

## A new species of *Lonchophylla* Thomas (Chiroptera: Phyllostomidae) from Ecuador

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*Abstract.*—We describe *Lonchophylla orcesi*, sp. nov., from the Chocó, a region of high biotic diversity, endemism, and rainfall along the western Andean slopes and Pacific lowlands of Colombia and Ecuador. One of the largest known *Lonchophylla*, it occurs sympatrically with at least two other species of *Lonchophylla* including the similar, but somewhat smaller *L. robusta*. We also recognize *L. concava* as a Middle American Province species distinct from *L. mordax* of Brazil and Bolivia on the basis of cranial and dental features.

From 1984 to 1988, personnel representing the Department of Biological Sciences of the Escuela Politécnica Nacional (EPN), Quito, Ecuador, conducted studies and made collections of mammals in the humid tropical forests of northwestern Ecuador. These forests are the southern terminus of the rain forests of the western Andean slopes and adjacent Pacific lowlands of northwestern South America known as the Chocó Association, which is considered to be derived from forest refugia isolated during Pleistocene glacial periods. The Chocó is characterized by high rainfall, high biotic diversity, and a high degree of endemism concentrated in two or three centers (Gentry 1982). A portion of northwestern Ecuador belongs to one of these centers, but despite its biological importance, few biologists have conducted research in the region. Consequently, knowledge of its fauna is poor in comparison with that of other regions in Ecuador.

During this period about 2000 specimens were collected, most of them bats. Among these are 22 specimens of glossophagine bats belonging to the genus *Lonchophylla*: 4 *L. robusta* Miller, 1912; 7 *L. concava* Goldman, 1914 (reported as *L. mordax*; see

below); 7 *L. thomasi* J. A. Allen, 1904; 3 *L. chocoana* Dávalos, 2004; and 1 specimen of a species unlike any previously recognized in *Lonchophylla*. Several reports on additions to the known fauna, descriptions of new species, and the status of conservation in the region, have been published or are under preparation (e.g., Albuja & Mena 1989, Albuja 1999).

*Lonchophylla* is distributed from Nicaragua through Costa Rica and Panama into South America to Peru, Bolivia, and southeastern Brazil (Jones & Carter 1976, Szirma et al. 1978, Koopman 1993). Among the eight species usually recognized today, Albuja (1999) reported five from Ecuador: *L. mordax* Thomas, 1903; *L. thomasi* J. A. Allen, 1904; *L. robusta* Miller, 1912; *L. haldleyi* Hill, 1980; and *L. hesperia* G. M. Allen, 1908. A sixth species that occurs in western Colombia and northwestern Ecuador, *L. chocoana* Dávalos (2004), is the most recently described. Five of these occur in tropical rainforest habitats in Ecuador and *L. hesperia* is found in the xeric habitats of northwestern Peru and southwestern Ecuador.

We recorded all measurement in millimeters. Those of total length, tail, and ear

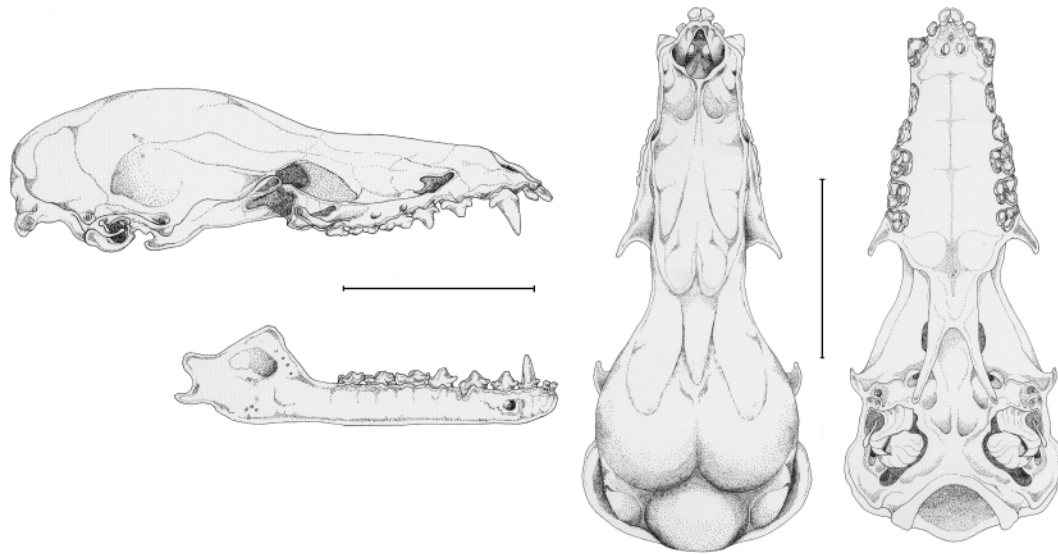


Fig. 1. Illustrations of the skull and ramus of the holotype of *Lonchophylla orcesi*. The bar equals 10 mm.

were taken in the field on fresh specimens. The other external and cranial measurements were taken in the laboratory with dial calipers under a stereomicroscope. Most of these are standard; however, the following warrant description to avoid misunderstanding:

*Length of noseleaf*.—From lower edge of horseshoe to tip of the noseleaf.

*Greatest length of skull*.—From anterior border of premaxillaries to posteriormost extension of the skull.

*Depth of braincase*.—From lower margin of presphenoid to top of the cranium.

*Mandibular length*.—From anterior end of ramus to posteriormost margin of the articular condyle.

*Height of coronoid*.—From ventral margin of ramus to tip of the coronoid process.

*Height of ramus*.—Height of ramus between first and second molars.

Capitalized colors terms are from the Naturalist's Color Guide (Smith 1975).

We describe our unique specimen of *Lonchophylla* as:

***Lonchophylla orcesi*, new species**

*Holotype*.—An adult female, preserved in alcohol with the skull extracted, Escuela

Politécnica Nacional (EPN) number 851241, collected on July 23, 1985 by P. Mena and J. Regalado.

*Type locality*.—Los Pambiles, 00°32'N, 78°38'W, Río Piedras, Cordillera de Toisán, Esmeraldas Province, Ecuador, elevation 1200 m.

*Distribution*.—*Lonchophylla orcesi* is known only from the type locality. We assume it inhabits other areas of similar habitat and elevation in northwestern Ecuador.

*Etymology*.—We name this species in honor of Prof. Gustavo Orcés V. (1903–1996), a distinguished zoologist and pioneer of Ecuadorian research on vertebrates, and former director of the Department of Biological Sciences of the Escuela Politécnica Nacional.

*Diagnosis*.—*Lonchophylla orcesi* equals or exceeds the size of *L. chocoana*, *L. handleyi*, and *L. robusta* in most dimensions, especially in cranial linear dimensions, which reflect its much longer rostrum. With a greatest length of skull (not including incisors) of 30.4 mm and a forearm length of 47 mm, *Lonchophylla orcesi* exceeds the size of all other known species of *Lonchophylla*. The interfemoral membrane is longer (Table 1) than in the other larger spe-

Table 1.—Measurements (mm) of *Lonchophylla orcesi*, *L. robusta*, and *L. chocoana*.

Measurements	<i>L. orcesi</i> 1 (holotype) female	<i>L. robusta</i> EPN 5 females, 3 males	<i>L. chocoana</i> <sup>2</sup> Holotype and paratype 2 females
Total length	72.0	72.8 (67.0–78.0)	81.3 (78.0–84.5)
Tail vertebrae	11.0	10.0 (8.2–12.0)	8.8 (7.0–10.5)
Foot	14.8	11.2 (10.0–14.0)	14.1 (13.2–15.0)
Ear from notch	17.0	15.0 (14.0–16.0)	15.5 (14.0–17.0)
Forearm	47.0	43.6 (42.7–45.1)	46.5 (45.0–48.0)
Tibia	18.3	16.7 (15.8–17.7)	17.4 (16.5–18.2)
Mass	22.0	17.2 (14.0–19.5)	21.0 (19.0–23.0)
Length of noseleaf <sup>1</sup>	6.6	7.4 (7.0–7.6)	
Breadth of noseleaf <sup>1</sup>	5.1	5.2 (5.1–5.2)	
Length of interfemoral membrane <sup>1</sup>	18.3	15.3 (14.4–16.0)	12.5 (12.4–12.6) <sup>3</sup>
Greatest length of skull	30.4	26.9 (26.0–27.9)	27.8 (27.2–28.3)
Condylbasal length	29.7	25.6 (24.5–26.6)	26.8 (26.1–27.3) <sup>3</sup>
Least postorbital constriction	5.6	5.3 (4.9–5.5)	5.3 (5.3)
Braincase breadth	11.1	10.0 (9.5–10.9)	10.4 (10.2–10.5)
Braincase depth	7.9	7.8 (7.6–8.0)	8.2 (8.1–8.3) <sup>3</sup>
Mastoid breadth	12.7	11.0 (10.6–11.5)	11.7 (11.3–12.0) <sup>3</sup>
Palatal length	17.9	15.0 (14.2–15.5)	15.7 (15.5–15.8)
Length maxillary toothrow	11.3	10.4 (10.0–10.9)	10.8 (9.8–11.7)
Breadth across molars	7.4	6.5 (5.3–6.9)	7.2 (7.0–7.5) <sup>3</sup>
Breadth across canines	4.8	4.1 (3.8–4.5)	4.4 (4.2–4.8) <sup>3</sup>
Height of canine	2.5	2.5 (2.3–2.6)	2.7 (2.6–2.7)
Length of mandible	22.2	19.1 (18.2–20.0)	19.2 (19.0–19.3) <sup>3</sup>
Length of mandibular toothrow	11.8	10.6 (10.4–10.8)	10.3 (10.0–10.6) <sup>3</sup>
Coronoid height	5.9	5.1 (4.7–5.5)	5.5 (5.2–5.6) <sup>3</sup>
Depth of ramus	2.4	1.9 (1.6–2.1)	2.3 (2.1–2.5) <sup>3</sup>

<sup>1</sup> Measurements of fluid-preserved specimens.

<sup>2</sup> Dávalos, 2004, except as noted.

<sup>3</sup> Measurements of EPN 851218, 851232, and USNM 575171 from Ecuador.

cies; the upper canines are robust, but not as long as in *L. chocoana*; and the upper inner incisors are especially long, procumbent, and have spatulate tips (Fig. 1).

*Description.*—*Lonchophylla orcesi* is one of the larger species of the genus (forearm, 47 mm; greatest length of skull (not including incisors), 30.4 mm; condylbasal length, 29.7; palatal length, 17.9; maxillary toothrow, 11.3 mm; mass, 22 g). The ears are short (17 mm). The tragus is broad, its medial margin thick and curved, and its external (posterior) border thin, almost straight, and with a small indentation or nick at the midpoint. The noseleaf is covered with fine hairs and measures 6.6 mm long and 5.1 mm wide. As in other members of the genus, the lower lip has a deep medial furrow bordered with small tubercles. The snout has many vibrissae and oth-

er tactile hairs. The interfemoral membrane is long (18.3 mm) and lacks a fringe of hair on its border. The tail extends a little more than half the length of the interfemoral membrane; its tip projects from the upper surface and is sparsely covered with short hairs. The calcar is short (5.5 mm), the feet are long (14.8 mm) and clothed with thinly scattered hairs, and the toes bear strong, curved claws.

Dorsal coloration is pale brown, darkest on the head, and the color of the basal band of pelage is whitish. Pelage of the venter is shorter, a paler yellowish gray-brown, and individual hairs are gray at the base. The ears, noseleaf, tragus, and interfemoral membrane are blackish. The pelage is thick and extends onto the proximal two-thirds of the forearm. The distal third of the forearm is clothed with small, scattered hairs, and

there is a tuft of hair at the base of the thumb.

The skull is long (30.4 mm) with an especially elongated rostrum as reflected by the lengths of palate and maxillary toothrow (17.9 and 11.3 mm, respectively; see Table 1). The rostrum, anterior to the post-orbital constriction, comprises almost half the total length of skull. The braincase is relatively low, but broad as reflected by breadths of braincase and mastoid (11.1 mm and 12.7 mm, respectively). The dentaries protrude anterior to the lower incisors forming a chin. The upper inner incisors are large, spatulate, strongly procumbent, and separated basally, but in contact at their tips. The upper outer incisors are smaller and more slender than the inner, and evenly spaced between the inner incisors and canines. The lower incisors are undifferentiated, oriented vertically, and the outer incisors are separated from the canine by a space nearly equal to their crown width. The canines are robust, but not especially long (height of crown, 2.5 mm). The upper premolars are triangular in lateral view, the first well separated from the canine. The central cuspids of the lower premolars are high, the first lower premolar is in contact with the canine and its anterior margin is slightly convex, but its posterior margin is concave with a posterior cuspule similar to that of the second lower premolar. The lower molars decrease in size posteriorly (Fig. 1).

*Comparisons.*—*Lonchophylla orcesi* is a member of the Chocoan fauna of Ecuador and Colombia where it is sympatric with *L. chocoana* and *L. robusta*. The only other large *Lonchophylla* in Ecuador is *L. handleyi*, which is a member of the upper (western) Amazon basin fauna. *Lonchophylla orcesi* differs from these species in having a longer skull, wider braincase and postorbital constriction, longer maxillary toothrow, longer mandible, absolutely and relatively longer rostrum, and longer inter-femoral membrane (Fig. 1, Table 1). In contrast to *L. chocoana*, the rostrum of *L. or-*

*cesi* is narrower and more delicate, its braincase is less elevated, and its inter-femoral membrane is wider. In all respects, *L. orcesi* is more similar to *L. robusta* than it is to *L. chocoana*. *Lonchophylla orcesi* differs from *L. robusta* in having a much longer rostrum, larger and more procumbent inner upper incisors, larger and higher central cuspids of lower premolars, a more protruding chin, and larger and stronger feet and claws. The canines are not especially long in comparison with those of *L. robusta* and *L. chocoana*.

*Habitat.*—*Lonchophylla robusta*, *L. orcesi*, and *L. chocoana* were netted together on a small, flat, densely forested river terrace at Los Pambiles on the banks of the Río Piedras. The canyon of the Río Piedras is a topographically diverse area in foothills of the Cordillera de Toisán. The collection site is in the Reserva Ecológica Cotacachi-Cayapas, classed as part of the Subtropical Zoogeographic Region (Albuja et al. 1980), and according to the ecological map of Cañadas (1983), as Very Humid Pre-montane Forest (bmhPM). This forest has at least two relatively undifferentiated strata. The canopy of the upper stratum is open and discontinuous; that of the lower stratum is denser and nearly continuous. The trees have relatively slender trunks and reach heights of 15 to 25 m. Young palms and saplings of other trees are plentiful in the understory, which includes tree ferns, and mosses. Epiphytes, which include large-leaved Araceae, orchids, and bromeliads, are conspicuous. This region, with a mean annual temperature of about 20°C, has high humidity and the annual precipitation can exceed 4000 mm.

The status of *Lonchophylla concava*  
Goldman, 1914

During the course of preparing this report, we were concerned with the identity of the other two species of *Lonchophylla* found in lowland and Andean slope forests of northwestern Ecuador. Albuja (1999) re-

Table 2.—Measurements (mm) of *Lonchophylla concava*, *L. mordax*, and *L. thomasi*.

Measurements	<i>L. concava</i> <sup>1</sup>	<i>L. mordax</i> <sup>2</sup>	<i>L. thomasi</i> <sup>4</sup>
Forearm	32.0–34.6	34.0–37.2	31.0–33.3
Condylbasal length	20.8–22.4	20.4–20.6 <sup>3</sup>	18.3–20.4
Condylincisive length	21.3–22.9	20.7–21.0 <sup>3</sup>	18.9–21.2
Palatal length	11.8–12.9	11.3–11.7	10.8–12.0
Zygomatic breadth	8.8–9.4	8.7–9.3	8.5–9.4
Least postorbital constriction	4.2–4.6	4.1–4.6	4.0–4.2
Braincase breadth	8.6–9.1	8.3–8.4 <sup>3</sup>	8.2–8.8
Mastoid breadth	9.1–9.6	8.5–9.0 <sup>3</sup>	8.5–9.3
Breadth across canines	3.5–3.9	3.4–3.7 <sup>3</sup>	3.6–4.2
Breadth across molars	5.0–5.3	4.8–4.9 <sup>3</sup>	4.8–5.3
Length maxillary tooththrow	7.4–7.9	7.5–7.9	6.2–7.0
Length mandibular tooththrow	7.8–8.4	7.9–8.1	6.6–7.3

<sup>1</sup> *N* = 13.<sup>2</sup> *N* = 4, except as noted.<sup>3</sup> *N* = 3.<sup>4</sup> *N* = 14.

ported these taxa as *L. mordax* and *L. thomasi*. *Lonchophylla thomasi* is a small species of *Lonchophylla* found throughout the greater Amazon basin and northern South America. It occurs in Ecuador and Colombia on both sides of the Andes and is in Central America at least as far north as Costa Rica. *Lonchophylla thomasi* has not been reported in eastern or southeastern Brazil where the species *L. bokermanni*, *L. dekeyseri*, and *L. mordax* are known to occur.

As currently recognized in the literature, the species *L. mordax* has a disjunct distribution with a Middle American Province component found from northwestern Ecuador to Costa Rica, and a Brazilian and eastern Bolivian component found mainly in eastern Brazil from eastern Pará south to the state of Espírito Santo. Goldman (1914) described the Middle American Province population as *Lonchophylla concava* with the type locality Cana, Darién, Panama. Handley (1966), based on the strong similarity with *L. mordax* Thomas, 1903 (type locality Lamarão, Bahia, Brazil), synonymized *L. concava* under *L. mordax* and used the name combination *Lonchophylla mordax concava* for the Panamanian population. Contrary to Handley's (1966) conclusion, our direct comparison reveals a se-

ries of trenchant differences between specimens from northwestern South America and specimens from eastern Bolivia and eastern Brazil, including a specimen from the type locality of *L. mordax*. Therefore, we consider the northwestern South American and southern Central American population to represent the species *Lonchophylla concava*, thereby restricting the name *L. mordax* to the Brazilian and eastern Bolivian populations.

These two species are superficially similar in size (Table 2) and shape, and it is easy to understand why Handley (1966) treated them as a single species. Major differences, however, are evident in the morphology of the rostrum, palate, coronoid process, and the last upper premolar (P4). *Lonchophylla concava* can be distinguished from *L. mordax* by its very small to obsolete lingual cuspule on the last upper premolar and the lack of evidence for root support for that cusp (lingual cuspule small to prominent, and always rooted in *L. mordax*); posterior margin of antorbital foramen within the relatively smooth contour of the lateral margin of the rostrum (posterior margin projects out from lateral margin of the rostrum in *L. mordax*); median furrow in palate transitions through an elongated

pit-like groove before it merges with the nearly flat terminal portion of the post-dental palate (median furrow transitions smoothly onto terminal post-dental palate in *L. mordax*); medial posterior projection of palate into mesopterygoid fossa usually absent (medial projection usually present in *L. mordax*); space between second lower incisor and canine usually as wide as or wider than width of crown of second lower incisor (space usually narrower than width of crown of second lower incisor in *L. mordax*); the first lower premolar (p2) large, blade-like, its posterior cuspid reduced (p2 not blade like, its posterior cuspid similar in development to that of p3 in *L. mordax*); and coronoid process low and broadly (anteriorly-posteriorly) rounded (coronoid process always angular in *L. mordax*). The skull is a little longer in *L. concava* and the braincase tends to be wider than in *L. mordax* (see Table 2); otherwise, cranial dimensions seem to be similar. Taddei et al. (1983) accurately described *L. concava* and used the configuration of the last upper premolar in their identification key to distinguish *L. mordax mordax* from *L. mordax concava*, which we treat as a species separate from *L. mordax*.

### Discussion

The tropical rain forests of the coastal and lower Andean slopes of western Colombia and Ecuador have been isolated from the Amazon forests for more than four million years by the Andean barrier (Prance 1982). Largely because of this isolation, a highly endemic and still poorly-known fauna has evolved. Prior to the mid to late 1960s, lack of access protected the northwestern region of Ecuador. While this isolation impeded research, it also limited forest conversion and general degradation of the ecosystem. With the opening of the Santo Domingo de los Colorados-Esmeraldas highway in 1960 and completion of the Ibarra-San Lorenzo railroad in 1969, colo-

nization surged, and the areal extent of forest habitat has declined dramatically.

Los Pambiles, the site where *L. choacoana*, *L. orcesi*, and *L. robusta* were collected, is within the Reserva Ecológica Cotacachi-Cayapas. Other species of bats known to inhabit this area are *Anoura geoffroyi*, *A. caudifer*, *Rhinophylla aethina*, *Platyrrhinus vittatus*, *Artibeus glaucus*, *Sturnira bidens*, and *Sturnira* spp.

Efforts to collect additional specimens were unsuccessful. Nevertheless, because our single specimen is characterized by distinctive characters that easily distinguish it from all other known species of *Lonchophylla*, we do not hesitate to name and describe it as a new species, *L. orcesi*.

Finding two previously unknown species in the same genus (*L. choacoana* and *L. orcesi*) at the same locality is a noteworthy indication of how poorly the biota of the area is known. Albuja (1999) reported *L. choacoana* as *Lonchophylla* Sp. A; and *L. orcesi* as *Lonchophylla* Sp. B. *Lonchophylla choacoana*, *L. orcesi*, and *L. robusta* are sympatric at the type locality of *L. orcesi*, and *L. concava* and *L. thomasi* also occur in the region. Each of these species has unique cranial and dental characteristics, probably as a result of adaptations to lessen competition because of their similar diets. Studies on the subtleties of resource partitioning among these bats should prove fascinating.

Ascorra et al. (1989) reported *L. concava* from two localities in the valley of the lower Palcazú, Pasco, Peru, at or near 375 m in the eastern foothills of the Andes. The forearm measurement they gave (39.0 mm) is too large for either *L. concava* (which is not known east of the Andes) or *L. mordax*, and we suggest that the specimens should be reexamined. Ascorra et al. (1994) reported 7 males and 11 female *L. mordax* from Jenaro Herrera in the eastern lowlands of Loreto, Peru. The forearm measurements they gave range from 29.7 to 37.6 mm, and are within the range for *L. mordax*. We also suggest that these specimens be reexamined

because of the great distance between this site and the closest distributional records for *L. mordax* in Brazil and Bolivia. The geographically closest confirmed record for *L. mordax* is from Parque Nacional Noel Kempff Mercado in eastern Santa Cruz, Bolivia (Louise H. Emmons, pers. comm.), an airline distance of approximately 1800 kilometers. We have examined a specimen in the University of Kansas Museum of Natural History (KU 144232) from Peru that may represent the species reported by Ascorra et al. (1989, 1994). Although similar to larger *L. mordax* in size and some morphological features, it has a shorter rostrum and its pale, reddish brown pelage matches that of *L. handleyi* and *L. robusta*. This specimen either represents an undescribed species or is a western representative of *L. dekeyseri*.

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Appendix  
Specimens examined

The following specimens are deposited in the National Museum of Natural History, Washington, D.C., U.S.A. (USNM); the Museum of Natural History, University of Kansas, Lawrence (KU); the Escuela Politécnica Nacional, Quito, Ecuador (EPN); and an uncatalogued collection made by Louise Emmons (LHE).

*Lonchophylla concava* (17): COLOMBIA, *Valle del Cauca*, Río Zabaletas, 29 km SE of Buenaventura (USNM 483360). COSTA RICA, *Puntarenas*, Quebrada Camaronal, near Sirena Station, Corcovado National Park (USNM 565809). ECUADOR, *Pichincha*, Palenque Science Center (USNM 528494–528500). PANAMA, *Chiriquí*, 1 mi. E of Cuesta de Piedra (USNM 331254); *Darién*, Cana (USNM 179621, holotype); Tarcacuna Village Camp (USNM 309384–309386, 309388, 309389); *San Blas*, Quebrada Repressa, Puerto Obaldía (USNM 335179).

*Lonchophylla chochoana* (2): COLOMBIA, *Valle del Cauca*, Río Zabaletas, 29 km SE of Buenaventura (USNM 483361, 483362). ECUADOR, *Esmeraldas*, Los Pambiles, Cordillera de Toisán (EPN 851218, 851232, USNM 575171).

*Lonchophylla handleyi* (2): PERU, *Junín*, Río Tulumayo, 3.2 km N of Vitoc (USNM 507172); *Pasco*, San Juan (USNM 364247).

*Lonchophylla hesperia* (1): PERU, *La Libertad*, Trujillo (USNM 283177).

*Lonchophylla mordax* (4): BRAZIL, *Bahia*, Lamarão (USNM 123392); Cidade da Barra (USNM 238008). BOLIVIA, *Santa Cruz*, Huanchaca I (LHE 1630, 1638).

*Lonchophylla orcesi* (1): ECUADOR, *Esmeraldas*, Los Pambiles (EPN 851241, holotype).

*Lonchophylla robusta* (9): ECUADOR, *Guayas*, San Rafael, 7 km S of Balao (USNM 498827–498829); Huerta Negra, 10 km ESE of Balao (USNM 522157); Huerta Negra, 20 km ESE of Balao (USNM 498830, 498831, 534298–534300).

*Lonchophylla thomasi* (12): COLOMBIA, *Valle del Cauca*, Río Zabaletas, 29 km SE of Buenaventura (USNM 483359, 483363–483365). ECUADOR, *Orrellana*, Yasuní 2, ca. 00°56'S, 75°57'W (USNM 528325); *Pastaza*, 130 mi S of Coca, 01°07'S, 76°57'W (USNM 574510, 574511). GUYANA, *Barama-Waini*, Baramita (USNM 582299–582301). PERU, *Ucayali*, 59 km SW of Pucallpa (USNM 499018); *Cuzco*, La Convención Camisea, Armihuarí (USNM 582795).

*Lonchophylla* sp. (1): PERU, *Madre de Dios*, Reserva Cuzco Amazónico, 15 km E of Puerto Maldonado (KU 144232).