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**A NEW SPECIES OF *GOLOFA* HOPE, 1837
(COLEOPTERA: SCARABAEIDAE: DYNASTINAE) FROM PERU**

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ABSTRACT

A new species of *Golofa* Hope is described from Peru along with supporting illustrations and a diagnosis.

RESUMEN

Se describe una nueva especie de *Golofa* Hope de Perú soportado por ilustraciones y diagnosis.

Key Words: rhinoceros beetles, taxonomy, South America, high elevation

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*Discovery consists of seeing what everybody
has seen and thinking what nobody has thought.*

——— Albert Szent-Györgyi

The New World genus *Golofa* Hope, 1837 currently has about 29 species, depending on which authority one uses (Dechambre 1983; Lachaume 1985; Morón 1995; Ratcliffe *et al.* 2013). Species are found from central Mexico to northern Argentina and Chile. Thirteen species are found in Central America, and 15 species are found in South America with the addition of the new one described here.

Adult males of most *Golofa* species may be recognized by their brownish yellow to dark reddish brown color (a few species are black or nearly so); presence of a tubercle or short to long, upright, slender head horn; presence of a short to long, erect or obliquely oriented pronotal horn or prominent tubercle (both rarely absent); mandibles either entire or notched at the apex; and protibia either tri- or quadridentate. *Golofa* females are dark yellowish brown to more commonly black, are often more heavily sculptured on the elytra, and lack armature other than a tubercle on the head. The front legs of the males have an elongated tibia and tarsus, whereas the length of the tibia and tarsus is shorter or “normal” in the females.

Some *Golofa* females may be easily confused with the females of some species of *Heterogomphus* Burmeister, for example, *H. mniszehi* (Thomson) (Central America) and *H. schoenherri* Burmeister (South America), all of which are black, about the same size, and have densely punctate elytra. In *Golofa* females, the basal segment of the protarsus is subequal to or longer than the apical spur of the protibia. In *Heterogomphus* females, the basal segment of the protarsus is distinctly shorter than the apical spur of the protibia. In addition, while the apex of the prosternal process may have long, dense setae in both genera, the shaft of the process is normally densely setose in *Golofa* species and glabrous or sparsely setose in *Heterogomphus* species.

Even after the modern synopses of Endrödi (1977, 1985), Dechambre (1983), Lachaume (1985), and Morón (1995), identification of many of the species of *Golofa* remains a sometimes difficult and often exasperating task. Experience with the group and a reference collection for comparison is almost essential in order to make reliable identifications. Why *does* identification of the males of these large beetles with often spectacular horns remain so difficult? The reasons are several. First and foremost is the significant morphological variation in

male secondary sexual characters combined with an unusual (for dynastines) lack of broad differentiation of the male genitalia. Most authors have based their concepts of *Golofa* species on the characters of male armature, and since these vary so much within a species due to allometric growth, it has always been difficult to incorporate all of the variation in a workable key, description, or photographs. In many cases, females can be identified only by being collected with the males. So, male characters vary considerably, the usually diagnostic (in dynastines) parameres are occasionally not reliable, other characters seem to vary in their expression, and most of the females all seem to look alike.

Contributing to this less-than-desirable state of affairs is an absence of any modern character analysis that would stabilize our concepts of what constitutes the various *Golofa* species. Only Morón (1995) discussed some character variation for the Mexican species. In spite of the fairly recent comprehensive treatments by Dechambre (1983), Endrödi (1985), and Lachaume (1985), the entire genus *Golofa* still needs, in our opinion, a thorough revision using modern methods of character analysis based upon a *large* assemblage of specimens as well as examination of all the types. Until this is done, we shall continue to stumble around muttering about our inability to *reliably* identify a number of these polymorphic species.

MATERIAL AND METHODS

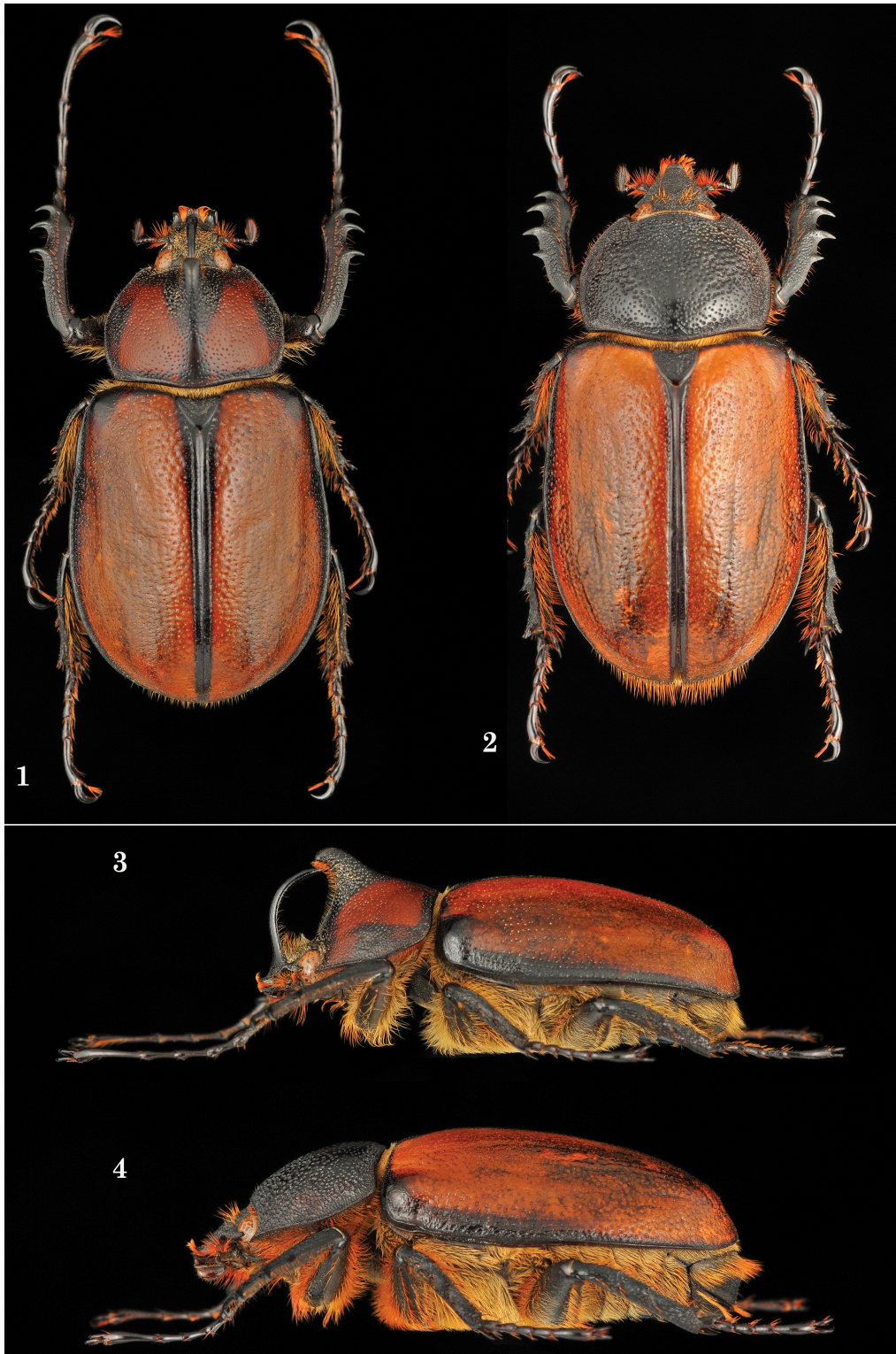
Label data for the new species are quoted verbatim. Different lines of a label are indicated by a diagonal slash (/). The species description is based on the following characteristics: length from the apex of the clypeus to apex of the elytra; width across humeri; color and markings; interocular width (number of transverse eye diameters across the frons); form and sculpturing of the head, pronotum, elytra, and pygidium; form of the protibia and mesometasternal process; and form of the male parameres. Punctures are considered simple unless otherwise noted. Minute punctures are generally not seen with 12.5X magnification but are easily seen with 50X magnification. Small punctures are easily seen with 12.5X magnification and can be seen with the naked eye. Large punctures are easily seen without the aid of instruments. Punctures are termed sparse if there are few of them or they are separated from one another by 10 or more puncture diameters. Punctures that are moderate in density are separated by about three to five puncture diameters, and dense punctures are separated by less than one to three puncture diameters. Obviously, there are gradations in density, and the terms should be used as a general guide. We adhere to the phylogenetic species

concept as outlined by Wheeler and Platnick (2000). This concept defines species as the smallest aggregation of populations diagnosable by a unique combination of character states.

Golofa limogesi Ratcliffe and Le Tirant, new species (Figs. 1–4, 6)

Type Material. Holotype male, allotype female, seven male paratypes, 10 female paratypes all with same data, labeled “PERU: Piura / Ayabaca, 3000 mts, / 1-5.III.2015 / Local collector” and with our red holotype, red allotype, and yellow paratype labels, respectively. Holotype and allotype deposited at the University of Nebraska State Museum (Lincoln, NE, USA) and paratypes deposited in the Insectarium de Montréal (Montréal, QC, Canada; 2), US National Museum of Natural History (Washington, DC, USA; 2), Museo de Entomología Klaus Raven Büller (Universidad Nacional Agraria La Molina, Lima, Peru; 2), Stéphane Le Tirant Collection (Terrebonne, QC, Canada; 7), and Brett C. Ratcliffe Collection (Lincoln, NE, USA; 4).

Description. Holotype male. Length 43.5 mm; width 18.8 mm. Color of pronotum and elytra dark reddish brown with fuscous and black margins and black longitudinally along center of pronotum (including horn) (Fig. 1). Head, horns, scutellum, elytral suture, pygidium, and legs black. **Head:** Frons densely, coarsely rugopunctate and with moderately dense, long, pale yellow setae. Frontoclypeal region with moderately long (9.3 mm), slender, strongly recurved horn with acute apex (Fig. 3); basal half of horn posteriorly with sparse, moderately long setae. Clypeus tapering to narrow, emarginate apex; surface with small, dense punctures. Interocular width equals 1.8 transverse eye diameters. Antennal club subequal in length to antennomeres 2–7. Mandible with apex distinctly notched. **Pronotum:** Center of disc with short (4.5 mm), parallel, slightly curved horn or elongate knob (Fig. 3) projecting forward and only slightly upward at about 22° from plane of pronotal disc, apex simply, bluntly rounded; anterior surface of horn with dense, moderately long, pale yellow setae, and a narrow sulcus extending from anterior base of horn to anterior margin of pronotum. Pronotal surface either side of horn finely shagreened, with moderately large, moderately dense, round and crescent-shaped punctures, punctures becoming denser along lateral margin. Base with complete marginal bead. **Elytra:** Surface finely shagreened, weakly shiny either side of suture and with large, moderately dense, shallow punctures; surface elsewhere dull, with small punctures in rows. **Sutural stria** a strongly impressed line. **Propygidium:** Stridulatory ridges converging towards apex.



Figs. 1–4. *Golofa limogesi*. Dorsal habitus: 1) Male holotype; 2) Female allotype. Lateral habitus: 3) Male holotype; 4) Female allotype.

Pygidium: Surface on basal third with small, dense, setigerous punctures; setae long, dense, tawny. Surface on apical 2/3 glabrous, shagreened, with small, moderately dense punctures. In lateral view, basal third weakly convex, apical 2/3 nearly flat and almost “retracted” beneath apical third. **Legs:** Protibia tridentate, basal tooth distinctly removed from others. Basal tarsomere of protarsus shorter than next 2 tarsomeres combined. Mesotibia at apex with 2 small, sharp teeth; 2 transverse carinae at middle of tibia obsolete. Basal tarsomere of meso- and metatarsi with apex extended into small spine. **Venter:** Prosternal process laminate, tapering, partially obscured by long, tawny setae, apex narrowly subtruncate. **Parameres:** In caudal view, form asymmetrical with left paramere broadly emarginate at center on inner surface (Fig. 5). Apices with long, dense, tawny setae. In lateral view, basal piece noticeably flattened on ventral surface.

Allotype Female. Length 38.5 mm; width 16.8 mm. As holotype male except in the following respects. Color of head and pronotum black (Fig. 2). **Head:** Frons and clypeus densely, coarsely rugopunctate; frons with a patch of long, reddish brown setae on both sides of middle. Horn absent (Fig. 4), but frons with low, transverse tubercle. Clypeus tapering to narrowly subtruncate apex. Interocular width equals 2.1 transverse eye diameters. **Pronotum:** Horn absent. Surface with large, dense (mostly confluent on apical half), deep, round punctures. **Pygidium:** Surface on apical 2/3 not as strongly “retracted” beneath apical third. **Legs:** Protibia quadridentate, all teeth subequally spaced from one another. Basal tarsomere of protarsus slightly longer than tarsomere 2. Mesotibia at apex with 2 large, sharp teeth; 2 transverse carinae at middle of tibia distinct.

Paratypes. Males ($n = 7$). Length 37.0–42.9 mm; width 17.3–20.0 mm. Very nearly identical with holotype except in the following respects. Body length varies slightly. Color of pronotum dark reddish brown with black as type or only on horn and a spot on lateral margin at widest point. **Head:** Frontoclypeal horn 4.9 mm in smallest male to 14.1 mm in largest male. Interocular width equals 1.5 transverse eye diameters. **Pronotum:** Horn varies in length from 2.5 mm in smallest male to 8.3 mm in largest male and varies in angle from projecting forward and only slightly upward at about 20° from plane of pronotal disc in minor male to projecting at 45° from plane of pronotal disc in major male. **Pygidium:** Surface on apical 2/3 not shagreened. **Legs:** Protibia tridentate, basal tooth only slightly removed from others. Mesotibia at apex with 1 large and 2 small, sharp teeth; 2 transverse carinae at middle of tibia distinct. **Females** ($n = 10$). Length 37.0–42.9 mm; width

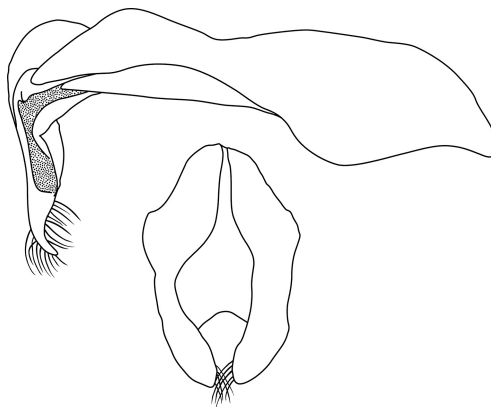


Fig. 5. *Golofa limogesii*, parameres, lateral and caudal views.

17.3–20.0 mm. The female paratypes do not differ significantly from the allotype. Two specimens have reddish brown on the basal half of the pronotum, while the remainder is black. Tubercle on the frons varies from virtually obsolete to pronounced, conical to slightly, transversely curved.

Etymology. We are pleased to name this species for René Limoges in grateful recognition of his skill and generosity in providing superb images of beetles over the years to both of us for our work.

Distribution. *Golofa limogesii* is, at present, known only from above the town of Ayabaca in Ayabaca Province in the Piura Region of northwestern Peru (Fig. 6). Ayabaca is the highest town in the region at 2,700 m. Most, though not all, species of *Golofa* live at elevations higher than 1,500 m but usually less than 2,500 m. This locality is adjacent to Loja Province in Ecuador where BCR, Ronald Cave, and Aura Paucar are engaged in a biodiversity inventory of the Dynastinae of Ecuador.



Fig. 6. *Golofa limogesii*, distribution.



Fig. 7. *Golofa eacus*, lateral habitus.

Accordingly, *G. limogesi* will be sought after in nearby southern Ecuador.

Diagnosis. *Golofa limogesi* males are distinctive because of the forward projecting pronotal horn or knob that is shorter than or equal to (in major males) the frontal horn, notched mandibular apex, elytra shiny next to the suture but dull elsewhere, black scutellum, and form of the parameres. The low, forward-projecting, curved pronotal horn resembles that of the South American *Golofa pelagon* Burmeister and the Central American *Golofa obliquicornis* Dechambre, but the parameres are different from those species. The parameres are nearly identical to those of the common and sympatric *Golofa eacus* (Drury), but the form of the pronotal horn is different. In *G. limogesi*, the pronotal horn is stout, knob-like, and projects forwards in all but the most developed males where the horn projects forwards and slightly upwards (Fig. 3), whereas in *G. eacus* the pronotal horn is slender and erect (even in minor forms) (Fig. 7). Both males and females of *G. limogesi* may be distinguished from *G. eacus* by the color of the scutellum (black in *G. limogesi*, reddish brown in *G. eacus*), and the stridulatory bands on the propygidium (converging in *G. limogesi* but parallel in *G. eacus*).

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