

TRABAJOS ORIGINALES

**Beetles (Coleoptera) of Peru: A Survey of the Families. Monotomidae Laporte, 1840**

**Escarabajos (Coleoptera) de Perú: un muestreo de las familias. Monotomidae Laporte, 1840**

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**Abstract**

The diversity of the beetle family Monotomidae is summarized for Peru. One subfamily, three tribes, three genera, and four species are recorded. This paper presents the first record of this family in the country, as part of the 'Beetles of Peru' project. Diagnostic characters for the family are given. This is only a preliminary checklist; many specimens were not identifiable past genus with current literature. The diversity of Monotomidae will expand considerably with additional surveys and sampling work within the country.

**Keywords:** taxonomy; Neotropical; minute clubbed beetles; South American biodiversity; checklist.

**Resumen**

La diversidad de la familia Monotomidae se resume para Perú. Una subfamilia, tres tribus, tres géneros y cuatro especies son registrados. Este trabajo presenta el primer registro de esta familia para el país, como parte del proyecto 'Escarabajos de Perú'; también, se presentan los caracteres diagnósticos para la familia. Este listado representa uno solamente preliminar, ya que muchos especímenes no eran identificables con la literatura actual más allá del género. La diversidad de Monotomidae se expandirá considerablemente con más trabajos de muestreos dentro del país.

**Palabras clave:** taxonomía; Neotrópico; escarabajos minúsculos de antenas capitadas; biodiversidad de Sudamérica; listado de especies.

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## Introduction

The family Monotomidae (the minute clubbed beetles) comprises two extant subfamilies, Rhizophaginae Redtenbacher and Monotominae Laporte, of which only the latter is known from Peru (Bousquet 2009). The sister group of the family is, as yet, unknown, but may be the Nitidulid-series (Nitidulida e+Kateretidae+Smicripidae) (McElrath et al. 2015, McKenna et al. 2015, Robertson et al. 2015) or various families allied to Erotylidae (Helotidae, Erotylidae, others) (Leschen et al. 2005, Hunt et al. 2007, Lawrence et al. 2011, Bocak et al. 2014). The family is thought to be monophyletic, although this has yet to be rigorously tested. Monotominae is divided into four tribes: Europini Sen Gupta, Lenacini Crowson (endemic to New Zealand), Monotomini Laporte, and Thionini Crowson. There are about 250 species described worldwide, nearly half of which are placed in three genera: *Europs* Wollaston (53 spp.), *Monotoma* Herbst (40 spp.), and *Rhizophagus* Herbst (53 spp.).

Below is the first checklist of the Monotomidae of Peru, which comprises 1 subfamily, 3 tribes, 3 genera, and 4 confirmed species. This report is another installment in the 'Beetles of Peru' project (see Chaboo, 2015). Beyond the confirmed species mentioned below, there are many Peruvian specimens that are unidentifiable past genus until comparisons with type material are possible, or until the respective genera are revised. Following the format used for other contributions to the Beetles of Peru Project, a summary is given of information on the recognition, habitat, biology and collecting methods of Monotomidae to advance research on this family, especially by Peruvians.

**Recognition.**- Adults can be reliably identified with the following combination of characters (Bousquet 2009, McElrath et al. 2012, McElrath et al. 2016): 1) antennae appearing ten-segmented, with a one- or two-segmented antennal club, the terminal segment actually representing a fusion of the true 10<sup>th</sup> and 11<sup>th</sup> antennal segments; 2) procoxal cavities broadly closed; 3) one (females and *Thione* Sharp) or two (males of most genera have a small sixth abdominal segment) abdominal tergites exposed beyond elytral apices; 4) first and fifth abdominal ventrites longer than any of ventrites 2 – 4 individually; and 5) tarsal formula 5 – 5 – 5 (females and Thionini) or 5 – 5 – 4 (males of most genera) (this character can be difficult to see as the first tarsal segment is small and somewhat hidden within the apex of the hind tibia).

Other characters helpful for recognition include: small body size (1 – 6 mm long from clypeus to elytral apex); body generally elongate-cylindrical to elongate-flattened, subglabrous to setaceous; head prognathous, exposed from above; antennae usually not concealed from above, widely separated, usually with an abrupt 1 – 2 segmented antennal club (not abrupt in *Crowsonius* Pakaluk & Ślipiński and some *Leptipsius* Casey), never 3 segmented; pronotum variable; mesocoxal cavities open; elytra with strong puncture rows or with dense, confused punctuation; abdominal ventrite 1 usually as long as 2 – 4 combined; and pygidium well-sclerotized, punctured (Bousquet 2009, McElrath et al. 2012, McElrath et al. 2016)(Fig. 1).

**Biology, Habitat, and Collecting Methods.**- Monotomids can be collected in a wide variety of habitats, though much is still to be learned about their biology. Passive collecting devices like flight intercept traps (FIT) and Lindgren funnel traps have

proven effective in catching large numbers of Monotomidae. The specimens reported below were collected by FIT, Malaise, colored pans, and from active collecting on fungus and tree sap.

*Monotoma*, especially the cosmopolitan species *M. longicollis* Gyllenhal and *M. picipes* Herbst, can be collected by sifting decaying vegetable matter such as decaying grass or compost heaps (Bousquet & Laplante 1999). Some *Monotoma* species can also be collected in refuse piles of ants (e.g. *Atta* F. or *Formica* L.), although no myrmecophilous taxa are known from Peru as of yet. Other species can be collected by sifting leaf litter or small mammal nests.

*Thione* species are thought to feed on scolytine and platypodine Curculionidae, or on their fungal crops; although this assumption is based on very limited data. They can be collected by examining the host galleries closely, peeling bark, or by using extraction methods that target these microhabitats such as emergence traps. Very little association or host data exists, but the three New World species have variously been collected from fungi: e.g. *Polyporus* (Micheli ex. Adanson), or from plants (probably under bark): *Lecythis corrugata* (Poiteau), *Persea borbonia* (L.), *Pouteria egregia* (Sandwith), *Toulicia pulvinata* (Radlkofer), and *Vismia guianensis* (Aublet).

*Europs* species, and especially *Europs bilineatus* Sharp, can be collected in great numbers under bamboo sheaths, especially those beginning to decay. Other species of *Europs* are associated with various rotting microhabitats, such as mammal nest detritus, rotting fruits, and fungus. *Europs fervidus* Blatchley, known from Florida and the Caribbean Islands, is a pollinator of the tropical hybrid fruit atemoya (*Annona x atemoya*). It is possible that other species may function in pollinator roles through the tropics (Jenkins et al. 2013, 2015). In the United States, *Europs pallipennis* LeConte and some other monotomids can be collected in great numbers using elevated flight intercept traps in old growth temperate forests (Ulyshen & Hanula 2007). This is the most diverse genus of tropical monotomids. It may well be collected in microhabitats that are currently undocumented.

Additional genera that may be found in Peru include *Leptipsius*, *Bactridium* LeConte, *Aneurops* Sharp, and *Hesperobaenus* LeConte, all of which are usually collected under bark in association with ascomycete fungi such as *Hypoxylon* Bulliard (Lawrence 1977, Bousquet 2009). Searching the subcortical microhabitat and other types of decaying vegetative material may yield new genus or species records of Monotomidae in Peru. The enigmatic genus *Crowsonius* is known only from a few collecting events in the nearby state of Pará, Brazil, and only from the nests of *Trigona* bees (Pakaluk & Ślipiński 1993, 1995). As *Trigona* bees are known to occur throughout the tropics, it is possible that *Crowsonius* also occurs in Peru. To collect this genus, direct examination of host bee nests is required, as all known *Crowsonius* species are flightless.

**Identification.**- Peruvian monotomid genera can be identified using the filter key of McElrath et al. (2016) or Sen Gupta (1988). However, it should be noted that additional undescribed taxa may be present, and identifications should be confirmed by a specialist. Species identification in this region, with the exception of a few well-characterized species, is extremely difficult, and usually requires comparison with type material.

## Materials and methods

Data presented here are based on examination of 361 adult specimens assembled from the following collections:

- CAS – California Academy of Sciences, San Francisco, CA, USA – David Kavanaugh, Rachel Diaz Bastin
- FMNH – Field Museum of Natural History, Chicago, IL, USA – Crystal Meier
- FSCA – Florida States Collection of Arthropods, Gainesville, FL, USA – Kyle Schepp, Paul Skelley
- NCSU – North Carolina State University Insect Museum, Raleigh, NC, USA – Bob Blinn
- SEMC – Snow Entomological Museum, University of Kansas Biodiversity Institute – Zackary Falin

Specimens collected for the Beetles of Peru Project were obtained under Peruvian research permits N°. 506-2011-AG-DGFFS-DGEFFS and No. 0159-2010-AGDGFFS-DGEFFS (PI C.S. Chaboo). Types, uniques and 50% of all other specimens from that project are to be repatriated to the Museum of Natural History, University of San Marcos, Lima, Peru.

## Results

Because no monotomid species have been reported from Peru before (e.g. Blackwelder 1945), those identified below represent **NEW COUNTRY RECORDS**. However, many species not recorded herein are known from surrounding countries, so this preliminary checklist is expected to expand greatly given sufficient time and collecting effort (Blackwelder 1945, McElrath unpublished data). Furthermore, there are additional species known from Peru, especially in the genera *Bactridium*, *Europs*, and *Monotoma*, that will be recorded from the country once these genera are revised. Peruvian specimens of the genus *Monotoma* were studied, but could not be confidently identified with current literature. It also is likely that the cosmopolitan species *Monotoma longicollis* and *Monotoma picipes* (Fig. 1B), recorded from neighboring countries, eventually will be found in Peru.

## CHECKLIST OF MONOTOMIDAE OF PERU

MONOTOMIDAE LAPORTE, 1840  
 MONOTOMINAE LAPORTE, 1840  
 EUROPINI SEN GUPTA, 1988  
 EUROPS WOLLASTON, 1854

*Europs bilineatus* Sharp, 1900 (Fig. 1A)

MONOTOMINI LAPORTE, 1840  
 MONOTOMA HERBST, 1793

*Monotoma species* undetermined (Fig. 1B)

THIONINI CROWSON, 1952  
 THIONE SHARP, 1899

*Thione cephalotes* Sharp, 1899 (Fig. 1C)

*Thione championi* Sharp, 1899 (Fig. 1D)

*Thione puncticeps* Sharp, 1899

## RHIZOPHAGINAE REDTENBACHER, 1845

None represented

## NEW COUNTRY RECORDS

For each new record the label data are quoted directly below, with “/” dividing separate lines of data on the labels, and quotes surrounding the entirety of each unique collecting event. Multiple similar collecting events are separated by “//”, with the first event containing all label data and the remaining events with only the changes listed. The number of specimens and the repository are given at the end of each record.

### *Europs bilineatus*

“Peru: Torrentoy / Canyon, base of / Machu Picchu, 2000 / m. 20.VI.1964 / leg. B. Malkin / under bark Inst. Zool. P.A.N. / Warszawa / 68/67 (325, FMNH)”

“Peru: Madre de Dios / Cocha Cashu Bio. Stn. / Manu National Park, 350 m / 11°53'45”S, 71°24'24”W / 17-19 OCT 2000, R. Brooks / PERU1B00 042 / ex. flight intercept trap (8, SEMC)”

“Peru: Tambopata Prov. / Madre de Dios Dpte. / 15km NE Puerto / Maldonado Reserva / Cuzco Amazónico / 12°33’S, 69°03’W / 200m, camp / 3 July 1989, J. S. Ashe, / R. A. Leschen #377 / ex. under bark with / fermenting sap (1, SEMC)”

### *Thione cephalotes*

“PERU: / Monson Valley / Tingo Maria / X-19-1954 / E.I.Schlinger / & E.S.Ross / collectors (1, CAS) // same, except X-10-1954 (2 specimens, CAS) // same, except X-26-1954 (4, CAS) // same, except XI-10-1954 (1, CAS) // same, except XII-9-1954 (1, CAS) // same, except XII-23-1954 (1, CAS)”

“PERU: Tambopata Prov. / Madre de Dios Dpto. / 15km NE Puerto / Maldonado Reserva / Cuzco Amazónico / 12°33’S, 69°03’W / 200m, camp / 21 June 1989, J. S. Ashe, / R. A. Leschen #213 / ex. at light (1, SEMC) // same except, 30 June 1989 #348 ex. under bark with fermenting sap (1, SEMC) // same except, 12 July 1989 / #493 ex. *Favolus hexagonalis* (1, SEMC)”

“PERU: Jauja Prov. / Junín Dept., 840m. / Sani Beni (8km.E. / Satipo) Oct-Nov 1935 / Felix Woytkowski (1, SEMC)”

“PERU: Madre de Dios: / CICRA Field Station, / Exp. Plot, South Transect / 12.55261°S 70.11008°W, 295m / 11-13. VII.2010 Chaboo team / ex. Malaise trap / PER-10-07-MaT-4 (1, SEMC) // same, except trail 6, rsrch / plot, 12.55207°S 70.10962°W / 11-13.VI.2011 / PER-11-MAT-021 (1, SEMC) // same, except PER-11-MAT-029 (1, SEMC)”

### *Thione championi*

“PERU: / Monson Valley / Tingo Maria / X-19-1954 / E.I.Schlinger / & E.S.Ross / collectors / *Thione championi* / Sharp 1899 / det TC McElrath 2015 (1, CAS)”

“PERU: Tambopata Prov. / Madre de Dios Dpto. / 15km



**Figure 1.** Monotomidae species occurring in or near Peru. Dorsal and ventral habitus images taken by TC McElrath: A) *Europs bilineatus* Sharp, 1900; B) *Monotoma picipes* Herbst, 1793; C) *Thione cephalotes* Sharp, 1899; D) *Thione championi* Sharp, 1899.

NE Puerto / Maldonado Reserva / Cuzco Amazónico / 12°33'S, 69°03'W / 200m, camp / 9 June 1989, J. S. Ashe, / R. A. Leschen #009 / ex. at light (1, SEMC)"

"PERU: Madre de Dios: / CICRA Field Stn., garden / 12.56940°S 70.10100°W / 260m 26.VIII-2.IX.2010 / MJ Endara, malaise trap / PER10-08-MAT-013 (1, SEMC)"

"PERU: Madre de Dios, / Puerto Maldonado / 17-XII-2013, 267 m / 12.56104°S, 71.10645°W / T. Perez, Malaise Trap (1, FSCA)"

"PERU:Loreto: 160 km / NE Iquitos, 3 mi.N.Rio / Sucusari on Rio Napo, / Lk. Shimigay; 29-VIII- / 1992; P.E. Skelley (1, FSCA)"

### *Thione puncticeps*

"PERU: / 15 mi.NE of / Tingo Maria, / 700 m XI-11-54 / E.I.Schlinger / & E.S.Ross / collectors (1, CAS)"

"PERU: Madre de Dios / Dept. Tambopata / 25-X-1982 / FMHD #82-391, L. E. / Watrous & G. Mazurek (1, FMNH)"

"PERU: Madre de Dios: / CICRA Field Station, / Exp. Plot, North Transect / 12.55261°S 70.11008°W, 295m / 13-15.VII.2010 Chaboo team / ex. flight intercept trap / PER-10-07-FIT-009 (1, SEMC)"

"PERU: Madre de Dios: / CICRA Field Station, / Exp. Plot, South Transect / 12.55261°S 70.11008°W, 295m / 11-13.VII.2010 Chaboo team / ex. blue pan trap / PER-10-07-DJB-020 (1, SEMC)"

"PERU Madre De Dios / nr.PuertoMaldonado / Explorer's Inn / 22 Aug.1985 / J.F.Cornell / under bark & logs (1, NCSU)"

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