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## A distinctive new species of wood lizard (Hoplocercinae, *Enyalioides*) from the Yanachaga Chemillen National Park in central Peru

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### Abstract

We describe a new species of *Enyalioides* from a mid-elevation premontane forest in central Peru. This represents the seventh species of *Enyalioides* known to occur east of the Andes in South America; the other six species are *E. cofanorum*, *E. laticeps*, *E. microlepis*, *E. palpebralis*, *E. praestabilis*, and *E. rubrigularis*. Among other characters, the new species is distinguished from other *Enyalioides* by the combination of an orange blotch on the antehumeral region (in adult males), 30 or fewer longitudinal rows of dorsals in a transverse line between dorsolateral crests at midbody, ventral scales strongly keeled, and caudal scales heterogeneous in size on each autotomic segment. The new species is most similar morphologically to *E. cofanorum* and *E. microlepis*.

**Key words:** *Enyalioides*, Hoplocercinae, new species, Peru, wood lizard, Yanachaga Chemillen

### Resumen

Describimos una nueva especie de *Enyalioides* proveniente de los bosques premontanos del centro de Perú. Esta representa la séptima especie de *Enyalioides* conocida al este de los Andes de Sudamérica; las otras seis especies son *E. cofanorum*, *E. laticeps*, *E. microlepis*, *E. palpebralis*, *E. praestabilis* y *E. rubrigularis*. La nueva especie se distingue de las demás especies de *Enyalioides* por la combinación de los siguientes caracteres: una mancha naranja en la región antero-humeral (en machos adultos), 30 o menos filas longitudinales de escamas dorsales (contadas en línea transversal entre las crestas dorsolaterales a la mitad del cuerpo), escamas ventrales fuertemente quilladas y escamas caudales de tamaño heterogéneo en cada segmento autonómico. Morfológicamente la nueva especie es similar a *E. cofanorum* y *E. microlepis*.

**Palabras clave:** *Enyalioides*, Hoplocercinae, lagartija de palo, nueva especie, Perú, Yanachaga Chemillen

### Introduction

The Neotropical iguanian lizard clade Hoplocercinae includes 13 species assigned to three taxa ranked as genera: *Enyalioides*, *Hoplocercus*, and *Morunasaurus* (Torres-Carvajal *et al.* 2011). Of these, *Enyalioides* (wood lizards) is the most diverse, with nine species known from low elevations (up to 2000 m) on both sides of the Andes from Panama to southwestern Brazil (Torres-Carvajal *et al.* 2011). Most of the currently recognized species (8) of *Enyalioides* occur in Ecuador, followed by Peru with 6, Colombia 5, Brazil 2, Panama 1, and Bolivia 1 (Torres-Carvajal *et al.* 2008; Venegas *et al.* 2010; Torres-Carvajal *et al.* 2011). However, the diversity of *Enyalioides* probably remains underestimated due to a lack of collections from certain areas, and/or lack of taxonomic work. Wiens and Etheridge (2003) reported on two possible new species from Bolivia and Peru, and two of the nine known species of *Enyalioides* (*E. touzeti* and *E. rubrigularis*) were only recently described (Torres-Carvajal *et al.* 2008, 2009). Herein we describe a new species of *Enyalioides* that was recently discovered on an expedition to the Yanachaga Chemillen National Park (YCNP) on the Amazonian slopes of the Andes in central Peru. This discovery increases the number of species known from Peru to seven, and highlights the importance of making collections in protected natural areas in Peru.

## Material and methods

The type series of the new species described in this paper was deposited in the herpetological collection of the Centro de Ornitología y Biodiversidad (CORBIDI). Additional specimens examined were from CORBIDI and the Museo de Historia Natural San Marcos (MUSM) in Lima, Peru, and the Museo de Zoología, Pontificia Universidad Católica del Ecuador (QCAZ) in Quito, Ecuador. Sex was determined either by noting the presence of hemipenes, by external inspection of base of tail, and sexually dichromatic characters. Snout-vent length (SVL) and tail length (TL) measurements were made with a ruler and recorded to the nearest millimeter. All other measurements were made with digital calipers and recorded to the nearest 0.1 mm. We followed the terminology of Avila-Pires (1995) and Torres-Carvajal *et al.* (2011) for scutellation characters and measurements.

### *Enyalioides rudolfarndti* sp. nov.

(Figs. 1–3)

Proposed standard English name: throat-sliced wood lizard

Proposed standard Spanish name: lagartija de palo de garganta cortada

**Holotype.** CORBIDI 07209 (Figs. 1–2), an adult male from the Pan de Azucar trail near the Puesto de Control Huampal in the YCNP (10°11'03" S 75°34'27" W; WGS 84) at 1050 m.a.s.l., collected on 16.VIII.2010, Provincia de Oxapampa, Región de Pasco, Peru, by P. J. Venegas.

**Paratypes.** CORBIDI 07210 and 07213, an adult female and a juvenile, respectively, collected with the holotype by P. J. Venegas, V. Duran, C. Z. Landauro, and L. Lujan. CORBIDI 07212, an adult male from the same location of the holotype but taken on 19.VIII.2010 by P. J. Venegas.

**Diagnosis.** *Enyalioides rudolfarndti* can be easily distinguished from other species of *Enyalioides* from the Amazon basin by the combination of the following characters: (1) scales posterior to the superciliaries enlarged (relative to adjacent scales), forming a well defined longitudinal row of distinctly raised scales across the lateral edge of the head in juveniles and adults of both sexes; (2) 30 or fewer longitudinal rows of dorsals in a transverse line between the dorsolateral crests at midbody; (3) a distinct orange round blotch on the antehumeral region in adult males; (4) ventral scales strongly keeled; (5) caudal scales heterogeneous in size on each autotomic segment. The orange round blotch on the antehumeral region in adult males of *Enyalioides rudolfarndti* is present also in some male individuals of *E. palpebralis* (Fig. 4). Furthermore, the new species also shares with *E. palpebralis* the presence of enlarged scales posterior to the superciliaries and the presence of strongly keeled ventral scales; however, the latter species can be easily distinguished from *E. rudolfarndti* by having a superciliary triangular flap that projects posterolaterally over each eye. In addition, *E. palpebralis* is the only species that has (most specimens) a discontinuous vertebral crest, having a small gap on the neck, and lacks femoral pores (Torres-Carvajal *et al.* 2011). *Enyalioides cofanorum* and *E. microlepis* share with the new species the presence of strongly keeled ventral scales and caudal scales of heterogeneous size on each autotomic segment. However, *E. cofanorum* differs from *E. rudolfarndti* (characters in parentheses) by having with more than 33 dorsal scales in a transverse line between the dorsolateral crests at midbody (30 or fewer) and scattered, projecting, large dorsal scales (absent). *Enyalioides microlepis* differs from *E. rudolfarndti* by having more than 40 dorsal scales in a transverse line between the dorsolateral crest at midbody (30 or fewer dorsal scales), and a low vertebral crest (high). In addition, adult males of *E. cofanorum* and *E. microlepis* have a black patch that covering the gular region (absent).

**Description of holotype.** Male (Figs. 1–2); SVL = 116 mm; TL = 191 mm; maximum head width = 23.2 mm; head length = 31.6 mm; head height = 23 mm; dorsal head scales including parietal region multicarinate; scales on lateral edge of head just posterior to superciliaries enlarged, forming a well defined longitudinal row of 7 (left) or 6 (right) distinctly raised scales; temporal scales small, conical, juxtaposed, nearly homogeneous in size; 1 large, pre-tympanic conical scale in anterodorsal margin of the tympanum; superciliaries 17; canthals 4; postrostrals 4; left supralabials 13 if counted to a point right below middle of eye, and 16 if counted to commissure of mouth (13 and 16 on right side, respectively); rostral (2.92 × 1.16 mm) about twice as wide as the adjacent supralabials; single longitudinal row of lorilabials between suboculars and supralabials at level of middle of the eye, longitudinal rows of lorilabials anterior to this point 2–3; loreal region broken into small, smooth, and juxtaposed scales; nasal at the

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level of supralabial IV; left infralabials 10 if counted to a point right below middle of eye, and 14 if counted to commissure of mouth (11 and 16 on right side, respectively); mental ( $2.77 \times 1.39$  mm) wider and higher than the adjacent infralabials; postmentals 2; gulars ventrally projected; gular fold weakly defined, complete midventrally; neck with only 2 distinct oblique folds.

Vertebral crest strongly projecting, decreasing in size posteriorly, with vertebrals on the neck at least four times higher than vertebrals between the hind limbs; crest bifurcates posteriorly at base of the tail and extends onto the tail for less than one-third of its length; flanks between forelimbs and hind limbs with dorsolateral and ventrolateral folds, as well as some oblique folds; scales on dorsolateral folds slightly larger than on the adjacent scales and forming a distinct row of raised scales; dorsal scales between dorsolateral fold and vertebral crest heterogeneous in size with small and large, strongly keeled, and imbricate scales; scales on flanks (i.e., ventral to dorsolateral fold) heterogeneous in size with some scales similar in size to dorsals surrounded by minute keeled scales, and some scattered enlarged scales with projecting keels that are two to three times larger than the adjacent scales on the near hind limb insertion; ventral scales imbricate, strongly keeled, rectangular, without a posterolateral mucron; ventrals more than twice the size of the dorsals.

Limb scales keeled dorsally and ventrally; thigh scales homogeneous in size dorsally and heterogeneous in size posteriorly, with most scales less than half of the size of those scales on the anterior and ventral aspects; subdigitals on Finger IV 19; subdigitals on Toe IV 25; femoral pore on each side 1; tail compressed and gradually decreasing in height towards tip; caudal scales strongly keeled and imbricate, increasing in size posteriorly on lateral and dorsal aspects of each autotomic segment; ventral caudals larger than dorsal caudals, with individual autotomic segments being 3 scales long ventrally and 5 scales long dorsally.



**FIGURE 1.** Dorsolateral view of the holotype of *Enyalioides rudolfarndti* sp. n. (CORBIDI 07209, adult male, SVL 116 mm). Photograph by P. J. Venegas.

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**FIGURE 2.** Close-up of head of *Enyalioides rudolfarndti* sp. n. (CORBIDI 07209) showing the orange anthehumeral blotch. Photograph by P. J. Venegas.



**FIGURE 3.** Dorsolateral and ventral views of the paratypes of *Enyalioides rudolfarndti* sp. n. Adult male (A, B, CORBIDI 07212), adult female (C, D, CORBIDI 07210), and juvenile (E, F, CORBIDI 07213). Photographs by P. J. Venegas.

Color in life of holotype (Figs. 1–2): scales on dorsal and lateral surface of head, including labials, rostral, and mental, green; gulars greenish white; skin between gulars black; small dark gray and diffuse gular patch immediately anterior to gular fold; one big orange blotch on each side of the neck, extending posteriorly onto the antehumeral region and ventrally near the dark gular patch; dorsal background green; pale gray round blotches covering dorsolateral region from the neck to base of the tail; fine black reticulation on dorsal aspect of the body, limbs,

flanks, and the proximal portion of the tail; ventrolateral region sky blue; ventral surface of body, limbs, and tail white; lateral borders of venter and ventral surface of thighs and shanks sky blue; the iris is gray with a fine brown radiation; pupil round with a white margin.

Color in ethanol after 10 months of preservation: dorsal background pale turquoise, gulars grayish turquoise; antehumeral blotch yellow; reticulation on the dorsal aspect of body, limbs, and base of the tail dark gray; gray blotches on dorsolateral region absent; ventral surface of body, limbs, and tail dark cream.

**Variation.** Meristic and morphometric characters of *Enyalioides rudolfarndti* are summarized in Table 1. In life, the single adult male paratype CORBIDI 07212 (Fig. 3A–B) has the same background coloration as the holotype but has the dorsum, flanks, dorsal surface of limbs and tail covered by black flecks and not by a fine black reticulation as on the holotype.

**TABLE 1.** Summary of morphological characters and measurements (mm) of *E. rudolfarndti* sp. n. Range follow by mean  $\pm$  standard deviation.

Characters	
Dorsal in transverse row between dorsolateral crests at midbody	27–30, 28.25 $\pm$ 1.5
Ventrals in transverse row at midbody	28–32, 30.25 $\pm$ 3.69
Vertebrales from occiput to base of tail	42–47, 45.5 $\pm$ 2.38
Gulars	33–36, 34.5 $\pm$ 1.29
Infralabials	11, 11
Supralabials	11–14, 12.5 $\pm$ 1.29
Canthals	3–4, 3.75
Superciliaries	14–18, 15.25 $\pm$ 1.89
Transverse rows of ventrals between fore and hind limb	35–38, 36.75 $\pm$ 1.5
Subdigitals fingers IV	19–23, 20 $\pm$ 2
Subdigitals toe IV	25–28, 26.5 $\pm$ 1.29
Femoral pores	1, 1
Head length/Head width	1.30–1.43, 1.35 $\pm$ 0.06
Fore limb length/SVL	0.43–0.56, 0.50 $\pm$ 0.05
Hind limb length/SVL	0.76–0.87, 0.80 $\pm$ 0.05
Tail length/Total length	0.60–1.49, 0.83 $\pm$ 0.44

In life, the single female paratype CORBIDI 07210 (Fig. 3C–D) has the head mossy green with black markings including flecks on the dorsal surface of head; a narrow stripe posterior to the superciliaries extends along the lateral edge of the skull roof; a broad postocular stripe extends to the commissure of the mouth and the anterior border of the tympanum, and an infraorbital stripe is present between the eyes and the labials; the dorsal surface of the neck has a white blotch on each side behind the tympanum, followed by a longitudinal pale stripe that extends to the scapular region; the gular region is dark gray, darker on the gular fold, with dark brown spots; the dorsal background is mossy green with transverse diffuse black bars on the body, limbs, and tail; the ventral surface of the body, limbs and tail is grayish white with black spots in the lateral borders of the belly, ventral surface of the limbs, and the tail; iris gray with a brown reticulation. The vertebral crest and the enlarged and raised scales posterior to the superciliaries are high as in the males.

In life, the juvenile paratype CORBIDI 07213 (Fig. 3E–F) has the head copper with black flecks on the dorsal surface and a broad dark brown subocular stripe; the dorsal background is dark brown with copper transverse bars on the body, limbs, and tail; the belly is copper with scattered dark copper and brown spots; the ventral surfaces of the limbs and the tail are dark brown with copper spots; the gular region is copper and darker than the belly, with some white spots on the ventral border of the snout; the iris is reddish brown and the pupil is round with a golden margin.



**FIGURE 4.** Close-up of head of *Enyalioides palpebralis* (CORBIDI 08347, adult male, SVL 112 mm) showing the orange antehumeral blotch. Photograph by G. Chávez.

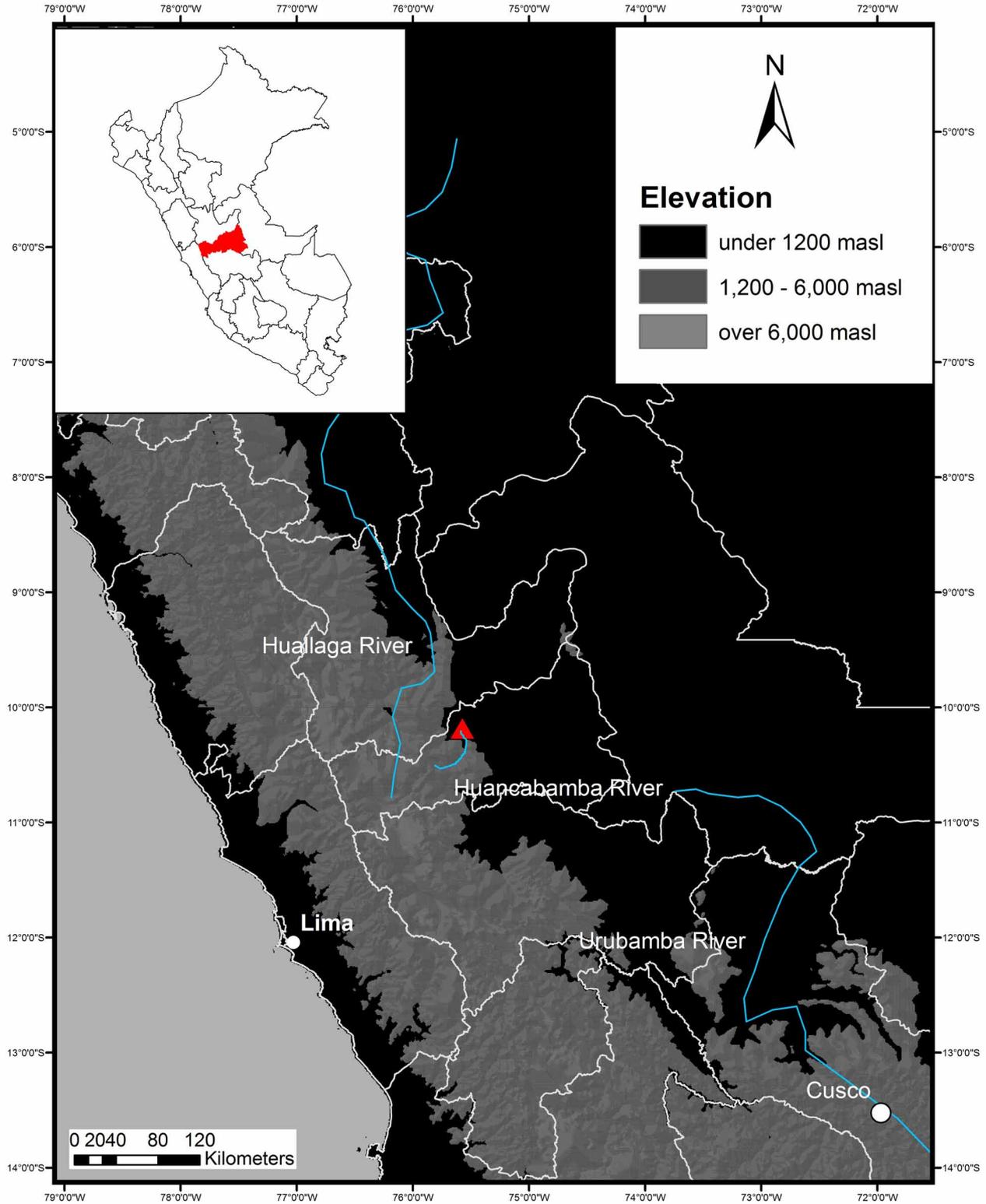
**Distribution and natural history.** *Enyalioides rudolfarndti* is known only from the type locality in the Región de Pasco, at an elevation of 1050 m.a.s.l., on the upper Amazon basin of central Peru (Fig. 5). This new species inhabit the premontane forest of the Río Huancabamba canyon that lies within the YCNP in the Pasco region (Fig. 6). All individuals of *E. rudolfarndti* were collected at night sleeping on horizontal stems of bushes up to 1.50 m above the ground. Sympatric species of reptiles collected with *Enyalioides rudolfarndti* were *Cercosaura argulus*, *Clelia clelia*, *Dipsas catesbyi*, *D. indica*, *D. schunkii*, *Micrurus annellatus*, *Oxyrhopus melanogenys*, and *Stenocercus torquatus*.

**Etymology.** The specific name is a patronym for Dr. Rudolf G. Arndt of Pomona, New Jersey, USA, in recognition of his financial support for the improvement of the herpetological collection of CORBIDI through the BIOPAT-Programme.

**Remarks.** Although *Enyalioides rudolfarndti* and a new species of *Euspondylus* are the only new species of reptile discovered in the Cordillera Yanachaga in the two last decades, the recent taxonomic work on amphibians and herpetological inventories in this region has resulted in the description of 27 new species of amphibians, of which 10 were discovered inside YCNP (Duellman *et al.* 2006; Lehr & Trueb 2007; Lehr *et al.* 2007; Chaparro *et al.* 2008; Boano *et al.* 2008; Duellman & Hedges 2008; Duellman & Chaparro 2008). The lack of new reptiles taxa discoveries in this region probably relates to an absence of taxonomic work in this group in general. Moreover, due to its complex topography, the Cordillera Yanachaga has not been adequately sampled and some areas, such as YCNP, have been only slightly explored. However, in a rapid biological inventory carried out in the northern portion of YCNP during August 2010, we collected the new lizard species described herein; a new species of gymnophthalmid lizard, genus *Euspondylus* (Chavez *et al.* 2011); two new species of strabomantid frogs, genus *Phrynopus*; and one new species of casqued tree frog, genus *Osteocephalus*, all of which are now being described. These findings highlight the importance of collecting in poorly explored areas of Peru, a country that awaits a large number of discoveries in herpetological terms.

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**FIGURE 5.** Distribution of *Enyalioides rudolfarnndti* sp. nov. in Peru. The red triangle indicates the type locality, the only locality where the species is known to date. White circles are important cities for reference.



**FIGURE 6.** Habitat at the type locality of *Enyalioides rudolfarndti* **sp. nov.** on August of 2010. Photograph by P. J. Venegas.

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## APPENDIX I. Specimens examined.

- Enyalioides cofanorum*.—**ECUADOR**: *Orellana*: Vía Pompeya-Iro, 66 Km from Pompeya, QCAZ 08035; *Sucumbíos*: La Selva lodge, 0°24'0"S, 76°39'0"W, QCAZ 03953, 03521.
- Enyalioides microlepis*.—**PERÚ**: *Loreto*: Pozo Runtusapa, MUSM 22264; Datem del Marañón; Andoas, 3°42'15.6"S, 77°18'46.2"W, 273 m, CORBIDI 01506, 01575; Capahuari Norte, 02°39'51.3"S, 76°30'4.42"W, 270 m, CORBIDI 04804; San Jacinto 02°19'51.0"S, 75°51'49.3", 160 m, CORBIDI 05120.
- Enyalioides palpebralis*.—**PERÚ**: *Cusco*: Camisea, 11°35'0"S, 72°57'0"W, 431 m, MUSM 14661; Echarate, 12°50'0"S, 72°39'0"W, 1133 m, MUSM 24663, 26114; 12°34'1.30"S, 73°5'24.9"W, 1300 m, CORBIDI 06042; La Convención 12°11'18.7"S, 73°00'3.31"W, 725 m, CORBIDI 06646, 06752, 06756, 08347; *Loreto*; Requena; Sierra del Divisor, 6°55'7.4"S, 73°50'46"W, 205 m, CORBIDI 02298.