Albuja 1982; Koopman 1981, 1994; Patzelt 1989; Solmsen 1998) and southward to southern Peru (Koepcke 1987; Koopman 1978) and Bolivia (Aguirre et al. 2003; Anderson 1997; Koopman 1981, 1994). In Bolivia, *C. minor* mainly is found north of Santa Cruz, but its documented range recently has been extended to the southeast in Santa Cruz (Brooks et al. 2002). *C. minor* has been characterized as an Amazon lowland species (Koopman 1978). However, its distribution is known to include localities that are west of the Andes in Ecuador, and at elevations of 3,860 m in Peru (Koopman 1978) and 600–1,400 m in the Brazilian Cerrado (Marinho-Filho 1996). There are no known fossils of *C. minor*.

FORM AND FUNCTION

The lower lip of *Choeroniscus minor* has a V-shaped median groove that corresponds to a V-shaped notch at the tip of the mandible. Because there are no lower incisors and the uppers are tiny and separated by a wide median gap, the tongue can be protruded through closed jaws (''tongue gliding channel''—Solmsen 1998:75). The tongue can be extended to a length that is about 50% of total body length. The tip of the tongue is covered with bristlelike papillae, directed backwards, that enhance uptake of nectar (Goodwin and Greenhall 1961). The nose leaf of *C. minor* is relatively short and triangular, which presumably provides easy access to flower corollas (Solmsen 1998).

The dental formula for *C. minor* is i 2/0, c 1/1, p 2/3, m 3/3, total 30 (Koopman 1994; Miller 1907; Phillips 1971; Solmsen 1994). With the exception of the canines, teeth are frail, mostly separated from each other, and compressed in the lingual–buccal direction. Upper incisors are small, with I1 smaller than I2 and not in contact with adjacent teeth. I1 has a low flat crown and I2 is triangular with a blunt cusp. Both pairs are separated from each other by a wide median gap. Canines are long and delicate, and C1 has a narrow lingual cingulum. Upper premolars are separated from the canines by a wide diastema, but p1 is close to the lower canines. Otherwise, premolars are separated from each other by narrow spaces. Premolars are long and narrow, and p2 and p3 show no molarization. The crowns of upper premolars are triangular in side view, each with a distinctly protruding main cusp and small anterior and posterior cingular styles**.** Lower premolars have anterior and posterior styles nearly as high as the main cusps. M1 and m1 do not contact adjacent teeth. M1 and M2 are of equal size, and M3 is slightly smaller. All molars are morphologically similar: they have low blunt protocones, high metacones extended by somewhat trenchant ridges in the direction of the metastyle, and prominent parastyles. Lower molars are nearly as narrow as the premolars and decrease slightly in size from m1 to m3. They are also similar morphologically: each has a rather prominent, nearly stylus-shaped metaconid, a lower and more blunt protoconid, and an even lower paraconid. In the lower molars the talonid is slightly longer than the trigonid and in m3 it is wider than the trigonid, with a distinct hypoconid and entoconid. Dental morphology, especially of the postcanine dentition, is highly variable in this species. Premolars and molars show quite different shapes even in a series of specimens from a single population (Simmons and Voss 1998).

As is typical of other glossophagine bats, *C. minor* has relatively shorter wings than other phyllostomids (Smith and Starret 1979). Wing dimensions (mm) of 3 females from Ecuador, Guyana, and Brazil (in this sequence) are as follows: length of metacarpal III, 33.5, 36.9, 34.10; length of phalanx 1, digit III, 13.0, 12.7, 11.5; length of phalanx 2, digit III, 17.7, 18.4, 16.5; length of phalanx 3, digit III, 9.4, –, 8.0; length of metacarpal IV, 30.2, 31.9, 31.6; length of phalanx 1, digit IV, 8.5, 8.8, 8.5; length of phalanx 2, digit IV, 12.1, 12.4, 11.1; length of metacarpal V, 29.7, 30.6, 30.8; length of phalanx, digit V, 8.5, 7.9, 8.5; length of phalanx 2, digit V, 11.2, 11.8, 9.7. There are no published reports of wing loading and wing shape for *C. minor*. Observations of

preserved material indicate that a relatively high wing loading and a below-average aspect ratio are likely, as is the case in other nectar-feeding Glossophaginae and Macroglossinae (Lindhe Norberg 2002).

ECOLOGY

Data on reproduction in *Choeroniscus minor* is insufficient to allow broad generalization of breeding patterns. One lactating female *C. minor* from Colombia was collected in December (Tamsitt et al. 1965). A juvenile has been reported in August in Peru (Tuttle 1970).

Choeroniscus minor inhabits tropical rain forests and prefers primary forest near rivers or lakes. Eleven specimens in Paracou, French Guiana, were collected in a locality mainly covered with primary rain forest (Simmons and Voss 1998). Eight specimens were found hanging beneath a log that had fallen across a river in Venezuela (Sanborn 1954). Several individuals of *C. minor* have been reported from the Amazon basin of Peru, roosting in small groups or in pairs under logs or in hollow trees in riverine areas. Three individuals were found among the roots of fallen trees and 1 pair beneath the bark of a rotten log. All individuals roosted 50–70 cm above the ground and occupied their roost sites over a period of several months. Of 3 *C. minor* captured at the edge of a primary forest, 1 was flying above a low field and another at a dead water of the Rio Llullapichis (Koepcke 1987). In French Guiana, a group of 6 *C. minor* (1 adult male, 4 adult females, and 1 sex unknown) was found roosting on the dark underside of a large fallen tree. An additional solitary adult male was found roosting beneath an undercut bank of a dry streambed. Both of these roosts were in primary forest (Simmons and Voss 1998).

Choeroniscus minor primarily feeds on pollen and nectar, but insects may be consumed (Gardner 1977; Goodwin and Greenhall 1961). Stomach contents include pollen, crystallized honey or fruit juice, and fragments of insects (Coleoptera and Hymenoptera—Goodwin and Greenhall 1961; Koepcke 1987). Two specimens captured in the early night (2000 and 2300 h) in Peru had almost empty stomachs, whereas 2 individuals collected in the morning at the day roost (1 male and 1 female) contained many food particles (Koepcke 1987). *C. minor* is classified by the International Union for the Conservation of Nature and Natural Resources (2007) as Lower Risk/Least Concern (LR/lc).

GENETICS

In *Choeroniscus minor* the diploid number (2n) is 20 (based on 1 male and 1 female from Suriname—Haiduk and Baker 1982). The karyotype includes 2 biarmed chromosome pairs (numbers 1 and 9), 7 subtelocentric pairs (numbers 2, 3, 4, 5, 6, 7, and 8), and a pair of submetacentric X-chromosomes. *C. minor* retains the primitive condition for this clade (das Neves et al. 2001). Males exhibit a multiple Y-chromosome pattern (Genoways et al. 1973); it can be presumed that *C. minor* has a XX/XY_1Y_2 sex-determining chromosome system (Hsu et al. 1968).

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