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Laemophloeidae of the ACP Panguana of the Amazon Area of Peru (Insecta: Coleoptera)

Part 1: Biodiversity

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Content

Abstract

The Laemophloeidae (beetles) of the primary lowland rain forest of the Panguana ACP (ACP = Área de Conservación Privada), situated in the Amazon area of Peru, are studied. The beetles were collected in a defined area of the forest (non-flooted during the rainy season) in a plot of about 2 km². Different collection techniques were used (mainly light traps, Malaise traps, sifting upper layers of soil and of litter, fogging trees). Seventy-four laemophloeid taxa/species could be documented, most of them not known from Peru before. All taxa are illustrated by photographs. The number of documented taxa in that plot of forest exceeds the number of taxa known from the whole South America by far.

The following taxa are recorded from Peru for the first time: *Cryptolestes robinclarkei* THOMAS, 2004, *C. uncicornis* (REITTER, 1976), *Dysmerus monstrosus* THOMAS, 2009, *D. rondoniensis* THOMAS, 2009, *D. symphilus* THOMAS, 2009, *Laemophloeus buenavista* THOMAS, 2013, *L. dozieri* THOMAS, 2014, *L. lecontei* GROUVELLE, 1876, *L. macrognathus* REITTER, 1876, *L. mathani* GROUVELLE, 1889, *L. megacephalus* GROUVELLE, 1876, *L. planaclavatus,* THOMAS, 2014, *L. sexarticulatus* KESSEL, 1926, *L. suturalis* REITTER, 1876, *L. taurus,* THOMAS, 2014, *Metaxyphloeus germaini* (GROUVELLE, 1896), *M. zeus* THOMAS, 1984,

Odontophloeus kesseli (HETSCHKO, 1928), *Phloeolaemus curtus* (GROUVELLE, 1876), *P. sharpi* (HETSCHKO, 1930), *P. reitteri* (GROUVELLE, 1877), *P. anticus* (SHARP, 1899), *Placonotus politissimus* (WOLLASTON, 1867), *Rhabdophloeus chiriquensis* SHARP, 1899.

Because several genera of Laemophloeidae are not adequately defined or revised, several taxa could not be assigned to a described species. Therefore, the following placements of the taxa from the Panguana ACP to the subsequently cited genera are partially tentative (the number of taxa of the genera in brackets): *Laemophloeus* DEJEAN, 1835 (12), *Charaphloeus* CASEY, 1916 (17), *Phloeolaemus* CASEY, 1916 (7), *Cryptolestes* GANGLBAUER, 1899 (7), *Lathropus* ERICHSON, 1835 (1), *Placonotus* MACLEAY, 1871 (2), *Odontophloeus* THOMAS, 1984 (1), *Rhabdophloeus* SHARP, 1899 (7), *Dysmerus* CASEY, 1884 (8), *Rhinomalus* GEMMINGER, 1870 (1), *Metaxyphloeus* THOMAS, 1984 (4), *Rhinophloeus* SHARP, 1899 (4), taxa of genera not yet defined (3).

The subsequent species are transferred from *Laemophloeus* DEJEAN, 1835 to *Charaphloeus* CASEY, 1916:
Laemophloeus convexus GROUVELLE, 1876) = *Charaphloeus convexus* (GROUVELLE, 1876) [comb. n.];
Laemophloenus flavescens SHARP, 1899 = *Charaphloeus flavescens* (SHARP, 1899) [comb. n.];
Laemophloeus guatemalenus SHARP, 1899 = *Charaphloeus guatemalenus* (SHARP, 1899) [comb. n.].

Introduction

Biodiversity inventory is one method to characterize the status of a habitat (see e. g. LONGINO & COLWELL 1997), and of most families of insects of the lowland rain forests of the Amazon basin a biodiversity inventory has not been performed. This also concerns the Laemophloeidae (Coleoptera).

The Laemophloeidae are a small family of beetles, taxiconomically only partially well studied, at time of investigation with 56 known species from South America and with 8 species from Peru (THOMAS & CHABOO, 2015). Laemophloeidae belong to a group of small flat bark beetles. All species have a sublateral line on pronotum in form of a groove or a narrow crest, and, except species of one genus, also on head in form of a crest. Their biology is poorly understood. In the USA several species are found under bark of hardwood logs, mostly species with a flat body, and these species are probably fungivoreous (THOMAS 1993).

Several genera with these flat species occur in Panguana. But there are a few genera with a subcylindrical body shape (THOMAS 1993). They probably live in holes of wood boring insects. Species of one genus with a subcylindrical body are also found in Panguana (*Dysmerus* CASEY, 1884). Usually Laemophloeidae are collected at light. This is also true for most species occurring In Panguana. In our material, however, several species were collected in malaise traps; one species was found only by sifting soil from the bottom of the primary forest, and another species was only found in fogging material.

THOMAS between 1984 and 2017 revised several American genera of Laemophloeidae. Only species of these genera can currently be determined with some certainty. These genera are *Laemophloeus* DEJEAN, 1835, *Cryptolestes* GANGLBAUER, 1899, *Placonotus* MACLEAY, 1871, *Dysmerus* CASEY, 1884, *Deinophloeus* SHARP, 1899, *Odontophloeus* THOMAS, 1984, and *Metaxyphloeus* THOMAS, 1984.

Genera not yet reviewed are *Charaphloeus* CASEY, 1916 (with many and mostly undescribed species in Panguana), *Rhinomalus* GEMMINGER, 1870 (one species in Panguana), *Rhinophloeus* SHARP, 1899 (several species) and *Lathropus* ERICHSON, 1846 (one species). Species of these genera can only be determined when types of described species are at hand for direct comparison. This is rarely the case. The distinguishing lines between several genera of Laemophloeidae are not well settled. This concerns revised genera and also not yet devised genera, e. g. between *Laemophloeus* and *Charaphloeus.* Furthermore, some species occurring in South America do not fit into described genera, e. g. Panguana species of the genera 1-3 of this paper (see below).

A bioinventory of Laemophloeidae in a more or less restricted area has only been performed by THOMAS (1993) concerning Florida, USA and some bounties of this state. The number of Laemophloeidae of Florida is limited. In South America, especially in primary rain forests, many more species have to be expected. We therefore sorted out Laemophloeidae from material collected at the biological field station Panguana ACP but we also sorted out species of Phalacridae, of Biphyllidae, of Nitidulidae, of Chrysomelidae and of some other families. In this paper the bioinvetory only of Laemophloeidae is studied. In following papers descriptions of new Laemophloeidae species but also on phylogenetic relations of their genera will follow. Other specialists may deal with the taxa of the other families.

The biological field station Panguana ACP (ACP = Área de Conservación Privada = private nature reserve) was founded 1968 in the primary lowland rain forest of the Peruvian Amazon basin by Drs. Maria and Hans-Wilhelm KOEPCKE, who at that time were members of the Natural History Museum, Lima. Since its founda-

tion ecological research and research on biodiversity was performed in that station. The Panguana ACP is situated at the banks of the river Yuyapichis, a tributary of River Pachitea, at an altitude of 230 m, 9°37'S, 74°56'W. The Panguana research area is lawfully protected by the Peruvian Government and directed by Dr. Juliana DILLER, née KOEPCKE, vice director of the Zoologische Staatssammlung, Munich. It is a 10 km² large plot mainly of natural forest which consists of hilly, not flooted areas in the rainy season (called Terra firme), but also of swamps and of alluvial forests. Inside of Terra firme there are also pools.

The investigations on Laemophloeidae were mainly performed in a 2 km² large plot of Terra firme. According to A. NIESNER (personal communication to the second author, 2020) the Terra firma: "is characterized by differentiated crown levels and frequent occurrence of emergent trees 50 to 60 m in height and several meters in circumference. The understory consists of young trees and only few herbaceous plants. Diversity of wood species is outstanding but population diversity of a single species is low. Several emergent old-growth individuals are present, but also patches with recently fallen trees and pioneer species. Most abundant tree species are *Pseudomedia laevigata* (Moraceae), *Iriartea deltoidea* (Arecaceae), *Nealchornea yapurensis* (Euphorbiaceae), *Virola calophylla* (Myristicaceae) and *Aspidosperma parvifolium* (Apocynaceae). Rain fall usually exceeds 300 mm/month from December to March, between 50 to 100 mm/month from June to August".

Results of the inventory on several insect families have already been published, e. g. in more recent years on Aradidae (Heteroptera) (HEISS & SCHMOLKE 2016), on Cicadellinae (SCHÖNITZER & FEUERABENDT 2014) or on treehoppers (Auchenorrhyncha, Membracoidea) (SCHULZE et al. 2016).

Before this inventory was started the following eight laemophloeid species were known from Peru: *Cryptolestes ampiyacus* THOMAS, 1988, *Dysmerus caseyi* (GROUVELLE, 1898), *Dysmerus skelleyi* THOMAS, 2009, *Placonotus pallentipennis* (GROUVELLE, 1876), *Laemophloeus corporeflavus* THOMAS, 2014, *Laemophloeus mathani* GROUVELLE, 1889 (THOMAS 2014, 11), *Laemophloeus incisus* SHARP, 1899 (THOMAS & CHABOO, 2015), and *Paraphloeolaemus vorticosus* THOMAS, 2017 (THOMAS 2017, 3).

Materials and Methods

This study is based on specimens obtained by different collection techniques in Terra firma of Panguana ACP: light traps, malaise traps, sifters (soil and litter), and fogging trees. Most insects were stored in 70 per cent alcohol in the "Zoologische Staatssammlung" München, Germany.

Over the last 5 years we sorted Laemophloeidae from that material which was obtained over about 10 years. We determined the species using determination keys and figures of the publications of THOMAS (1984a, b, c, 1988, 2002a, b, 2004, 2010, 2013, 2014, 2017). Additionally, several species have been compared with types of species described by SHARP (1899) (stored in the Natural History Museum, London). Furthermore, determinations of a few species have been confirmed by THOMAS (2017). Given that several genera of the Neotropical area have not yet been revised - and therefore most of their taxa cannot be determined correctly - all taxa are documented by a habitus photograph, and, concerning the species not determinable, by photographs of parts of the body, furthermore by a few diagnostic notes. Because it was no place for more than one photograph in this paper only the photograph of the habitus is published here . However, in case of revision of genera or description of new species the additional photographs may be published. The second author of this paper is continuing this work on Laemophloeidae from Panguana, sorting out more material and also describing new taxa either alone or in cooperation with other specialists. This paper is part 1 in a planned series on this family from the Panguana ACP field sites.

This inventory of the biodiversity of the Laemophloeidae of the Panguana research station may be compared with data of other habitats of tropical America when they become available.

Specimen deposit: All laemophloeid specimens which had been collected from Panguana ACP except holotypes of newly described species are deposited in "Zoologische Staatssammlung München", Germany. Holotypes of newly described species are deposited in the Museo de Historia Natural Javier Prado of the University San Marcos, Lima, Peru.

Measures of insects: Body length corresponds to the length from the anterior midpoint of labrum to end of elytra; length of pronotum from the mid of anterior margin to the mid of posterior margin; width of pronotum corresponds to width of the widest part of pronotum; length of elytra corresponds to anterior margin of scutellum to the end of elytra; widest part of elytra corresponds to its greatest width.

The body length given below the photographs corresponds to the body length of the photographed specimen.

Collection sites and abbreviations under which these locations are quoted in the following text.

A = Peru: Dept. Huánuco, Panguana ACP, Río Yuyapichis, 9°37'S-74°56'W, 230 m, at blacklight, XII.2015, leg. J. MONZÓN.

B = Ditto, but I.2016, leg. J. MONZÓN.

C = Ditto, but 8.-10.X.2017, leg. D. HAUTH.

D = Ditto, but V.-VI.2017, leg. J. MONZÓN.

E = Ditto, but UV Trap, 1.V.-21.VI.2015, leg. F. WACHTEL.

E1= Ditto, but UV Trap, 20.IX.-7.X.2013, leg. F. WACHTEL.

F = Ditto, but at light, 22.IX.-10.X.2017, leg. F. WACHTEL.

G = Ditto, but light trap 50 m above the ground level in a tree, last days of October 2017.

H = Ditto, but UV trap on a higher level above ground level, road to Estanque, 1.V.-21.VI.2015, leg. F. WACHTEL (Estanque = small pool inside primary forest).

I = Ditto, but Malaise trap, 23.XI.-7.XII.2008, leg. E. DILLER.

J = Ditto, but Malaise trap, 24.IV-8.V.2014, leg. E. DILLER.

K = Ditto, Malaise Trap, 1-20.V.2015, leg. E. DILLER.

L = Ditto, but Malaise Trap, Sept. 2015, leg. E. DILLER.

M = Ditto, but Malaise Trap, 24.IV.-8.V.2016, leg. E. DILLER.

N = Ditto, but Malaise trap, 25.V.-15.VI.2016, leg. E. DILLER.

O = Ditto, but Malaise Trap, 25.IX.-9.X.2016, leg. E. DILLER.

P = Ditto, but Malaise trap, but 22.IV.-4.V.2018, leg. E. DILLER.

Q = Ditto, but Winkler sifter from the upper layer of soil, 22.IX.-10.X.2017, leg. S. FRIEDRICH, F. WACHTEL & D. HAUTH.

R = Ditto, but Berlese, 20.IX.-7.X.2013, leg. S. FRIEDRICH & F. WACHTEL.

S = Ditto, but tree zonation, at light, 22.IX.-10.X.2017, leg. BURMEISTER.

T = Ditto, but meadow inside Panguana ACP, at light, 9/10.X.2017, leg. BURMEISTER.

U = Ditto, but fogging a tree, B104, ZSM-HYM-FOG1809104, 28.VIII.2018, leg. A. FLOREN.

* = Species new for Peru.

Abbreviations of some institutions:

BMNH	Natural History Museum, London, UK.
MNHN	Muséum National d'Histoire Naturelle, Paris, France.
MHNSM	Museo de Historía Natural Javier Prado of the University San Marcos, Lima, Peru.
ZSM	Zoologische Staatssammlung, Munich, Germany.

Results

Concerning the collecting sites, dates and methods used for collection the abbreviations of the preceding paragraph are used (e.g. A, B, C etc.); the number of specimens studied are quoted in brackets.

In the introductions to the different genera we usually refer to the definitions published by THOMAS, but additionally some remarks on these genera are given by the first author when it seems to be necessary. Concerning American laemophloeid genera and species THOMAS was the only author who revised them by using modern techniques. Several genera have not been revised yet and will no longer be revised by THOMAS (he died 2019). The first author tried to quote the essential characters of the not yet revised genera mainly basing on his own observations. Some species of not yet revised genera could be determined by comparing them with types (mainly species described by SHARP 1899). These types are deposited in the Natural History Museum, London, UK, and the first author received them on loan.

The species from Panguana which are undescribed are portrayed by notes on their characters. This is also done in described species when we feel it necessary. All species found, described or undescribed, are documented by a photograph.

This study is based on more than 2000 Laemophloeidae specimens from Panguana.

Genus *Laemophloeus* DEJEAN, 1835

Laemophloeus DEJEAN, 1835: 315.
Type species: *Cucujus monilis* FABRICIUS by subsequens designation of LEFKOVITCH 1959: 101.

A recent definition of this genus was given in two papers of THOMAS (2013, 2014). In these papers also the meaning of three frequently used terms of essential characters are discussed, e. g. "antebasal denticle", "elytral cell" and "stiff, erect seta antero-dorsally on scape". A diagnosis of all described species of the Neotropical area with several photographs are given, and determination keys of species are provided in THOMAS' papers.

Laemophloeus species from Panguana

***Laemophloeus buenavista* THOMAS, 2013** (Fig. 1)
Diagnosis: THOMAS 2013, 4-6; Figs. pp.12, 18.
Formerly known distribution: Mexico, Panama, Bolivia.
Specimens studied from Panguana: A (1) - B (2) - C (1) - G (3).

***Laemophloeus dozieri* THOMAS, 2014** (Fig. 2)
Diagnosis: THOMAS 2014, 7; Figs. pp.19, 30. Only the holotype was known formerly.
Body measures of the Panguana specimens of this species: Body length: 1.89-2.88 mm. Body width: 0.91-1.26 mm. Ratios: Length/width elytra 1.29-1.38; width/length pronotum 1.71-1.79; length elytra/length pronotum 2.55-2.82.
Formerly known distribution: Bolivia.
Specimens studied from Panguana: A (2) - B (3) - C (1). The correct determination of these species was confirmed by THOMAS (2017).

***Laemophloeus incisus* SHARP, 1899** (Fig. 3)
Laemophloeus incisus SHARP, 1899: 521.
Laemophloeus catharinensis KESSEL, 1926: 72, 82; [syn.]: THOMAS 2014, 8.
Laemophloeus similans KESSEL, 1926: 72, 83; [syn.]: THOMAS 2014, 8.
Diagnosis, redescription and illustration: THOMAS 2014: 8, Figs. pp.20, 31.
Formerly known distribution: Jamaica, Mexico, Belize, Honduras, Costa Rica, Panama, Trinidad, Peru.
Annotation: Most specimens from Panguana have a testaceous coloration, but a few are light brown (mostly head and pronotum).
Specimens studied from Panguana: A (32) - B (10) - C (1) - E (1) - G (1) - H (1) - K (3).

***Laemophloeus lecontei* GROUVELLE, 1876** (Fig. 4)
Laemophloeus lecontei GROUVELLE, 1876: 496: pl. 9, fig.14.
Laemophloeus chevrolati GROUVELLE, 1878: 264; [syn.]: THOMAS 2014, 10.
Diagnosis, redescription and illustration: THOMAS 2014: 10; Figs. pp.3, 22, 33.
Formerly known distribution: USA: Florida (THOMAS 2015, 10), Bahamas, Cayman Islands, Dominican Republic, Jamaica, Mexico, Belize, Honduras, Costa Rica, Panama, Trinidad, Venezuela, Colombia, Bolivia, Brazil (Rondonia).
Specimens studied from Panguana: A (13) - B (8) - C (7) - F (1) - H (1) - L (1) - T (3).

***Laemophloeus macrognathus* REITTER, 1876** (Fig. 5)
Laemophloeus macrognathus REITTER, 1876: 48.
Diagnosis, redescription and illustration: THOMAS 2013, 8; Figs. pp.15, 22.
Formerly known distribution: Panama, Trinidad, Colombia, Brazil (Rondonia).
Specimens studied from Panguana: A (7) - B (4) - C (2) - D (1) - S (1).

***Laemophloeus mathani* GROUVELLE, 1889** (Fig. 6)
Laemophloeus mathani GROUVELLE, 1889: 108.
Diagnosis, redescription and illustration: THOMAS 2014, 10-11, Figs. pp.23, 34.
Annotation: Head, pronotum and lateral parts of elytra are more or less brown in most specimens from Panguana. A similar color pattern has been found in specimens from Surinam (THOMAS 2014, 11).
Formerly known distribution: Bolivia, Brazil (Goiás), Ecuador, Surinam.
Specimens studied from Panguana: A (36) - B (23) - L (1) - T (1).

***Laemophloeus megacephalus* GROUVELLE, 1876** (Figs. 7a, b)

Laemophloeus megacephalus GROUVELLE, 1876: 495.
Laemophloeus distinguendus SHARP, 1899: 518; [syn.]: THOMAS 2014, 11.
Laemophloeus floridanus CASEY, 1884: 45; [syn.]: THOMAS 1986, 60.

Diagnosis, redescription and illustration: THOMAS 2014, 11-12; Figs. pp.24.

Formerly known distribution: Caribbean Islands, Central and South America.

Specimens studied from Panguana (males, females are not yet determinable): A (2) - B (4) - E1 (1).

***Laemophloeus planaclavatus* THOMAS, 2014** (Fig. 8)

Laemophloeus planaclavatus THOMAS, 2014: 12-13; Figs. pp.25, 36.

Formerly known distribution: Brazil (Rondonia, São Paulo), Bolivia.

Specimens studied from Panguana: A (1) - F (1) - H (2).

***Laemophloeus sexarticulatus* KESSEL, 1926** (Fig. 9)

Laemophloeus sexarticulatus KESSEL, 1926: 72, 82.

Diagnosis: Redescription and illustration: THOMAS 2013, 4; Figs. pp.11, 17.

Formerly known distribution: Mexico, Belize, Trinidad, Surinam, Bolivia, Brazil (Santa Catharina).

Specimens studied from Panguana: A (20) - B (22) - C (1) - D (2) - F (1) - G (3) - K (1) - N (1) - S (1).

Remarks: A more or less impressed median suture is separating the frons, in large males this suture may be markedly impressed. In males, there is a more or less noticeable emargination of frons above antennal insertion, and the mandibles are definitely larger in males than in females. However, relatively many "minor" males with less obvious sexual characters are found. Head is frequently somewhat infuscate, but the body color is more or less uniformly testaceous.

***Laemophloeus suturalis* REITTER, 1876** (Fig. 10)

Laemophloeus suturalis REITTER, 1876: 50.

Diagnosis, redescription and illustration: THOMAS 2014, 13-14; Figs. pp.26, 37.

Body lengths: 2.1-2.8 mm (THOMAS 2014).

Measurements of one specimen: Body length: 2.45 mm. Body width: 1.09 mm. Ratios: Length/width elytra 1.38; width/length pronotum 1.67; length elytra/length pronotum 2.81.

Formerly known distribution: Guatemala, Mexico, Belize, Costa Rica, El Salvador, Panama, Venezuela, Brazil (Minas Gerais), Bolivia.

Specimen studied from Panguana: A (2) - B (2) - G (1) - K (1).

***Laemophloeus taurus* THOMAS, 2014** (Fig. 11)

Laemophloeus taurus THOMAS, 2014: 14-15, Figs. pp.3, 27.

Diagnosis: THOMAS 2014. 14-15.

Formerly known distribution: Brazil (Rondonia), Bolivia, Mexico.

Specimens studied from Panguana: A (42) - B (17) - C (3) - D (5) - E (4) - F (1) - G (20) - H (1) - L (1).

***Laemophloeus* species 1** (Fig. 12)

Remark: We at first were not sure about the placement of this taxon but we now consider it reasonable to place it to *Laemophloeus* DEJEAN. Our species possesses structural relations to *Laemophloeus dozieri* THOMAS, 2014 and to *L. planaclavatus* THOMAS, 2014.

Small, wide; upper side and underside uniformly testaceous; head with reduced luster because of a faint micro reticulation; lateral margins of pronotum without an antebasal denticle; elytra with a distinct subhumeral carina, and elytra slightly convex transversely; antennae short, with a club of three antennomeres; tarsomeres 1 very short - shorter than penultimate tarsomeres.

Body length: 1.59-1.73 mm. Body width: 0.74-0.78 mm. Ratios: Length/width elytra 1.25-1.32; width/length pronotum 1.82-1.95; length elytra/length pronotum 2.63-2.71.

Specimens studied from Panguana: A (2) - S (1).

The shape of this taxon is similar to *Laemophloeus planaclavatus* THOMAS, 2014 and to *L. dozieri* THOMAS, 2014. It differs from these species by its uniformly testaceous coloration and by missing an oblique line on each side of head which extends posteriorly from epistomal suture to anterior third of eye (circumventing a low rising of the lateral parts of frons); however, a low rising of the lateral anterior parts of frons is also present in our species.

Genus *Charaphloeus* CASEY, 1916

Charaphloeus CASEY, 1916: 127 (as subgenus of *Laemophloeus* DEJEAN, 1835, upgraded to genus: THOMAS 1984a, 75). Type species: *Laemophloeus convexulus* LECONTE (by original designation).

No revision or fully established definition of this genus exists nor a publication on a single species of *Charaphloeus* from South America.

Several *Laemophloeus* species from Central America have been described by SHARP (1899) which in on-line species lists have been combined with *Charaphloeus* (HALLAN 2008, THOMAS 2011), but this combination with *Charaphloeus* has not been substantiated by a publication in a scientific journal yet.

According to THOMAS (1984a, 75, 78) the following characters should be present or missing in species of the genus: not all elytral "cells" present; a subhumeral carina of elytra not present (exceptions, see below); pronotum not irregularly toothed or crenulate laterally; antennal club composed of three antennomers, frons not prolonged into rostrum; sublateral lines of pronotum complete to apex; epistomal suture associated with transverse groove; tarsomere I not shorter than penultimate tarsomeres; sternum VIII not modified to form claspers; dorsal piece of tegmen present; internal sac with flagellum, an antebasal denticle on sides of pronotum missing. – Additionally, elytra are convex transversely, the prosternal process between procoxae is very wide, and ventrite III is anteriorly acuminate.

Remarks: "Absence of a subhumeral carina": THOMAS (1984a) stated that species of this genus should not have a subhumeral carina: According to THOMAS (1985, 158) there is one exception from an absence of a subhumeral carina: *Charaphloeus flavosignatus* (SCHAEFFER, 1910) from Arizona possesses a fully shaped carina, and therefore this species is intermediate between *Laemophloeus* and *Charaphoeus*. Another exception is *Charaphloeus* species 2 from Panguana which also has a fully developed subhumeral carina and also three fully evolved elytral "cells", however, this species shows a distinct transverse convexity of elytra as it is found in *Charaphloeus* but not in *Laemophloeus*; several *Charaphloeus* species from Panguana possess a subhumeral carina of in a more or less rudimentarily form.

"Emargination of frons above insertion of scape in males": An emargination of frons above the scape of antennae is found in males of two *Charaphloeus* species from Panguana: *Charaphloeus* species 15 and *Charaphloeus* species 17; an equivalent emargination is already present in *Charaphloeus bituberculatus* (REITTER, 1878) (occurring in USA, Florida, and West Indies).

"Grooved epistomal suture": a more or less incised epistomal suture is found in all *Charaphloeus*-species from Panguana (only one species, *Charaphloeus* species 3, presents groove-like impressions only in the lateral parts of the epistomal suture in males);

"Tarsal structure": in all species which we checked the tarsomere 1 was very short and shorter than tarsomere II, and equally short as the penultimate tarsomere (we did not yet check this in a few very small species); the tarsal structure of *Charaphloeus* species therefore corresponds to the tarsal structure of species of the genus *Laemophloeus* (our finding is somewhat in contrast to THOMAS' statements in 1984a and also points to a relation of both genera).

In summary: Concerning external characters there are transitions between *Laemophloeus* DEJEAN 1835 and *Charaphloeus* CASEY, 1916. It concerns the development of the subhumeral carina, of the elytral "cells" and of the transversal convexity of elytra. According to THOMAS the structure of tarsae should differ between both genera, this is not always the case according to our findings. Cladistic analysis of external characters, structure genitalia, and barcode-trees in species of both genera should be performed in order to settle their phylogenetic relations.

Other characters found in *Charaphloeus*: Coloration: Most species are uniformly yellow, testaceous or dark brown to black; one species has black elytra in combination with testaceous head and pronotum: *Charaphloeus* species 7; tarsal formulae of *Charaphloeus* species: 5-5-4 in males, 5-5-5 in females.

Similar taxa found in Panguana which probably do not belong to *Charaphloeus*:

One taxon alike *Charaphloeus* but with a distinctly protruding forehead and, additionally, with a prosternal process between procoxae which is narrower than that found in species of *Charaphloeus*; this taxon has no stiff erect seta antero-dorsally on scape (in this paper it is treated as a presumably different genus: **Genus & species 1** (Fig. 30) (see below).

There is another taxon with upper sides alike *Charaphloeus.* This taxon possesses a narrow prosternal process (as it is found in species of the genera *Rhinomalus* GEMMINGER, 1870, *Metaxyphloeus* THOMAS, 1984). Additionally, this taxon presents a stiff seta antero-dorsally on scape as it is found in species of the genera *Rhinomalus, Metaxyphloeus* and *Rhinophloeus* SHARP, 1899; it also presents a slightly protruding forehead (in this paper it is treated as a presumably separate genus: **Genus & species 2** (Fig. 31) (see below).

Charaphloeus species from Panguana

***Charaphloeus* species 1** (Fig. 13) (= ?*Charaphloeus frequens* (SHARP, 1899))
Head and pronotum nearly black, elytra dark brown. On frons with very short, recumbent hairs; lateral parts of frons and the whole epistomal suture narrowly bordered; in front of eyes the sides of frons are shortly and slightly widen, thence they shortly and straightly narrowing towards the lateral end of epistomal suture; epistomal suture well recognizable, slightly curved; epistome on a lower level than frons, additionally short, anterior margin emarginate; mandibles large, protruding beyond the also large labrum; pronotum with slightly protruding front angles, hind angles accentuated, acute angled, sublateral lines of pronotum conspicuous, nearly carinate; on elytra only the lateral "cell" visible. Body length: 2.04 mm. Body width: 0.86 mm. Ratios: Length/width elytra 1.34; width/length pronotum 1.50; length elytra/length pronotum 2.27.

Specimen studied from Panguana: A (1, male).

According coloration and body shape this species could be similar or identical with *Charaphloeus frequens* (SHARP, 1899), known from Panama and Guatemala (we did not yet see the syntypes of this species).

***Charaphloeus* species 2** (Fig. 14)
Upper side black, lustrous, legs light brown, mandibles, antennae brown. Distinct epistomal suture which is narrowly bordered on its frontal side; mandibles somewhat protruding; antennae short, just passing the anterior margin of elytra; pronotum with distinct punctation; elytra widest at one third; subhumeral carina expressed; lateral "cell" of each elytron complete, inner border of "cell" is narrowly raised (especially recognizable within the apex), also slightly raised is the inner border of the more medial "cell" (especially visible also within the apex), inside these "cells" there are rows of distinct punctures; anterior margin of ventrite III like a pointed arch. Body length: 1.60 mm. Body width: 0.68 mm. Ratios: Length/width elytra 1.53; width/length pronotum 1.45; length elytra/length pronotum 2.43.

Specimen studied from Panguana: C (1, presumably female).

We do not know another similar species of this genus.

***Charaphloeus* species 3** (Fig. 15)
Upper side testaceous. Epistomal suture groove-like impressed in its lateral parts in males leaving vacant the lateral sides of epistome; epistome closely covered with relatively long hairs in males; epistomal suture in presumed females distinct, but not groove-like impressed in its lateral parts and without a densely haired epistome; pronotum relatively short, moderately narrowing posteriorly, hind angles accentuated, front angles rounded; elytra without any subhumeral carina, with faint striae on disc which do not reach the apex; ventrite III acuminate anteriorly. Body length: 1.23-1.36 mm. Body width: 0.58-0.62 mm. Ratios: Length/width elytra 1.25-1.37; width/length pronotum 1.46-1.63; length elytra/length pronotum 2.78-2.87.

Specimens studied from Panguana: A (5) - B (3) - G (1) - H (2) - L (1) - S (1).

We do not know another species of this genus with groove-like impressions of the epistomal suture in males.

***Charaphloeus* species 4** (Fig. 16)
Elytra with brown, narrow, longitudinal stripes on a lighter brown ground color; pronotum short, wide, very convex transversely, with widely curved sides within the 85 anterior per cent and sinuate within the posterior 15 per cent, hind angles acutely pointed; sides of pronotum with narrow, nearly horizontal margins, they contrast with the convex rest of pronotum; antennae very short; elytra short, widest shortly in front of middle, subhumeral carina rudimentarily expressed; lateral "cell" not clearly depicted. Body length: 1.42 mm. Body width: 0.62 mm. Ratios: Length/width elytra 1.34; width/length pronotum 1.48; length elytra/length pronotum 2.10.

Specimen found in Panguana: N (1).

Charaphloeus sp. 5 also shows similar dark brown stripes on elytra, but this species is larger, it has much longer antennae, its punctures on pronotum and frons are much smaller; shape of pronotum differs from shape of pronotum of species 4.

Charaphloeus sp. 8 has a similar shape of pronotum and also similar and short antennae; *Charaphloeus* sp. 8 is still smaller and possesses longer elytra than *Charaphloeus* sp. 4.

***Charaphloeus* species 5** (Fig. 17)
Elytra brown with darker colored striae, pronotum and head are remarkedly lighter brown, lustrous. Antennae long, reaching to hind quarter of elytra in the male, all antennomeres in the male are longer than wide, the presumed female has much shorter antennae, they reach over one third of elytra; mandibles small, partly

covered by labrum; elytra elongate, nearly oval, very convex across; "cells" on surface well visible, the punctures which constitute the borders of "cells" are distinct and of medium size, their darker colored striae are marked; intervals impunctate. Body length: 1.57+1.75 mm. Body width: 0.67+0.86 mm. Ratios: Length/width elytra 1.33+1.41; width/length pronotum 1.40+1.50; length elytra/length pronotum 2.36+2.50.

Specimens studied from Panguana: A (1, male) - B (1, presumed female).

Concerning differences to *Charaphloeus* sp. 4, see *Charaphloeus* sp. 4.

***Charaphloeus* species 6** (Fig. 18)

Pronotum relatively wide, front angles narrowly rounded and obtuse; sides of pronotum straightly narrowed towards hind angles. In front of hind angles not sinuate; hind angles angular, not accentuated, obtuse; antennae of medium length in males, in females shorter; elytra oval, elongate, markedly convex across, a lateral "cell" present, the medial ones only formed as longitudinal lines. Head light brown, pronotum and elytra testaceous, antennae brown, legs yellow. Body length: 1.21-1.36 mm. Body width: 0.53-0.60 mm. Ratios: Length/width elytra 1.34-1.53; width/length pronotum 1.73-1.80; length elytra/length pronotum 2.80-3.10.

Specimens studied from Panguana: A (4) - B (6) - C (2) - D (4) - E (1) - G (3) - H (2) - S (1).

A very similar species is *Charaphloeus* sp. 12. This species is larger (body length 1.54-1.73 mm), and the eyes are smaller.

***Charaphloeus* species 7** (Fig. 19)

Elytra nearly black, lustrous, interstices 1 somewhat lightened, frons and pronotum brown, very lustrous, epistome lighter brown than frons, legs and antennae brown; eyes large; epistomal suture indistinct; pronotum heart-shaped, with widely rounded front angles, in front of hind angles allusively sinuate, hind angles sharp, accentuated; antennae short, overlapping the first quarter of elytra, antennomeres 9-11 much wider than preceding antennomeres; elytra long, with a moderately expressed subhumeral carina. Body length: 1.36 mm. Body width: 0.60. Ratios: Length/width elytra 1.48; width/length 1.53; length elytra/length pronotum 2.71.

Specimen studied from Panguana: B (1).

We do not know another species with this special coloration and combination of other characters.

***Charaphloeus* species 8** (Fig. 20)

Widely rounded front angles of pronotum, sides clearly curved towards the hind 10 per cent, in front of hind angles somewhat sinuate, hind angles sharply pointed and rectangular; head with a distinct epistomal suture; antennae short; the elongate oval elytra with three longitudinal striae, one belongs to the inner border of lateral "cell". Upper side uniformly light brown, lustrous. Body length: 1.26 mm. Body width: 0.51 mm. Ratios: Length/width elytra 1.58; width/length pronotum 1.50; length elytra/length pronotum 2.56.

Specimen studied from Panguana: A (1).

From *Charaphloeus* sp. 3 and *Charaphloeus* sp. 6 this taxon differs by its darker color; additionally, *Charaphloeus* sp. 3 has laterally a deeply impressed epistomal suture in males (not so *Charaphloeus* sp. 8, but we did not check the sexe), the pronotum of *Charaphloeus* sp. 3 is less convex; the elytra of *Charaphloeus* sp. 6 are wider and shorter, and the pronotum does not present sinuate sides just in front of hind angles, this is in contrast also to *Charaphloeus* sp. 8; *Charaphloeus* sp. 4 additionally shows similar shapes of pronotum and antennae, concerning differences, see *Charaphloeus* sp. 4.

Charaphloeus flavescens (SHARP, 1899) (Fig. 76) from Guatemala possesses a similar shape of pronotum as *Charaphloeus* sp. 8; but the holotype of *C. flavescens* is with a body length of 1.44 mm somewhat larger than *Charaphloeus* sp. 8, and its body color is a very lustrous pale yellow; the antennae of *Charaphloeus flavescens* are very different from the antennae of *Charaphloeus* species 8; they are much longer and reach to the apex of elytra, and all their antennomeres are clearly longer than wide (and are somewhat alike the antennae of *Placonotus* species), the frons of *C. flavescens* is depressed anteriorly (not so in *Charaphloeus* sp. 8), and the pronotum is densely punctured with large punctures (also in contrast to *Charaphloeus* sp. 8); on elytra there are stria-like structures and on interstices relatively large, widely separated punctures (also these characters differ from those of *Charaphloeus* sp. 8).

***Charaphloeus* species 9** (Fig. 21)

This not very conspicuous species is characterized by a frons with minute, but well visible recumbent hairs, by a heart-shaped pronotum with narrowly rounded front angles and acute and sharp hind angles, by elongate oval elytra which are transversely clearly convex, but otherwise this species is not very marked, on elytra a lateral "cell" present; antennae relatively long; eyes relatively small. Head brown, lustrous; pronotum and

elytra lighter brown, lustrous. Body length: 1.23-1.38 mm. Body width: 0.48-0.55 mm. Ratios: Length/width elytra 1.51-1.57; width/length pronotum 1.50-1.60; length elytra/length pronotum 2.75-2.87.

Specimens studied from Panguana: A (4, probably females).

***Charaphloeus* species 10** (Fig. 22)

Characterized by a chitinous shield at the underside of head which anterior to eyes is protruding laterally parallel to frons, the socket of scape is situated on it; antennae long in males, reaching somewhat over the hind quarter of elytra (antennomeres 9 + 10 longer than wide), antennae of presumed females markedly shorter, reaching somewhat over posterior margin of pronotum (antennomeres 9 + 10 are about as wide as long); in males in the lateral part of frons it is protruding anteriorly, and it ends anteriorly narrowly carinate, in females the sides of frons are anteriorly not protruding but they meet with the lateral end of the epistomal sutures in a right angle; epistomal suture vanished in its middle part in males, not so in females; pronotum relatively wide; sides curved in the anterior 60 per cent, in the hind 40 per cent the sides constrict straightly towards the slightly pointed, obtuse hind angles. Head yellowish-brown or testaceous; pronotum and elytra yellow, surface somewhat lustrous; antennae light brown; legs yellow. Body length: 1.52-2.04 mm. Body width: 0.63-0.82 mm. Ratios: Length/width elytra 1.41-1.52; width/length pronotum 1.39-1.57; length elytra/length pronotum 2.57-2.85.

Specimen studied from Panguana: A (37) - B (12) - C (1) - G (1) - H (3) - S (2).

We do not know any similar *Charaphloeus* species.

***Charaphloeus* species 11** (Fig. 23)

Characterized by the shape of pronotum in combination with the smooth surface of elytra without striae and nearly without punctures; pronotum with greatest width just behind anterior angles, sublateral lines of pronotum are curved and end posteriorly in the inner rim of the border of the median part of the posterior margin; elytra elongate oval; eyes relatively large; frons with short, not very dense, distinct, recumbent hairs, especially recognizable in males; in "mayor" males the frons may be sloping downwards to its anterior part; antennae long, reaching in males to the hind quarter of elytra, in females to the first third of elytra; head brown, lustrous, pronotum lighter brown, lustrous, elytra more yellow, very lustrous. Body length: 1.56-1.96 mm. Body width: 0.64-0.76 mm. Ratios: Length/width elytra 1.39-1.51; width/length pronotum 1.36-1.50; length elytra/length pronotum 2.48-2.76.

Specimens studied from Panguana: A (5) - B (1) - C (3) - G (1).

Antennae somewhat shorter than those of the somewhat similar C*haraphloeus* sp. 13 which also has relatively small eyes: in contrast to our species *Charaphloeus* sp. 13 has incised striae on elytra and a distinct lateral cell on elytra.

***Charaphloeus* species 12** (Fig. 24)

Elytra elongate oval, with a rudimentary subhumeral carina in the anterior half; except a distinct lateral elytral "cell" with clearly incised striae as border there are only two faint striae which start about at one third, elytra impunctate; pronotum widest shortly in front of middle, towards the somewhat obtuse hind angles the sides are narrowing with straight margins in the hind third (in front of hind angles the sides are not sinuate!); towards front angles the rounded sides are slightly narrowing, and the front angles are narrowly rounded; pronotum with some small punctures; eyes relatively large; meeting point of lateral border of frons and lateral end of epistomal suture itself shortly pointed; epistomal suture laterally faint, median indistinct; eyes large, laterally widest behind the middle, somewhat hanging down like a drop; mandibles small; antennae of medium length, in males longer than in females, reaching to one-third of elytra in females and to middle in males. Body length: 1.54-1.93 mm. Body width: 0.63-0.76 mm. Ratios: Length/width elytra 1.42-1.49; width/length pronotum 1.64-1.73; length elytra/length pronotum 2.88-2.97.

Specimens collected in Panguana: A (5, females) - B (2, males) - H (1, male, 1, female).

Similar to *Charaphloeus* sp. 6 which also have the pronotal sides not sinuate in front of hind angles, but *C.* sp. 6 is smaller (body length 1.21-1.42 mm), and the eyes are larger.

***Charaphloeus* species 13** (Fig. 25)

Eyes relatively small, mandibles of medium size, uniformly bent; antennae in males reaching somewhat over middle of elytra, in females over a third of elytra; sides of frons scarcely bordered, transition between sides and episomal suture somewhat irregularly rounded; pronotum relatively wide, punctured; anterior angles narrowly rounded, greatest width approximately at anterior fourth, posteriorly narrowing, in front of

posterior angles sinuate, hind angles pointed and distinct; elytra without a subhumeral carina, but with incised striae and a distinct lateral cell; elytra somewhat paunchy, widest somewhat in front of middle, apex rounded. Body length: 1.63-1.82 mm. Body width: 0.68-0.78 mm. Ratios: Length/width elytra 1.35-1.44; width/length 1.62-1.88; length elytra/length pronotum 2.74-3.00.

Specimens studied from Panguana: A (6) - B (9) - G (1) - K (1).

Somewhat similar to *Charaphloeus* sp. 13 is *Charaphloeus* sp. 14; however, *Charaphloeus* sp. 13 has smaller eyes than *Charaphloeus* sp. 14, and the mandibles are clearly smaller; elytra of *Charaphloeus* sp. 14 have its greatest width about at one third, and sides of elytra are narrowing towards apex slightly curved, and the apex has the tendency being narrower (and less uniformly rounded); (the apex in *Charaphloeus* sp. 13 is uniformly rounded).

Concerning body shape and length of antennae in both sexes *Charaphloeus* sp. 13 is similar to *Charaphloeus convexus* (GROUVELLE, 1876) (Figs. 77, 78), known from Guatemala. However, shapes of mandibles and the anterior part of head are very different between both species: mandibles are uniformly bent and somewhat smaller in *Charaphloeus* sp. 13, mandibles are larger and nearly straight in *Charaphloeus convexus*; the anterior margin of epistome of *Charaphloeus* sp. 13 is widely emarginate, and epistome and labrum are situated on the same level as frons; in *Charaphloeus convexus* there is an abrupt change of elevation between epistome and frons, the epistome and labrum of this species are on a lower level and shorter, and the anterior margin of epistome is less emarginate in *Charaphloeus convexus*. The body lengths between specimens of *Charaphloeus convexus* (GROUVELLE) from Guatemala are remarkable (1.75-2.57 mm).

***Charaphloeus* species 14** (Fig. 26)

Characterized by markedly protruding mandibles, relatively large eyes with their greatest width situated somewhat behind middle; the sides of frons hit the lateral end of epistomal suture with an obtuse but angular angle; antennae of medium length, overlapping about 60 per cent of elytra in males, antennae of females are shorter, they overlap one-quarter of elytra; front angles of pronotum narrowly rounded, sides in hind 40 per cent narrowed towards the angulate hind angles; elytra with its greatest width about at one third, posteriorly the sides are narrowing somewhat curved towards apex, and the apex has the tendency becoming narrower and is not uniformly rounded, elytra with a lateral cell and with longitudinal striae which start about at the frontal fourth and reach to the apical region, in the apical region the striae are somewhat darker colored; antennae reach to the hind 40 per cent in males. Body length 1.50-1.73 mm. Body width: 0.56-0.70 mm. Ratios: Length/width elytra 1.42-1.51; width/ length pronotum 1.61-1.68; length elytra/length pronotum 2.55-2.68.

Specimens studied from Panguana: A (10) - B (7) - C (2) - F (1) - G (3) - H (1).

Similar to *Charaphloeus* sp. 15 concerning body length and shapes of pronotum and elytra, but males of *Charaphloeus* sp. 15 present an emargination over insertion of antennae which males of *Charaphloeus* sp. 14 not have; the mandibles are more marked in species 14; the antennae are somewhat shorter in species 15, and the antennomere 11 is shorter and more pear-shaped. It is not always possible to separate females of both species, especially if it concerns "minor" specimens. Concerning relation to *Charaphloeus* sp. 13, see *Charaphloeus* sp. 13.

***Charaphloeus* species 15** (Fig. 27)

Characterized by an emargination with sharp edges over insertion of antennae in males, by angular front angles of pronotum, and somewhat enlarged mandibles; elytra with its greatest width at one third, posteriorly the sides are narrowing somewhat curved towards apex, and the apex is not very broadly rounded. In some specimen, head and pronotum brown, in others testaceous; elytra testaceous. Body length: 1.52-1.96 mm. Body width: 0.60-0.80 mm. Ratios: Length/width elytra 1.44-1.55; width/length pronotum 1.67-1.80; length elytra/length pronotum 2.72-3.00.

Specimens studied from Panguana (males): A (4) - B (3) - D (2) - E (1) - G (1) - H (3). Presumed female: D (1).

Similar to *Charaphloeus* sp. 14 concerning body length and shapes of pronotum and of elytra, but *Charaphloeus* sp. 14 has no emargination over insertion of antennae in males, additionally the mandibles are smaller, the antennae are somewhat shorter, and the antennomere 11 is shorter and more pear-shaped, the antennomere 11 of sp. 14 is more elongate.

***Charaphloeus* species 16** (Figs. 28a, b)

Characterized by a distinct punctation on pronotum with dense, large, irregularly fusing punctures which in their middle have very tiny setae; front angles of pronotum angulate; epistomal suture marked and in front

of it epistome slightly depressed; antennae in the male relatively long, reaching to hind third of elytra; eyes spherical; elytra widest at the first third and without a subhumeral carina, distinct lateral "cell", medial of it surface impunctate, in hind third to hind half there are faint striae. Elytra yellow, pronotum and head somewhat infuscate. Body length: 1.67 mm. Body width: 0.72 mm. Ratios: Length/width elytra 1.41; width/length pronotum 1.70; length elytra/length pronotum 2.60.

Specimen studied from Panguana: B (1, male).

Differs from all *Charaphloeus* species of this area by its dense and large punctation of pronotum.

***Charaphloeus* species 17** (Fig. 29)

Characterized by widely rounded front angles of pronotum and by a small emargination over insertion of antennae in males; furthermore characterized by large mandibles, impressed epistomal suture and small eyes. Antennae reaching to the middle of elytra in males and to the end of anterior quarter in females; elytra without a subhumeral carina, a lateral "cell" on elytra present, other "cells" incomplete, the striae somewhat infuscate. Coloration of most specimens yellow, in some specimens with a browner head and pronotum, and one specimen is uniformly brown. Body length: 1.67-1.81 mm. Body width: 0.71-0.78 mm. Ratios: Length/width elytra 1.41-1.44; width/length pronotum 0.80-0.84; length elytra/length pronotum 2.69-2.79.

Specimens studied from Panguana: A (4) - B (7) - D (1) - E1 (1).

There is no other *Charaphloeus* species with widely rounded front angles of pronotum, an emargination over insertion of eyes in males and large mandibles.

Genus & species 1 (from Panguana)

See Introduction of *Charaphloeus* CASEY, 1916.

This genus is characterized by a relatively long, protruding forehead and by a narrower prosternal process than that found in *Charaphloeus*; otherwise, the shape corresponds to shapes as they are found in *Charaphloeus*. Scape without a stiff, erect seta antero-dorsally. Procoxae open behind. Ventrite III anteriorly acuminate.

***Species** (Fig. 30)

Body color testaceous. Body length: 1.90 mm. Body width: 0.62 mm. Ratios: Length/width elytra 1.48; width/length pronotum 1.45; length elytra/length pronotum 2.70.

Specimen studied from Panguana: B (1).

* Genus & species 2 (from Panguana)

See Introduction of *Charaphloeus* CASEY, 1916.

This genus is characterized by a slightly prolonged forehead; the chitinous plate of underside of head which represents the neck is protruding in front of eyes, it is discernible there in front of eyes in view from above; there is a stiff, erect seta on scape antero-dorsalis; the prosternal process between procoxae is narrow; pronotum heart-shaped; elytra elongate oval, only the lateral elytral "cell" present, a rudimentary subhumeral carina of elytra is present, elytra convex transversely; ventrite III acuminate; antennae longer in males than in females. The upper side is black and maculae on elytra are missing.

At first sight this species points to a species of the genus *Charaphloeus* (*Charaphloeus* sp. 10 of Panguana also presents a somewhat prolonged forehead, and the protruding plate of the underside of head becomes visible laterally of frons in dorsal view), it also has transversely convex elytra, but *Charaphloeus* species have no stiff, erect seta on scape and a wide prosternal process. Species of the genus *Rhinophloeus* SHARP also present a stiff, erect seta on scape, but in contrast to **species 2** their elytra are maculate. Species of genus 2 can only be placed to *Rhinophloeus* when the definition of the genus *Rhinophloeus* is extended in order to include immaculate species.

***Species** (Fig. 31)

Upper side black to dark brown, without maculae; legs and mandibles brown, antennae dark brown. Frons situated on a somewhat higher level than epistome; mandibles long, bent; on frons there are distinct, minute, recumbent hairs, in females there are less distinct hairs on frons, or they are entirely missing. Antennae reaching slightly beyond middle of elytra in females, in males to the apex of elytra, the antennomere 11 is elongate oval and relatively wide in females, it is elongate and alike a bean in males. Body length: 1.46-1.98 mm. Body width: 0.58-0.76 mm. Ratios: Length/width elytra 1.46-1.53; width/length pronotum 1.19-1.30; length elytra/length pronotum 2.29-2.59.

Specimens studied from Panguana: A (4) – B (2) (1 male, 5 females).

Genus *Phloeolaemus* CASEY, 1916
Phloeolaemus species from Panguana

Laemophloeus, s. g. *Phloeolaemus* CASEY, 1916: 127.
Phloeolaemus CASEY, 1916; [stat. n.]: THOMAS 1993, 179.
Type species: *Laemophloeus immersus* SHARP, 1899, by original designation.
Further details on this genus, see Discussion (at the end of this paper).

Diagnosis: Similar to *Laemophloeus* DEJEAN but an acuminate intercoxal process on ventrite III is missing, and an epistomal suture is not recognizable; elytra with more or less distinct subhumeral carina and a flat or somewhat convex surface in between subhumeral carinae, there is only one lateral "cell" on each elytron; the procoxal cavities are widely open posteriorly; in males of some species the mandibles are expanded laterally by a tooth-like appendage, e. g. in *Phloeolaemus curtus* (GROUVELLE, 1876) (see Fig. 32); the anterior angles of the epistome of several species are distinctly acute-angled or triangularly protruding processes; tarsal formula 5-5-4 in males, 5-5-5 in females.

***Phloeolaemus curtus* (GROUVELLE, 1876)** (Fig. 32)

Laemophloeus curtus GROUVELLE, 1876: xxxiii.
Phloeolaemus curtus (GROUVELLE, 1876); [comb. n.]: THOMAS 2017: 5.

This species is very characteristic, and its main characters may be taken from the photograph. Pronotum nearly as wide as elytra, anterior angles of pronotum produced anteriorly. Mandibles only of males with a lateral tooth-appendage. Elytra short. Body length: 1.92-2.35 mm. Body width: 0.76-1.05 mm. Ratios: Length/width elytra 1.18-1.31; width/length pronotum 1.71-1.80; length elytra/length pronotum 2.23-2.43.
Formerly known distribution: Panama, Brazil.

Specimens studied from Panguana: A (1) - C (3) - T (2).

There are no other species with which *Phloeolaemus curtus* could be mistaken.

***Phloeolaemus sharpi* (HETSCHKO, 1930)** (Fig. 33)

Laemophloeus minutus SHARP, 1899: 518.
Laemophloeus sharpi HETSCHKO, 1930; [nom. n.]: HETSCHKO 1930:41 [not OLIVIER 1791].
Phloeolaemus sharpi (HETSCHKO, 1930); [comb. n.]: THOMAS 2017: 6.

Head wide (in males) with small eyes, long temples, large mandibles with straight sides within the basal three quarter; pronotum with straight, posteriorly narrowing sides; elytra short, with curved sides. Body length: 1.80 mm. Body width: 0.66 mm. Ratios: Length/width elytra 1.25; width/length pronotum 1.94; length elytra/length pronotum 2.50.
Formerly known distribution: Panama.

Specimen studied from Panguana: F (1).

***Phloeolaemus anticus* (SHARP, 1899)** (Fig. 34)

Laemophloeus anticus SHARP, 1899: 518.
Phloeolaemus anticus (SHARP, 1899); [comb. n.]: THOMAS 2017, 5.

Large mandibles and a large labrum; behind the small eyes there is a rounded, small temple; antennae relatively long reaching to the hind third of elytra; pronotum wide, widest shortly behind angular front corners, from the greatest width sides are narrowed posteriorly, the posterior 8 per cent of sides subparallel; hind angles rectangular; sublateral lines of pronotum narrowly and lowly carinate. Elytra somewhat oval, with a blunt subhumeral carina; between subhumeral carinae slightly convex; lateral "cell" present, the other elytral cells incomplete; surface nearly impunctate. Head, pronotum brown, lustrous; labrum dirty greenish; elytra greenish straw-colored, lustrous; antennae brown; legs light brown. Measures of the specimen from Panguana: Body length: 1.50 mm. Body width: 0.58 mm. Ratios: Length/width elytra 1.35; width/length pronotum 1.50; length elytra/length pronotum 2.25.
Formerly known distribution: Panama.

Specimen studied from Panguana: O (1, male).

The Panguana specimen was compared with the holotype of *Phloeolaemus anticus* (SHARP, 1899) from Panama, deposited in BMNH. Measures of holotype from the BMNH: Body length: 1.61 mm. Body width: 0.61 mm. Ratios: Length/width elytra 1.37, width/length pronotum 1.53, length elytra/length pronotum 2.23.

***Phloeolaemus reitteri* (GROUVELLE, 1877)** (Fig. 35)

Frons with tiny, recumbent hairs; aside eyes the frons is somewhat raised to a border, this border is continued anteriorly towards the lateral end of an allusive epistomal suture. Epistome short, its lateral sides bordered,

its front angles angular, obtuse, not protruding, anterior margin of epistome bordered, emarginate. Labrum does not cover the relatively large mandibles. Front angles of pronotum slightly protruding, sides in its anterior 70 per cent more or less curved, then moderately narrowed to the angular hind angles; posterior margin laterally with a small fovea, in its median part indistinctly bordered and slightly emarginated; sublateral lines of pronotum do not directly reach the hind margin, they split in a short distance from hind margin, and one part is directed medial and meets the border of the median part of posterior margin, the other part is directed to the hind angles; lateral of the sublateral lines the pronotum is steeply descending to the lateral margins, punctation indistinct and tiny. Elytra with their greatest width at one quarter, subhumeral carinae distinct, in between them nearly flat, surface indistinctly punctured. Prosternal process wide. Head brown, pronotum light brown, elytra straw-colored, antennae brown, legs light brown. Body length: 1.42-1.55 mm. Body width: 0.54-0.59 mm. Ratios: Length/width elytra 1.39-1.41; width/length pronotum 1.42-1.57; length elytra/length pronotum 2.17-2.32.

Specimens studied from Panguana: P (2, females) - S (2, ?females).

******Phloeolaemus* **species 1** (Fig. 36)

Eyes small. Frons wide, impunctate, aside eyes narrowly bordered, this narrow border is also present at the lateral edge of epistome, it ends anteriorly in a pointed small tip aside labrum, anteriorly epistome moderately emarginate. Labrum is on a lower level than epistome, anteriorly it is widely rounded, laterally it is fenced in by the triangular epistomal tip. Mandibles small, partly covered by the labrum. Antennae of medium length, with a club of three widened antennomeres, antennae reach over one-fifth of elytra. Lateral margins of pronotum curved in its whole length; sublateral lines lowly carinate; upper side impunctate. Elytra oval, with a subhumeral carina near the lateral margin of elytra; lateral of subhumeral carinae sides are steeply descending to lateral margins; in between carinae surface moderately convex transversely, surface impunctate. Prosternal process between procoxae wide; abdominal sternites with short setae. Upper side including antennae and legs light brown; lustrous. Body length: 1.17 mm. Body width: 0.54 mm. Ratios: Length/width elytra 1.33; width/length pronotum 1.54; length elytra/length pronotum 2.40.

Specimen studied from Panguana: R (1).

Phloeolaemus species 2 and 3 are the closest relatives of *P.* sp. 1. These species have a similar shape of head with its small eyes and similar pronotum and elytra. The sides of elytra of *Phloeolaemus* sp. 1 are more strongly rounded than the sides than *Phloeolaemus* sp. 2 and 3. The anterior angles of epistome of these three species have different shapes.

******Phloeolaemus* **species 2** (Fig. 37)

Frons wide, impunctate, sides bordered, in front of eyes sides roundedly narrowed towards the end of an allusive epistomal suture. Epistome short, with long, triangular processes on its anterior front angles, epistome very lustrous. Labrum large, laterally fenced in by the triangular processes of epistome. Mandibles relatively small. Eyes small, spherical, without visible temples. Antennae of medium length, reaching slightly beyond the middle of elytra; with a club of three, moderately widened antennomeres, ultimate antennomere apically with a narrow, cone-shaped appendage. Pronotum wider than long, sides curved, not essentially narrowed posteriorly, front angles somewhat protruding anteriorly, hind angles angular, slightly obtuse, posterior margin emarginated in its middle part, there the margin is bordered, sublateral lines slightly curved, lowly carinate, posteriorly they end in the border of the middle part of posterior margin, prosternum moderately convex transversely, surface impunctate. Scutellum widely triangular. Elytra elongate oval, apex truncate, subhumeral carinae strong, lateral “cell” translucent, disc with two allusive rows of small, widely separated punctures, otherwise impunctate. Prosternal process, wide, its posterior margin slightly curved. Head brown, pronotum and elytra yellowish-brown, lustrous, underside, legs and antennae yellowish brown. Body length: 1.17+1.19 mm. Body width: 0.43+0.48 mm, Ratios: Length/width elytra 1.41+1.52; width/length pronotum 1.62+1.73; length elytra/length pronotum 2.62+2.69.

Except its small size this species is characterized by narrow, pointedly protruding triangular processes of anterior angles of epistome, by the small mandibles, by the cone-shaped appendages on antennomere 11, and by the shape of pronotum with its anteriorly protruding front angles.

This species has to be differentiated from *Phloeolaemus* sp. 1 which has the same size. The sides of *Phloeolaemus* sp. 1 are more rounded than the sides of *P.* sp. 2. *Phloeolaemus lacerda* (GROUVELLE, 1877) seems to have triangular processes on the anterior front angles of epistome and a similar body shape, it could be one of a group of similar species, the type in MNHN should be checked.

Specimens studied from Panguana: M (1) - S (1).

***Phloeolaemus* species 3** (Fig. 38)

Sides of frons aside eyes anteriorly narrowing, faintly bordered; this border is continued anteriorly with slight bending and ends anteriorly where the allusive epistomal sutures should reach the lateral margin. Epistome short, its sides end in a nearly rectangular tip, anteriorly the epistome is widely emarginated. Mandibles large, towering in front of labrum. Eyes relatively small, spherical, with a very small and short temple. Antennae reaching over 20 per cent of elytra. Lateral margins of pronotum are curved except in the immediate vicinity of hind angles; anterior angles narrowly rounded, hind angles angular, somewhat obtuse; sublateral lines of pronotum are narrowly and lowly carinate; disc very faintly convex transversely, with some tiny punctures. Elytra elongate oval, greatest width at one third of length; subhumeral carinae sharp, in between them faintly convex transversely; lateral "cells" visible and their inner margins are formed alike a carina, medially faint striae only visible within hind third, otherwise surface impunctate. Tarsal formula of metatarsae: 5-5-4. Head brown, pronotum light brown lustrous, elytra pale brown. Body length: 1.42 mm. Body width: 0.54 mm. Ratios: Length/width elytra 1.42; width/length pronotum 1.39; length elytra/length pronotum 2.17.

This species is characterized by its pale brown elytra, missing of triangularly protruding processes on the anterior angles of the epistome, and the distinct club of the ultimate antennomeres.

Specimen studied from Panguana: Q (1, male).

Similar to *Phloeolaemus endomychus* (SHARP, 1899) (Fig. 80). *Phloeolaemus* sp. 3 was compared with the holotype of *P. endomychus*. *Phloeolaemus* sp. 3 presents a sharp subhumeral carina which extends nearly to apex, and the inner margin of the lateral "cell" is formed alike a low carina (discernible only in oblique view), elytra are slightly convex between subhumeral carinae. *Phloeolaemus endomychus* presents a rudimentary subhumeral carina which is only reaching to the middle of elytra; a low carina at the inner margin of lateral "cell" is missing; elytra in between subhumeral carinae are clearly convex transversely; the greatest width of pronotum of *Phloeolaemus* sp. 3 is nearly in the middle, that of *Phloeolaemus endomychus* is at the first quarter; additionally, the lateral parts of pronotum of *Phloeolaemus endomychus* are steeper descending to the lateral margin than those of *Phloeolaemus* sp. 3. The shape of the anterior part of frons is different between both species: frons, epistome and labrum of *Phloeolaemus* sp. 3 are nearly on the same horizontal level; the labrum and mandibles of *Phloeolaemus endomychus* are on a lower level than frons/epistome. Antennae of *Phloeolaemus endomychus* are shorter than antennae of *Phloeolaemus* sp. 3, but this may be caused by different sex of both species (the hind legs of *Phloeolaemus endomychus* are hidden under elytra, therefore the tarsal segments of this species could not be counted).

Genus *Placonotus* MACLEAY, 1871
Placonotus species from Panguana

Placonotus MACLEAY, 1871: 168.

Type species: *Placonotus longicornis* MACLEAY, 1871: 168 (by monotypy).

Definition (THOMAS, 1984b): Elongate, dorso-ventrally compressed, distinct epistomal suture, labrum shallowly emarginated anteriorly, head and pronotum with sublateral lines, procoxal cavity narrowly open posteriorly, metepisternum not contributing to mesocoxal cavities but mesepisternum and mesepimeron do, pygidium often exposed beyond elytral apices, tarsal formula 5-5-5 in females, 5-5-4 in males.

The species of the New World have been revised by THOMAS 1984b: 1-28.

***Placonotus politissimus* (WOLLASTON, 1867)** (Fig. 39)

Laemophloeus politissimus WOLLASTON, 1867: 67.
Laemophloeus commixtus GROUVELLE, 1912: 304; [syn.]: THOMAS 1984b, 6.
Laemophloeus mirus GROUVELLE, 1905: 142; [syn.]: THOMAS 1993.
Laemophloeus victus KESSEL, 1926: 69, 86; [syn.]: THOMAS 1984b, 6.

Diagnosis, redescription, illustration: THOMAS 1984b: 6-7. Figs. pp.19, 22, 24, 26, 27.

This species possesses femoral lines on ventrite III; this is the only species of the Neotropical area with such femoral lines. Females have shorter antennae than males.

Formerly known distribution: Capverdian Islands, Congo, Ivory Coast, Nigeria, Zimbabwe, Madagascar, Seychelle Islands, USA (Florida), Mexico, Belize, Colombia, Bolivia, Brazil, Cuba, Jamaica, Puerto Rico, Grenada, Trinidad.

Specimens studied from Panguana: A (41) - B (14) - C (1) - D (2) - K (1) - L (1) - T (3).

***Placonotus pallentipennis* (GROUVELLE, 1876)** (Fig. 40)

Laemophloeus pallentipennis GROUVELLE, 1876: 500.
Placonotus pallentipennis (GROUVELLE, 1876); [comb. n.]: THOMAS 1984b: 13.

Diagnosis, redescription, illustration: THOMAS 1984b, 13, Figs. pp.20, 22, 24, 26, 27, 28.
Formerly known distribution: Costa Rica, Panama, Colombia, Ecuador, Peru (THOMAS 1984b, 13), Brazil, Argentina.

Specimens studied from Panguana: B (1) - I (1).

Genus *Cryptolestes* GANGLBAUER, 1899
Cryptolestes species from Panguana

Leptus THOMSON 1863, Skandinaviens Coleoptera **5**: 92, 95, nec LATREILLE, 1796, nec DUFTSCHMID 1825.
Cryptolestes GANGLBAUER, 1899: 608, 612 (nom. nov.) (described as subgenus of *Laemophloeus*).
Fractophloeus KESSEL, 1921; [syn. n.]: LEFKOVITCH 1959. 104.
Type species: *Cucujus ferrugineus* STEPHENS (by subsequent designation of CASEY 1916).

The New World species have been revised by THOMAS 1988 and 2002a. An additional species from Bolivia, *Cryptolestes robinclarkei*, was described by THOMAS (2002b).

Definition (THOMAS 1988, 45): Epistomal suture scarcely discernible; labrum rounded anteriorly; antennomere II longer and more robust than III; sublateral lines of pronotum carinulate; metasternal suture not attaining anterior edge of sclerite; intercoxal process of ventrite III broadly rounded anteriorly or straight; anterior tibial spurs subequal in length; elytra with three complete cells; body dorso-ventrally compressed. The scape is highly modified in several species of males.

Cryptolestes uncicornis* (REITTER, 1876) (Fig. 41)

Microbrontes uncicornis REITTER, 1876: 45.
Cryptolestes uncicornis (REITTER, 1876); [comb. n.]: LEFTOVITCH 1958, 93.
Laemophloeus recticollis REITTER, 1876: 52; [syn.]: LEFTOVITCH 1958, 93.
Laemophloeus quadratus CASEY, 1884: 90; [syn.]: THOMAS 1988, 57.
Laemophloeus denticornis CASEY, 1884: 94; [syn.]: LEFTOVITCH 1958, 93.
Laemophloeus iteratus SHARP, 1899: 528; [syn.]: LEFTOVITCH 1958, 93.

Diagnosis, redescription, illustration: THOMAS 1988, 57-58: The female has a relatively short scape without any appendage. The males present a very characteristic scape. Specimens of both sexes possess two sublateral lines on pronotum. The lateral line is shortened and does not reach the posterior margin of pronotum. Body length (THOMAS 1988): 1.3-1.8 mm.
Formerly known distribution: Southern USA, Mexico, Guatemala, El Salvador, Costa Rica, Panama, Surinam, Ecuador, Bolivia, Brazil, Paraguay, Argentina, Cuba, Puerto Rico, Virgin Islands, Guadeloupe, Trinidad (THOMAS 1988, 58).

Specimens studied from Panguana, males: A (17) – B (3) - C (2) – F (1) – K (4) – J (1).
Presumed females: A (28) – B (5) – E (3) – L (1).

Cryptolestes robinclarkei* THOMAS, 2002 (Fig. 42)

Cryptolestes robinclarkei THOMAS, 2002: 2002b, 251-253.

This species has a very characteristic body shape, see THOMAS 2002b, 251-253. Measures of our Peruvian specimen: Body length: 2.18 mm. Body width: 0.89 mm. Ratios: Length/width elytra 1.59; width/length pronotum 1.63; length elytra/length pronotum 3.11.
Formerly known distribution: Bolivia.

Specimen studied from Panguana: A (1).

Cryptolestes ?trinidadensis* THOMAS, 1988 (Fig. 43)

This species is characterized, beside its tiny size, in males by a small tooth on the ventral side of scapes (only discernible in ventral view), by relatively large eyes which do not bulge out of contour of head, by declivous sides of pronotum and elytra, by a somewhat elongate form of body. Body length: 1.19-1.36 mm. Body width: 0.43-0.51 mm. Ratios: Length/width elytra 1.58-1.74; width/length pronotum 1.34-1.41; length elytra/length pronotum 2.50-2.64.

Specimens studied from Panguana: A (1, male) – S (3, females).

Cryptolestes thomasi* HAUTH & BREMER sp. n. (Fig. 44)

Concerning diagnosis, differential diagnosis and photographs, see HAUTH & BREMER 2020: 49-52.

Cryptolestes* species 1 (Fig. 45)

Except scapes in males the body shape of *Cryptolestes* sp. 1 is nearly identical with the body shape of *Crypto-*

lestes uncicornis (REITTER, 1876). *Cryptolestes* sp. 1 possesses a long and nearly club-shaped scape. All specimens of *Cryptolestes* which we checked had a tarsal formula 5-5-4 and are probably males. *Cryptolestes* sp. 1 is a frequently occurring species in Panguana, therefore, it is curious that only males of this species have been found. Do females of *Cryptolestes* sp. 1 possess a similar shape as females of *Cryptolestes uncicornis* (REITTER)? *Cryptolestes* sp. 1 possesses a second sublateral line on pronotum as also *Cryptolestes uncicornis* has. The second sublateral pronotal line of *Cryptolestes* sp. 1 is also shortened posteriorly, but it is slightly longer than the second sublateral line of *C. uncicornis*, but the differences are too little to use this character for differentiation of both taxa. Body length: 1.38-1.71 mm. Body width: 0.53-0.64 mm. Ratios: Length/width elytra 1.60-1.64; width/length pronotum 1.31-1.37; length elytra/length pronotum 2.59-2.77.

Specimens of *Cryptolestes* sp. 1 studied from Panguana: A (14) – B (17) – F (2) - G (1) - L (1) – Q (7) - T (9).

A similar prolonged scape in males is found in *Cryptolestes punctatus* (LECONTE, 1854), but in this species, the second sublateral line of pronotum diverges posteriorly to attain the basal angle of pronotum (in *Cryptolestes* sp. 1 the second sublateral line is only shortened, and it does not diverge in order to attain the posterior angle of prosternum). Additionally, the punctures on head and pronotum of *Cryptolestes punctatus* are definitely larger than those of *Cryptolestes* sp. 1. *Cryptolestes punctatus* is only known from the Eastern and Central States of the United States (THOMAS 1988, 56).

In Panguana one more taxon near *Cryptolestes* sp. 1 is found which we tentatively call *Cryptolestes* sp. 2. The only difference from *Cryptolestes* sp. 1 concerns the scapes of males. In *Cryptolestes* sp. 2 the blunt tips of the scape is somewhat bent inwards (Fig. 44).

***Cryptolestes* species 2** (Fig. 46)

Scape long (in males) and with a somewhat inwardly bent anterior part, the tip is blunt or slightly angular on one side. We call this taxon tentatively *Cryptolestes* sp. 2. But we are not fully convinced whether both taxa are different species or only a variation within one species. This taxon also has two sublateral lines on pronotum; in most species they are running parallel to each other, the most lateral line does not reach the base, in a few specimens the lateral line is indistinct. The pedicel is straight and somewhat longer and wider than antennomere 3. Eyes are relatively small. Antennae are long. Body length: 1.54-1.66 mm. Body width: 0.54-0.57 mm. Ratios: Length/width elytra 1.61-1.75; width/length pronotum 1.33-1.42; length elytra/length pronotum 2.61-2.76.

Specimens studied from Panguana: A (4) - B (3) - F (1) - T (2)

We do not know the female of this taxon.

***Cryptolestes* species 3** (Fig. 47)

Cryptolestes sp. 3. is also near *Cryptolestes* sp. 1 and sp. 2, and only the male is known. There are also two sublateral lines on pronotum which run parallel over two third, the second line is shortened and does not reach the base. Scape long (in males) and with a somewhat inwardly bent anterior part, the tip is pointed and hooked. The antennomeres 9-11 are thin and elongate. Otherwise this taxon is very near *Cryptolestes* sp. 1. Body length: 1.57 mm. Body width: 0.54 mm. Ratios: Length/width elytra 1.68; width/length pronotum 1.41; length elytra/length pronotum 2.76.

Specimen studied from Panguana: A (1).

We do not know the female of this species.

Besides the scape of males *Cryptolestes* 3 differs from *Cryptolestes* sp. 1 and 2 by the shape of antennae: the antennomeres 9-11 are thinner and longer. *Cryptolestes* sp. 3 is certainly a species different from *C.* sp. 1 and 2.

Concerning scape *Chryptolestes* sp. 3 is similar to *Cryptolestes spectabilis* THOMAS, 2002 (2002a, 149-150), but the pedicel of *Cryptolestes spectabilis* is curved and mostly transversely positioned, the pedicel of sp. 3 is longitudinally positioned as the antennomeres 4-11 are, and additionally the scape of *Cryptolestes spectabilis* has a somewhat different shape.

Genus *Lathropus* ERICHSON, 1845
Lathropus species from Panguana

Lathropus ERICHSON. 1845: 327.
Type species: *Trogosita sepicola* MÜLLER.

Diagnosis of genus (THOMAS 2010, 1): Very small (<2.0 mm); short antennae with an ultimate club of 3 antennomeres, the antennomeres 1+2 are also much wider and longer than the following antennomeres; mesocoxal cavities laterally closed by meso- and metasterna; procoxal cavities closed posteriorly; coarse

surface sculpture of head and pronotum; tarsal formula 5-5-5 in both sexes. *Lathropus* is the only genus of Laemophloeidae with the mesocoxal cavities closed by meso- and metasterna.

The *Lathropus* species of Florida and the species of the West Indies only have been revised (THOMAS 2010). No species from South America has been described yet.

***Lathropus* species 1** (Fig. 48)

Characters as in the diagnosis of the genus. Furthermore, with coarse surface sculpture of head, pronotum and elytra; lateral parts of pronotum irregularly curved; sublateral lines of pronotum formed as irregular carinae; elytra with a subhumeral carina and three elytral cells. Body length: 1.02 mm. Body width: 0.41 mm. Ratios: Length/width elytra 1.50; width/length pronotum 1.35; length elytra/length pronotum 2.42.

Specimen studied from Panguana: R (1) (one elytron is missing in the unique specimen known).

Genus *Odontophloeus* THOMAS, 1984
Odontophloeus species from Panguana

Odontophloeus THOMAS, 1984c: 437-439.

Type species: *Laemophloeus quadridentatus* CHAMPION, 1914 (designation: THOMAS 1984c, 437).

Diagnosis of genus (THOMAS 1984c): Possession of three rounded teeth laterally on pronotum between anterior and posterior angles; sublateral lines of pronotum irregularly curved; bluntly pointed intercoxal process of ventrite III.

The shape of the *Odontophloeus* species resemble species of *Rhabdophloeus* SHARP, 1899, but by their evenly rounded teeth on pronotum they are distinguished from *Rhabdophloeus* which present the lateral margins of pronotum irregularly curved (most have more than three teeth). Concerning other characters, see THOMAS 1984c.

***Odontophloeus kesseli* (HETSCHKO, 1928)** (Fig. 49)

Laemophloeus ambiguus KESSEL, 1928: 66.

Laemophloeus kesseli HETSCHKO, 1928: 142 (nom. n. because of nom. praeocc.)

Odontophloeus kesseli (HETSCHKO, 1928); [comb. n.]: THOMAS 1984a, 446.

Diagnosis: see THOMAS 1984c: 446

Formerly known distribution: Brazil (Santa Catarina), Guatemala, Panama (THOMAS 1984a, 446).

Specimens studied from Panguana: A (30) - B (19) - J (1) - M (1) (identity of *Odontophloeus kesseli* (HETSCHKO) confirmed by examination of aedeagus).

Genus *Rhabdophloeus* SHARP, 1899
Rhabdophloeus species from Panguana

Rhabdophloeus SHARP, 1899: 531.

Diagnosis of genus: Upper side pubescent. Adults have irregularly curved sublateral carinae of pronotum, lateral margins with mostly more than three teeth; the front angles of pronotum and, in most species, also the hind angles sharply angled; the process of ventrite III is anteriorly acuminate.

No revision of the Neotropical species of *Rhabdophloeus* has been published yet, therefore, if the identity of specimens could not be confirmed by comparison with types, we only number the Panguana species.

We checked syntypes of *R. chiriquensis* SHARP, 1899, *R. concolor* SHARP, 1899, and *R. dispar* SHARP, 1899 from BMNH (they are from Central America) and compared them with the species found in Panguana. *Rhabdophloeus chiriquensis* SHARP is the only species which obviously occurs in Panguana.

We do not know the four *Rhabdophloeus* species from Badenfurt, Santa Catharina, Brazil, which had been described by KESSEL (1925) and are deposited in the Warsaw Museum of the National Academy of Sciences. According to THOMAS (personal communication to the first author 2017) they are not labelled as types.

Rhabdophloeus dispar SHARP possesses longitudinal elevations medially the sublateral carinae of the pronotum. From the Panguana specimens affine *R. dispar* there are two taxa with longitudinal elevations medial of the sublateral carinae of pronotum. However, both taxa are definitely different from *R. dispar* SHARP from Central America. The taxa from Panguana affine *Rhabdophloeus dispar* are dealt in this paper as *Rhabdophloeus* sp. 2 and sp. 3.

Specimens from Panguana affine *Rhabdophloeus concolor* SHARP (*Rhabdophloeus* sp. 1) differ only slightly from the syntype of *Rhabdophloeus concolor* SHARP from Central America; they could represent a subspecies of the Central American species.

We did not see the type of *R. costatus* (GROUVELLE, 1876) from the MNHP which also originates from Central America, but we could study two specimens of *Rabdophloeus* from BMNH which are determined and published by SHARP (1899) as being *Rhabdophloeus costatus* (GROUVELLE), a male and a female. The female of them is *R. chiriquensis* (SHARP). However, possibly the male specimen is the real *R. costatus* (GROUVELLE), but without studying the type of GROUVELLE's species this remains speculative. In Panguana there are three taxa with a body shape similar to *R. costatus*. The most frequently collected taxon has short antennae in both sexes and a pear-shaped 11th antennomere; it is called in this paper *Rhabdophloeus* sp. 4. *Rhabdophloeus* sp. 5 has longer antennae than *Rhabdophloeus* sp. 4 and a different shape of antennomere 11, it is near but not identical with the male specimen which SHARP determined as *Rhabdophloeus costatus*. There is a third taxon alike *Rhabdophloeus costatus* (GROUVELLE), only one male. It is called in this paper *Rhabdophloeus* sp. 6. It has very long antennae; they are longer than the antennae of the other Panguana species affine *R. costatus* and also longer than those of the Central American specimen. The identity of the three species affine *R. costatus* from Panguana remains unsettled, and it is possible that all of them are undescribed.

***Rhabdophloeus chiriquensis* SHARP, 1899** (Fig. 50)

Rhabdophloeus chiriquensis SHARP, 1899: 532.

Rhabdophloeus chiriquensis was formerly only known from Panama. We examined one of the two syntypes from BMNH, a male, and compared it with Panguana specimens. It is obvious that *Rhabdophloeus chiriquensis* SHARP occurs in Panguana. Measures of the male syntype: Body length: 2.18 mm. Body width: 0.91 mm. Length/width elytra 1.39; width/length pronotum 1.64; length elytra/length pronotum 2.89.

Rhabdophloeus chiriquensis is characterized by a broad and depressed form of body, by explanate margins of the elytra, by markedly curved sides of elytra and by long antennae (in males distinctly longer than in females); on the disc of elytra there are three elevated, rib-like ridges between suture and subhumeral carina (the inner ridge just at suture) which in matures specimens are darker colored than the rest of elytra. Measures of specimens from Peru: Body length: 1.75-2.02 mm. Body width: 0.72-0.82 mm. Length/width elytra 1.37-1.41; width/length pronotum 1.40-1.70; length elytra/length pronotum 2.52-2.80.

Specimens studied from Panguana: A (14) – B (26) – C (1) – H (2) – S (4).

This species has to be differentiated from *R. costatus* (GROUVELLE, 1876) and related species. Based on SHARP's description: The elytra of *R. costatus* are less oval laterally, and therefore the elytra are narrower; the antennae of males and females are shorter than those of *R. chiriquensis*, the frons of *R. costatus* has a slightly impressed median suture which is best recognized in oblique view (and by the laterad direction of the frontal hairs on both sides of frons), this median impression and the laterad direction of the frontal hairs on both sides of frons are not seen in *Rhabdophloeus chiriquensis* (nor in two *Rhabdophloeus* species affine *Rhabdophloeus dispar* SHARP, 1899).

***Rhabdophloeus* species 1** (Fig. 51) (Species affine *Rhabdophloeus concolor* SHARP, 1899)

We checked a syntype of *Rhabdophloeus concolor* SHARP, 1899, a female; this syntype was compared with specimens from Panguana.

Specimens of *Rhabdophloeus* species 1 from Panguana are characterized as follows: Elongate, flat; head and pronotum more or less brown, mat, elytra lighter brown, but the lateral and apical margins are frequently somewhat darker brown, antennae brown, legs yellowish brown; elytra with three very low, rib-like elevations between suture and lateral carina; upper side of elytra transversely flat between subhumeral carinae; head with short, recumbent hairs; hairs on pronotum are shorter; hairs on elytra are microscopically short. Antennae of medium length, in females somewhat shorter than in males, antennomere 11 apically rounded. Measures of 6 specimens from Panguana: Body length: 2.02-2.30 mm. Body width: 0.74-0.78 mm. Ratios: Length/width elytra 1.61-1.69; width/length pronotum 1.32-1.35; length elytra/length pronotum 2.74-2.87.

Specimens studied from Panguana: A (42) – B (22) – C (1) – F (1) – H (2) – M (1) – S (4) – T (1).

Concerning size, shape of body and antennae very similar to *Rhabdophloeus concolor* SHARP from Mexico and Guatemala. In contrast to *R. concolor* SHARP from Mexico and Guatemala the upper side of species 1 is opaque, especially discernible on head and pronotum (in *R. concolor* from Mexico and Guatemala lustrous; in species 1 head and pronotum are also darker colored than head and pronotum of the syntype of *Rhabdophloeus concolor*). Antennae of both taxa correspond to each other. *Rhabdophloeus* species 1 could be a subspecies of *Rhabdophloeus concolor* SHARP. However, further studies are necessary to settle upon.

***Rhabdophloeus* species 2** (Fig. 52) (1st Species affine *Rhabdophloeus dispar* SHARP, 1899)
This species and the *Rhabdophloeus* species 3 from Panguana have been compared with a syntype of *Rhabdophloeus dispar* SHARP, 1899 from BMNH.

Rhabdophloeus species 2 possesses a special form of pronotum: Besides the sublateral sharp carinae there is another elevation medial from the sublateral carinae which is lower and not carinate, it starts at base and ends approximately a third behind the anterior margin; the external carina and the inner elevations are moderately curved and are running parallel to each other. Elytra elongate oval, with three distinct elongate costae between suture and subhumeral carina (an inner costa is situated at suture). Antennomere 11 is large in both sexes; in males antennomeres 5-7 are somewhat longer than wide, in female antennomeres 5-7 are about as long as wide. – A congruent shape of pronotum of *R.* species 2 is found in *Rhabdophloeus dispar*. However, *R. dispar* is generally narrower than *R.* species 2, and the elytra are longer (length/width elytra of *R. dispar* 1.67 vs. 1.43-1.56 in species 2); the scape of antennae of *R. dispar* is narrower and longer than the scape of species 2, and also the antennomeres 9+10 are different; the eyes of the syntype of *R. dispar* are definitely larger than the eyes of our species from Panguana.

Measures of specimens of *R.* species 2: Body length: 1.82-1.91 mm. Body width: 0.70-0.78. Ratios: Length/width elytra 1.43-1.56; width/length pronotum 1.27-1.40; length elytra/length pronotum 2.39-2.60.

Specimens studied from Panguana: A (5) – B (2) – P (2) – Q (3) – R (1).

Rhabdophloeus species 3 from Panguana has also an elevation medial of sublateral carinae of pronotum, in this species the pronotal elevations end at the anterior margin. It has definitely longer antennae than *R.* species 2; eyes of *R.* sp. 3 are as small as eyes in species 2.

***Rhabdophloeus* species 3** (Fig. 53) (2nd species affine *R. dispar* SHARP, 1899).
Species with longitudinal elevations of pronotum medial of the sublateral carinae, these elevations starts at the pronotal base and reach the anterior margin of pronotum. The antennae are very long, especially the antennomere 11 is prolonged, antennae in males reach to apex of elytra, in females they cover about three-quarters of elytra. The eyes are relatively small. The elytra are similar to elytra of *Rhabdophloeus* species 2. Body length: 1.77-1.95 mm. Body width: 0.72-0.74 mm. Ratios: Length/width elytra 1.46-1.53; width/length pronotum 1.29-1.40; length elytra/length pronotum 2.57+2.64.

Specimens studied from Panguana: B (4) (2 with elytra, 2 without elytra: one female, three males).

The eyes of *Rhabdophloeus dispar* from Central America are much larger and the pronotum is wider than in *Rhabdophloeus* sp. 3.

Rhabdophloeus sp. 3 differs from *Rhabdophloeus* sp. 2 by the following characters: The longitudinal elevations of pronotum medial of the sublateral carinae are longer and reach to the anterior margin (those of *R.* sp. 2 ends approximately a third behind the anterior margin); the shape of pronotum is more rectangular than that of *R.* sp. 2; the antennae are much longer than the antennae of *R.* sp. 2.

Rhabdophloeus sp. 2 and *R.* sp. 3 from Panguana are certainly species different from *Rhabdophloeus dispar* SHARP, 1899.

***Rhabdophloeus* species 4 (**Fig. 54) (1st Species affine *R. costatus* (GROUVELLE, 1876))
The specimens of *Rhabdophloeus* species 4 are frequently collected in Panguana at light. Their elytra are relatively narrow, the costae on elytra are low, and the interstices of elytra possess very short, dense punctures with tiny, recumbent hairs; frons with a median, moderately impressed suture which is best recognized in a somewhat oblique view, it opens anteriorly to a less pubescent triangular area; antennae relatively short, in males only slightly longer than in females; antennomere 11 pear-shaped. Upper side of most specimens testaceous, in some also darker and with dark brown costae on elytra. Tarsal formula 5-5-4 in males, 5-5-5 in females; tarsomeres 1 short and about as long as penultimate tarsomeres.
Measures: Body length: 1.61-1.87 mm. Body width: 0.62-0.77 mm. Ratios: Length/width elytra: 1.46-1.54; width/length pronotum 1.32-1.42; length elytra/length pronotum 2.50-2.70.

Specimens studied from Panguana: A (76) – B (56) – G (2) – H (9) – N (1) – S (3).

Concerning identity of this species and the relations to real *Rhabdophloeus costatus* (GROUVELLE), see Introduction to species of *Rhabdophloeus.*
Differences between *Rhabdophloeus* sp. 4 and *R. chiriquensis*, see at *R. chiriquensis.*

Rhabdophloeus sp. 5, another species affine *R. costatus,* has a similar body shape, but it does not show median an impressed frons as *R. costatus* (GROUVELLE) does, and *R.* sp. 3 elicits, it has longer antennae than *R.* sp. 4, moreover, the antennomere 11 of males of *R.* sp. 5 is apically pointed; the interstices of elytra possess recumbent hairs of medium length in *Rhabdophloeus* sp. 5 which *R.* sp. 4 do not have.

***Rhabdophloeus* species 5** (Fig. 55) (2nd Species affine *R. costatus* (GROUVELLE, 1876))

Concerning body shape similar to *Rhabdophloeus* sp. 4, but antennae longer than antennae of *R.* sp. 4; the antennae of this species have about the length and shape of the (male) specimens from Central America which SHARP determined as *Rhabdophloeus costatus* (GROUVELLE, 1876) (see above); however, they have median no impressed sulcus on frons, and there is no triangular, less pubescent area anteriorly on frons as it is found in *R.* sp. 4.

Antenna of medium length, antennomere 11 very elongate, in males apically pointed, antennomeres 6-8 in males longer than wide, in females approximately as wide as long. Hairs are longer in the interstices of elytra than in the interstices of *R.* sp. 3. Body length: 1.52-1.69 mm. Body width: 0.60-0.68 mm. Ratios: Length/width elytra 1.51-1.55; width/ length pronotum 1.27-1.46; length elytra/length pronotum 2.40-2.72.

Specimaens studied from Panguana: A (6) – B (8) – E (1).

Concerning relation to *Rhabdophloeus costatus* (GROUVELLE), see remarks in *Rhabdophloeus* sp. 4.

***Rhabdophloeus* species 6** (Fig. 56) (3rd Species affine *R. costatus* (GROUVELLE, 1876))

This is another species affine *R. costatus* according to the shape of body. Elytra are longer than those of *Rhabdophloeus* sp. 4 and those of sp. 5; antennae are much longer, antennomere 11 very long, apically pointed. In the anterior part of frons there is a distinct triangular, less pubescent area, this is also found in *R.* sp. 4. Body length: 2.06 mm. Body width: 0.70 mm. Ratios: Length/width elytra 1.56; width/length pronotum 1.33; length elytra/length pronotum 2.67.

Specimen studied from Panguana: B (1).

Genus *Dysmerus* CASEY, 1884
Dysmerus species from Panguana

Dysmerus CASEY, 1884: 97.

Type species: *Dysmerus basalis* CASEY, 1884 (by monotypy).

This genus has been revised by THOMAS (2009, 1-28) (determination key of males, ditto pp.5, 6). In contrast to species of many other genera of Laemophloeidae species of *Dysmerus* are subcylindrical in cross-section and possess long, narrow elytra.

Definition of genus (THOMAS 2009, 2-3): Body elongate, parallel-sided and subcylindrical, pedicel attached laterally to scape in males, which is highly modified; procoxal cavities closed; intercoxal process of prothorax apically truncate; intercoxal process of first visible abdominal segment (ventrite III) narrow; tarsal formula 5-5-4 in males, 5-5-5 in females. Species of *Dysmerus* are uniformly testaceous in color, have sublateral pronotal lines composed of a groove bordered laterally by a ridge, and all three elytral cells are complete.

Among the material from Panguana we found males of seven species, of which five could be assigned to a described species. From three more species, we found only females which we could not place to one of the species of which we have males. Only male specimens can currently be placed to a described species, female specimens only if one has males for comparison and shapes of pronotum, elytra, presence or absence of a median carina on frons, and shape of antennomeres 2-10 point to a special species. By this way it is easy to determine females of *Dysmerus symphilus* THOMAS, 2009. We neglect most of these female specimens in the following list. However, among these females, there is one relatively large species with two sublateral lines on pronotum which certainly is not *Dysmerus symphilus* THOMAS, the only known *Dysmerus* species with two sublateral lines: The antennomeres of our taxon are loosely articulated and not moniliform as they are in *Dysmerus symphilus* THOMAS, and this female specimen certainly belongs to an undescribed species. If a male will be found with these sublateral lines on pronotum, the same form of pronotum and with such loosely articulated antennomeres it certainly can be placed to this female. This female is therefore included here as a separate species (*Dysmerus* species 3).

***Dysmerus caseyi* (GROUVELLE, 1898)** (Fig. 57)

Laemophloeus caseyi GROUVELLE, 1898: 42.

Dysmerus caseyi (GROUVELLE, 1898), in part; [comb. n.]: LEFKOVITCH 1958, 97.

Diagnosis: see THOMAS 2009, 7-8, Figs. 9, 33.

Formerly known distribution (THOMAS 2009, 8): Mexico, Belize, Costa Rica, Honduras, Panama, Grenada, Trinidad, Brazil, Peru.

Specimens studied from Panguana: A (2) - G (1) - S (1).

***Dysmerus skelleyi* THOMAS, 2009** (Fig. 58)

Dysmerus skelleyi THOMAS, 2009: 24, fig. 18.

Diagnosis: see THOMAS 2009, 24, Figs. 18, 28 (only the holotype formerly known).

Measures of our four specimens: Body length: 1.78-1.95 mm. Body width: 0.51-0.56 mm. Ratios: Length/ width elytra 1.97-2.04; width/length pronotum 0.92-1.04; length elytra/length pronotum 2.19-2.36.

Formerly known distribution: Peru (THOMAS 2009, 24).

Specimens studied from Panguana: A (2) - G (2).

****Dysmerus symphilus* THOMAS, 2009** (Fig. 59)

Dysmerus symphilus THOMAS, 2009: 24, Figs. 20, 42.

Diagnosis: see THOMAS 2009, 24-25.

Formerly known distribution: Trinidad, Costa Rica, Honduras, Panama, French Guyana, Brazil (Rondonia), Bolivia.

Specimens studied from Panguana: A (4) - B (4) - C (1) - F (1) - G (2).

****Dysmerus monstrosus* THOMAS, 2009** (Fig. 60a, b)

Dysmerus monstrosus THOMAS, 2009: 19-20, Figs. 15, 26.

Diagnosis: see THOMAS 2009, 19-20.

Formerly known distribution: Brazil (Mato Grosso), Argentina (Prov. Salta).

Specimens studied from Panguana: B (2).

****Dysmerus rondoniensis* THOMAS, 2009** (Fig. 61)

Dysmerus rondoniensis THOMAS, 2009, 22, Figs. 17, 27.

Diagnosis: see THOMAS 2009, 22.

Formerly known distribution: Brazil (Rondonia).

Specimens studied from Panguana: A (1) - C (1) - G (1).

****Dysmerus* species 1** (Fig. 62)

Small, elongate, subcylindrical. Head without a clear median carina; sides of head emarginated, anteriorly these sides end outwards in a tip, from this tip inwards there is a rising edge, further inwards there is a hollow from where the frons is steeply descending, on a lower level the epistome presents an acute angle on each side which encircles the labrum. Body length: 1.46 mm. Body width: 0.45 mm. Ratios: Length/ width elytra 1.96; width/length pronotum 0.98; length elytra/length pronotum 2.14.

Specimen studied from Panguana: B (1, male) (unfortunately damaged when handling).

****Dysmerus* species 2** (Fig. 63)

A median carina on head is reaching to the anterior margin of frons; the sides of the epistome are anteriorly sharp-angled; pronotum short, with two sublateral lines, the lateral one is reaching neither to the anterior nor to the posterior margin; elytra with subhumeral carinae; the uneven intervals of elytra carinate in the apical region. Antennae loosely articulated, the antennomeres 9-11 longer than wide. Upper side with distinct, mostly recumbent hairs. Head and pronotum brown, elytra lighter brown, somewhat lustrous; antennae brown, legs light brown.

This species has to be differentiated from *Dysmerus symphilus* THOMAS, 2009 which is the only *Dysmerus* species known which also presents two sublateral lines on pronotum. In *D. symphilus* the second sublateral line reaches to the anterior margin and ends shortly in front of posterior margin, furthermore, most antennomeres of *D. symphilus* are moniliform and very closely set, those of *Dysmerus* sp. 3 are loosely articulated. Body length: 2.08 mm. Body width: 0.67 mm. Ratios: Length/width elytra 1.88; width/length pronotum 1.17; length elytra/length pronotum 2.71.

Specimen studied from Panguana: A (1, female).

****Dysmerus* species 3** (Figs. 64)

This is a *Dysmerus* with a form of scape of the males which does not correspond to the form of shapes of any other described species of *Dysmerus*. The form of the scapes resemble more the form of scapes of some *Cryptolestes* species, e. g. *Cryptolestes* species 2; however, the scapes of *Dysmerus* species 3 are longer, and the sentinel is not apically attached to the scape but more laterally to the scapes. The two sublateral lines of pronotum run closely parallel but the lateral one ends shortly in front of posterior margin of pronotum. Measures of the male: Body length: 1.40 mm. Body width: 0.42 mm. Ratios: Length/width elytra 1.91;

width/length pronotum 1.14; length elytra/length pronotum 2.39. Measures of the females: Body length: 1.52-1.55 mm. Body width: 0.35-0.41 mm. Ratios: Length/width elytra 1.92-2.05; width/length pronotum 1-08-1.11; length elytra/length pronotum 2.32-2.50.

Specimen studied from Panguana: A (1, female) - B (1, male) - K (1, female).

Genus *Rhinomalus* GEMMINGER, 1870
Rhinomalus species from Panguana

Rhinomalus GEMMINGER *in* DE HAROLD, 1870: 124.
Type species: *Homalirhinus rufirostris* CHEVROLAT, 1833 (by monotypy).

This genus comprises immaculate species with a long, narrow rostrum (longer than wide), antennae with a long antennal scape, and on scape with one erect seta near apex on dorsal side; the antennae have a club of three widened antennomeres; the sublateral lines of pronotum do not reach the anterior margin; on elytra there is no subhumeral carina and no "cell"; the ventrite III is acuminate (THOMAS 1984a, 75). The aedeagus possesses a dorsal piece of tegmen. Tarsal formula in males 5-5-4, in females 5-5-5.
No revision of the genus *Rhinomalus* exists.

In the Panguana material there is only one *Rhinomalus* species, but it is collected in an abundant number (not all collected specimens mounted). This taxon could be *Rhinomalus fulvicollis* GROUVELLE, 1896 according to GROUVELLE's description. However, this has to be substantiated by comparison with type(s).
We compared the Panguana specimens with the holotype of *Rhinomalus chiriquensis* SHARP, 1899 from BMNH (collected in Panama) (Fig. 81) and specimens which probably are *Rhinomalus rufirostris* (CHEVROLAT, 1833) from Colombia. However, the *Rhinomalus* from Panguana has a much stronger punctation and a rufous tinge on pronotum which *R. chiriquensis* and *R. rufirostris* both do not have. In the old collection of the ZSM there are two specimens with the label "Columb." which are determined as *Rhinomalus rufirostris*, probably by GEMMINGER. GEMMINGER 1870 created the genus name *Rhinomalus.* At that time he worked as custos in the ZSM. It is conceivable that these two specimens from Colombia of the ZSM are from the same source from which CHEVROLAT also received the specimen(s) which he described as *Homalirhinus rufirostris* (his type(s) were originating from "Colomb."). One or both specimens of the ZSM came via the collection of Prof. SCHAUM into the collection of the ZSM. SCHAUM studied in Paris at the same time when CHEVROLAT described in Paris the *Homalirhinus rufirostris.* Thus, the two specimens of the ZSM are probably the real *Rhinomalus rufirostris* (CHEVROLAT, 1833). We could not trace the whereabouts of the type(s) of CHEVROLAT.

***Rhinomalus* species 1** (Fig. 65)
Pronotum with a reddish tinge on a black ground color and with a distinct punctation; elytra black, there is a slightly impressed subhumeral stria; other striae exist medial of this humeral stria, but they are more or less distinct; on apex of elytra there are some stiff, erect setae. In males the scapes are nearly as long as the rostrum, in females the rostrum is longer than the scapes. There are also differences on width of the three ultimate antennomeres between both sexes.

Specimens studied from Panguana: (males) A (59) - B (9) - D (1) - K (2) - L (2); (females) A (37) - B (7) - C (1).

Genus *Metaxyphloeus* THOMAS, 1984
Metaxyphloeus species from Panguana

Metaxyphloeus THOMAS, 1984: 1984a, 68-69.
Type species: *Rhinomalus germaini* GROUVELLE, 1896 (designation by THOMAS 1984a, 67).

Definition (THOMAS 1984a): Antennal club of six widened antennomeres (in one species with five widened antennomeres); elytra maculate; sublateral lines of pronotum complete to apex; antennal scape with a single prominent and erect dorsal seta near apex, visible at 100-fold or higher magnification; rostrum almost as long as wide (or longer in one unpublished species = *Metaxyphloeus* sp. 1); dorsal piece of tegmen (of aedeagus) missing; tarsal formula in males 5-5-4, in females 5-5-5.

Elytra with a subhumera carina and a lateral elytral "cell". This is the only genus in which the dorsal piece of tegmen is missing.

A determination key of species of this genus was provided by THOMAS 1984a: 74-75.
Species of *Metaxyphloeus* are similar to species of a taxon which is immaculate, We tentatively call it **Genus et species 3**, see the following paragraph.

***Metaxyphloeus germaini* (GROUVELLE, 1896)** (Fig. 66)

Rhinomalus germaini GROUVELLE, 1896: 198; [comb. n.]: THOMAS 1984, 69.

Diagnosis, redescription and illustration: THOMAS 1984: 69-70; Fig. p.68.

Formerly known distribution: Costa Rica, Guatemala, Panama, Trinidad, Colombia, Bolivia.

Specimens studied from Panguana: A (38) - B (13) - E (1) - L (2) - S (3).

***Metaxyphloeus zeus* THOMAS, 1984** (Fig.67)

Metaxyphloeus zeus THOMAS, 1984: 72; Figs. pp.73, 77.

Body length: 2.18-2.55 mm. Body width: 0.74-0.91 mm. Ratios: Length/width elytra 1.44-1.56; width/ length pronotum 1.31-1.35; length elytra/length pronotum 2.46-2.70.

Formerly known distribution: Bolivia.

Specimens studied from Panguana: A (10) - B (5) - K (1).

Annotation. This species has an antennal club of 5 antennomeres.

***Metaxyphloeus* species 1** (Fig. 68)

Of medium size. Upper side covered with long hairs; on elytra there is only one macula on each elytron. THOMAS collected several specimens of this taxon in Bolivia (personal communication of THOMAS 2016 to the first author). It probably remained undescribed. Body length: 1.93 mm. Body width: 0.68 mm. Ratios: Length/width elytra 1.37; width/ length pronotum 1.20; length elytra/length pronotum 2.40.

Specimen studied from Panguana: A (1, female).

***Metaxyphloeus* species 2** (Fig. 69)

Pronotum and elytra yellow with a dark brown macula in the middle of elytra. The six last antennomeres widened. Antennal scape with a single dorsal seta near apex; rostrum of medium size and laterally sinuate; pronotum and elytra with a similar shape as it is found in *Metaxyphloeus germaini* (GROUVELLE, 1896). However, the eyes of *Metaxyphloeus* species 1 are larger than the eyes of *M. germaini*. Body length: 1.67-2.06 mm. Body width: 0.64-0.74 mm. Ratios: Length/width elytra 1.40-1.42; width/ length pronotum 1.35-1.39; length elytra/length pronotum 2.43-2.54.

Specimens studied from Panguana: A (1) - G (1) (both males) - P (1).

***Metaxyphloeus* ?species 2** (Fig. 70)

This specimen, a female, has a somewhat similar shape and ?coloration as *Metaxyphloeus* species 2: We hesitate currently to decide whether it belongs to *Metaxyphloeus* sp. 2 or is a separate taxon. Its measures: Body length: 1.77 mm. Body width: 0.64 mm. Ratios: Length/width elytra 1.45; width/length pronotum 1.41; length elytra/length pronotum 2.67.

Specimen studied from Panguana: I (1).

***Genus & species 3 (**Genus & species 3 Fig. 71)

Genus affine *Metaxyphloeus* THOMAS, 1984. Elytra without a macula; long rostrum similar to the rostrum of species of *Rhinomalus* GEMMINGER, 1870; the sublateral lines of pronotum are present up to anterior margin; scape of antennae with a stiff seta antero-dorsally; antennal club composed of 6 widened antennomeres; elytra without a subhumeral carina and without a lateral "cell"; prosternal process between procoxae narrow; ventrite III anteriorly acuminate.

By the long rostrum in combination with a club of six widened antennomeres this taxon seems to be next to *Metaxyphloeus* THOMAS. According to definition, *Metaxyphloeus* species should be maculate and possess a subhumeral "cell" (last statement of the sentence not in the original definition). Our species is immaculate and has no elytral "cell". The only species without an elytra "cell" is *Metaxyphloeus vicinus* (GROUVELLE, 1896) from Mexico, but this species has one macula on each elytron. Species of the genus *Metaxyphloeus* are characterized by the loss of the dorsal piece of the tegmen (THOMAS 1984a). One could be eager to know whether this is also true for the species of **genus 3**.

***Species of genus 3** (Fig. 71)

Except the antennae club of six antennomeres this species is a typical *Rhinomalus.* Elytra somewhat paunchy, greatest width approximately in the middle, surface nearly impunctate. A few stiff, long setae at the sides in the hind half. Upper side dark brown to black, brilliant, legs brown, antennomeres 1-5 brown, 6-11 black, prosternum and ventrite III brown, rest of underside black. Body length: 1.71-1.93 mm. Body

width: 0.63-0.70 mm. Ratios: Length/width elytra 1.36-1.44; width/length pronotum 1.21-1.25; length elytra/length pronotum 2.42-2.57.

Specimens studied from Panguana: A (4) - B (5).

Genus *Rhinophloeus* SHARP, 1899
Rhinophloeus species of Panguana

Rhinophloeus SHARP, 1899: 531.
Type species: *Laemophloeus salpingoides* GROUVELLE, 1876 (THOMAS 1984a).

Definition: The genus *Rhinophloeus* SHARP, 1899 consists of maculate species which, according to THOMAS (1984a, pp.75,78), present the following features: not all elytral "cells" present; subhumeral carinae of elytra not present; pronotum not irregularly toothed nor crenulate; antennal club composed of three antennomeres; frons may be prolonged anteriorly; epistomal sutures in some species recognizable, in other species not well discernible; sublateral lines of pronotum complete to apex; tarsomere 1 not shorter than penultimate tarsomere; sternum VIII not modified in males to form claspers; internal sac with flagellum; dorsal piece of tegmen present.

In three species from Panguana the pronotum is markedly narrowed towards hind angles; in one species it is heard-shaped and then sides possess shortly in front of the real hind corners a marked antebasal denticle which feigns a hind corner; antennal scape with a single prominent and erect seta antero-dorsally, antennae in females shorter than in males; the spurs of protibiae are unequal in length: the more dorsal one is longer and curved, the more ventral one is straight and shorter; the prosternal process between procoxae is relatively narrow. Tarsal formulae: 5-5-4 in males, 5-5-5 in females.

No revision of the genus *Rhinophloeus* exists, therefore, a reliable determination of the specimens from Panguana is not possible. Because of the different shape of pronotum it could be that the species belong to different genera. The four species from Panguana are therefore only numbered.

***Rhinophloeus* species 1** (Fig. 72)

Rhinophloeus ?*salpingoides* (GROUVELLE, 1876): 490.

Species with one yellow macula on each elytron, situated somewhat in front of the middle, ground color black. Pronotum dark red; markedly narrowed to hind corners (without an antebasal denticle), with a moderate protrusion of forehead, in males this protrusion is as long as the length of the scape, in females it is slightly longer than the scape; scape antero-dorsally with a stiff, erect seta. Body length: 1.34-2.33 mm. Body width: 0.54-0.89 mm. Ratios: Length/width elytra 1.38-1.50; width/ length pronotum 1.20-1.31; length elytra/length pronotum 2.37-2.58.

Specimens studied from Panguana: A (42) - B (22) - G (1) - H (2) - L (1).

***Rhinophloeus* species 2** (Fig. 73)

Species with two yellow maculae on each elytron. Pronotum heart-shaped, with a strong antebasal denticle. Antennae long, in males nearly attaining the apicale, in females the hind third. On frons short, recumbent, distinct hairs in males, in female either no hairs or less hairs than in males. Tarsomeres 1 relatively long and much longer than penultimate tarsomeres. Body length: 1.46-1.85 mm. Body width: 0.64-0.76 mm. Ratios: Length/width elytra 1.39-1.52; width/ length pronotum 1.24-1.37; length elytra/length pronotum 2.43-2,63.

Females specimens studied from Panguana: A (24) - B (10) - E1 (1) - G (1) - H (1).

Male specimens in Panguana: A (33) - B (21) - H (5) - M (1) - S (4).

***Rhinophloeus* species 3** (Fig. 74)

Rhinophloeus ?productus (GROUVELLE, 1876)

The maculae similar to the maculae of *Rhinophloeus* sp. 2, but *R.* sp. 3 is not closely related to *Rhinophloeus* sp. 2 because *R.* sp. 3 lacks the antebasal denticle of pronotum; antennae much shorter than in *Rhinophloeus* sp. 2, in males they reach about to the middle of elytra, in females overlapping about 40 per cent of elytra; frons only with a few short, recumbent hairs in males or without hairs. Frons dark brown; pronotum yellow to light brown; elytra with two maculae on each elytron, in several specimens the hind maculae occupy the whole apex, first interstice also yellow/light brown within the anterior 40 per cent. Body length: 1.57-2.08 mm. Body width: 0.62-0.81 mm. Ratios: Length/width elytra 1.45-1.48; width/ length pronotum 1.19-1.36; length elytra/length pronotum 2.21-2.47.

Specimens studied from Panguana: A (35) - B (23) - E (2) - H (3) - M (1) - P (2) - S (3).

***Rhinophloeus* species 4** (Fig. 75)

Pronotum heart-shaped and markedly constricted towards base, without an antebasal denticle; pronotum and apex of elytra with short, recumbent, distinct hairs in both sexes, upper side of head also with distinct, recumbent hairs which are denser in males than in females; antennae long, in male slightly longer than the body, in females reaching to the hind 20 per cent of elytra. Two yellow maculae on each elytron on a black ground, pronotum reddish brown, head nearly black, antennae brown, legs light brown. Body length: 1.54-2.26 mm. Body width: 0.60-0.79 mm. Ratios: Length/width elytra 1.44-1.56; width/ length pronotum 1.24-1.33; length elytra/length pronotum 2.36-2.56.

Specimens studied from Panguana: A (6) - B (14) - G (1) - H (2) - S (1) - T (1).

New Combinations

Several species of *Laemophloeus* from Central America were listed in on-line species lists as belonging to *Charaphloeus* (HALLAN 2008, THOMAS 2011, now removed from the web). However, this has not been justified by a publication in a scientific journal. We could see the holotypes of a few of these species and additionally of one certainly described species of GROUVELLE. We justify hereby these new combinations and publish adequate photographs of these species:

Charaphloeus convexus (GROUVELLE, 1876) [**comb. n.**]
= *Laemophloeus convexus* GROUVELLE, 1876 (Figs. 77, 78);

Charaphloeus flavescens (SHARP, 1899) [**comb. n.**]
= *Laemophloenus flavescens* SHARP, 1899 (Fig. 76);

Charaphloeus guatemalenus (SHARP, 1899) [**comb. n.**]
= *Laemophloeus guatemalenus* SHARP, 1899 (Fig. 79).

Discussion

Our inventory of Laemophloeidae in a 2 km² plot of lowland primary rain forest in Peru's Amazon concerns a relatively small family of Coleoptera. By its limited number of species it creates a prerequisite to any investigation to compare different habitats. Most of the laemophloeid species are collected at ultra violet and mercury vapor light, but a small set of species were collected with other collecting techniques. Concerning the main purpose of this investigation (receiving a measure for comparing the biodiversity of different habitats) it is probably sufficient to use only blacklight traps for the collection of Laemophloeidae. The majority of species were attracted by blacklight (67 out of 74 species). Only a few species of the genera *Phloeolaemus* and *Cryptolestes* were only collected by sifting soil, litter, by using Malaise traps or fogging the canopies of trees.

Our results are of interest in other fields, e. g. it uncovers our limited knowledge about the taxonomy of several genera of Laemophloeidae.

Fifty-six species of Laemophloeidae were previously reported from South America (THOMAS & CHABOO, 2015). In Panguana ACP alone we documented 74 different species. We certainly did not discover all species which are occurring there. It is expected that the real number of species in Panguana is higher. It should be reminded that we did not find all species which are in the list of THOMAS & CHABOO (2015) for Peru: From the eight species already known from Peru we did not find three reported species: *Cryptolestes ampiyacus* THOMAS, 1988, *Laemophloeus corporeflavus* THOMAS, 2014, and *Paraphloeolaemus vorticosus* THOMAS, 2017. These species were also collected in the rain forests of Peru. Further collecting will certainly uncover them.

If the different genera are considered separately a quite different view is obtained concerning the genera:

Laemophloeus: Most *Laemophloeus* species have a wide range of distribution (THOMAS 2013, THOMAS 2014), therefore, it is not surprising that we could document 11 of the 15 species known from South America. We did not see samples of *Laemophloeus corporeflavus* THOMAS, 2014, *L. capitesculptus* THOMAS, 2014, *L. concinnus* THOMAS, 2013 and *L. germaini* GROUVELLE, 1896.

L. corporeflavus has been found in an area of Peru adjacent to Panguana ACP (THOMAS 2014, 6), and it is expected to occur also in Panguana ACP. *L. capitesculptus* is only known from the southeastern part of Brazil (THOMAS 2014, 4), and Panguana may be out of its range of distribution. *L. concinnus* is known from Panama and the northwestern province of Antioquía of Colombia (THOMAS 2013, 7); it is possible that this

species has not cross the Andes barrier yet. *L. germaini* has a wide distribution from Central America down to Bolivia and to the southeastern part of Brazil (THOMAS 2013, 7); but everywhere the number of collected specimens was small; therefore, because of its rarity in the habitats it may also be present in Panguana.

Charaphloeus: No species has been reported from South America before. 16 species of *Laemophloeus* from Central America had been listed in on-line species lists as belonging to *Charaphloeus* (HALLAN 2008, THOMAS 2011). Theoretically, these Central American species could also be present in South America. However, only one species from Panguana is probably identical with one of these Central America species: *Charaphloeus frequens* (SHARP, 1899). Our specimen has not been compared with the syntypes of *C. frequens. C. frequens* is known from Panama and Guatemala (SHARP 1899, 526). The majority of the Panguana species of *Charaphloeus* do not appear to be the same as the Central American species and are probably new species.

Phloeolaemus: Three species of this genus were known until 2017 (THOMAS 2017, 1). 16 species formerly described as *Laemophloeus* were listed formerly in on-line species lists (HALLAN 2008, THOMAS 2011) as belonging to *Phloeolaemus*. THOMAS (2017) made this placement changes justified in a scientific journal. Four species found in Panguana (*Phloeolaemus curtus* (GROUVELLE, 1876), *P. reitteri* (GROUVELLE, 1877), *P. anticus* (SHARP, 1899), *P. sharpi* (HETSCHKO, 1930)) are among the species newly assigned to *Phloeolaemus*. In his paper THOMAS (2017) published photographs of types and authoritatively identified specimens of these 16 species. Unfortunately, these photographs were not high quality to permit a determination of a species by comparison with the respective photograph. A review of the species of this genus with redescriptions and good illustrations or photographs and the creation of a determination key are needed.

Placonotus: *Placonotus pallentipennis* (GROUVELLE, 1876) and *P. politissimus* (WOLLASTON, 1867) are the only species found in Panguana. Their discovery is not surprising because both species are widely distributed (THOMAS 1984b, 7, 16). However, it is most surprising that only these two species are found in Panguana.

Cryptolestes: This genus is widely distributed and occurs on most continents (LEFKOVITCH 1962, 231-240). It is probably polyphyletic, and its limits are not fully established. The American species of *Cryptolestes* have recently been reviewed by THOMAS (1988 and 2002a), Therefore, it is unexpected that we found several species which are obviously undescribed.

Lathropus: No general revision of the American species exists, and, besides one species from Mexico, only a few species from Florida and the Smaller Antilles are described and revised (THOMAS 2010). The tiny species of this genus may easily be overlooked when collecting. Only one specimen was found by sifting soil in Panguana. However, it is conceivable that many more species of this genus may occur in Panguana. In order to find them, one it has to be looking for them particularly, e. g. by sifting organic material, litter and upper layer of soil.

Odontophloeus: This genus was created by THOMAS (1984c). We found an abundant number of *Odontophloeus* specimens at light. We mounted only a limited number of them. According to our genital examination of a few males, these belong to *O. kesseli* (HETSCHKO, 1928). There is another species with externally the same shape as *O. kesseli* (*Odontophloeus crybetes* THOMAS, 1984) which only can be differentiated from *O. kesseli* by genital examination. *Odontophloeus crybetes* is known from Central America and Trinidad, *O. kesseli* from Brazil, Panama and Guatemala (THOMAS 1984c). It is necessary to genitalize many more specimens from Panguana to be sure that only *O. kesseli* occurs in Panguana.

Rhabdophloeus: No revision of this genus has been done. The genus *Rhabdophloeus* was created by SHARP (1899) to receive four species from Central America, three of them described by SHARP and one described by GROUVELLE. KESSEL (1926) described four more species from the Southeastern part of Brazil. We know the types of the species of SHARP and GROUVELLE but we do not know the species described by KESSEL. The types of KESSEL are deposited in Warsaw but they have not been studied well.

One species from Panguana could be determined as *R. chiriquensis* SHARP, 1899 by comparison with a male syntype from Panama. Other *Rhabdophloeus* species from Panguana are possibly undescribed or – one taxon - being a subspecies of one of SHARP's species described from Guatemala.

Dysmerus: This genus was revised by THOMAS (2009). *Dysmerus* species are tiny, elongate, and subcylindrical in cross-section and possibly live in galleries of scolytine curculionids. Specimens of this genus are poorly represented in collections. Males have an extreme sexual dimorphism concerning the form of the scape. Despite the rarity of species and specimens in collections the number of specimens and species of the Panguana material is remarkable: Five of our species could be determined as being already known species,

two more males could not be referred to an already described species and are probably new; from 4 more taxa of Panguana only females have been collected, they also could not be referred to an already known species.

Rhinomalus: This genus with conspicuous species very urgently needs a revision. Without a revision it is very difficult to determine specimens affine *Rhinomalus rufirostris* CHEVROLAT, 1833, the type species. According to our knowledge no paper referred to the type specimen(s) since description. The reason for it is unknown to us. But several species of this genus have been described later-on. Only one species has been collected in Panguana, and this species has been found in a great number. But, without seeing the types of all described species and the genital dissections of these species we will be uncertain of the identity of our species. Additionally, we have collected a few specimens on which we are uncertain whether they represent malformations of our species which we have in a great number.

Metaxyphloeus: Within the material which we collected in Panguana there are two species which are already known and two more taxa of which one taxon probably represents a new species and which THOMAS collected frequently in Bolivia, and one of them could be identical with a species which GROUVELLE already described.

Rhinophloeus: Despite their beautiful appearance no revision of *Rhinophloeus* exists, and it is difficult to determine them. Two of them are probably undescribed.

Species of an undescribed genus: As already THOMAS stressed there are species in tropical America which cannot be assigned to an already defined genus. This could be true for three species in our Panguana material. After ascertaining of their placement new genera could be created or definitions of neighboring genera should be extended in order to receive these species.

This inventory of the Laemophloeidae of the Panguana ACP could certainly be a starting point for similar inventories in other habitats. It should also start further taxonomic work concerning Laemophloeidae of the Amazon rain forests. Many species of our material are certainly undescribed. And species of not revised laemophloeid genera could be present in our material.

Acknowledgment

The ZSM thanks the SERFOR (Servicio Forestal y de Fauna Silvestre) of Peru for the license to collect in Panguana ACP and to export the collected insects. Collection permit no. 007-2014-SERFOR-DGGSPFFS, exportation permit no. 003052-SERFOR.

It is a great pleasure to thank all colleagues who contributed to this work by supplying materials which they collected in Panguana, e. g. JULIO MONZON, specialist in Arctiidae, from which we received the bycatch of his light traps, STEFAN FRIEDRICH, specialist in soil mites who delivered the beetles from Winkler and Berlese siftings, FRANZ WACHTEL, specialist in Troglossitidae, who contributed with light trap material e. g. from tree canopies, ERICH DILLER, retired head of Hymenoptera Section of ZSM, for supplying the Malaise material, ANDREAS FLOREN for material obtained by fogging, and Dr. JULIANE DILLER, ZSM, for getting the permits of the Peruvian Governmental Departments and arranging the stays on the Panguana ACP. Furthermore, we are much obliged to NERY PANDURO RENGIFO and CARLOS VÁSQUEZ MÓDENA for their great hospitality and helpfulness at Panguana Field Station. Dr. MICHAEL BALKE generously placed to our disposal the equipment of the Section of Coleoptera of the ZSM which we thankful acknowledge.

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HJB is deeply indebted to the Dr. MICHAEL C. THOMAS, Gainesville, FL. (1948-2019), eminent specialist of Laemophloeidae, that he placed an unpublished key of genera of Laemophloeidae to his disposal, and commented on a few species. For the trustful loans of specimens from the collections of the BMNH we thank MAXWELL V. L. BARCLAY and Dr. DMITRY TELNOV, the first author also thanks MAX BARCLAY for the pleasant cooperation over some decades. NICHOLAS BREMER kindly revised the manuscript, and LENZ BECKER helped to improve some photographs which we thankfully acknowledge.

Photographs of species of the genus *Laemophloeus* DEJEAN, 1835 from Panguana:

Fig. 1: *Laemophloeus buenavista* THOMAS, 2014; body length: 1.72 mm.

Fig. 2: *Laemophloeus dozieri* THOMAS, 2014; body length: 2.05 mm.

Fig. 3: *Laemophloeus incisus* SHARP, 1899, ♂; body length: 2.28 mm.

Fig. 4: *Laemophloeus lecontei* GROUVELLE, 1876, ♂; body length: 2.43 mm.

Fig. 5: *Laemophloeus macrognathus* REITTER, 1876, ♂; body length: 2.78 mm.

Fig. 6: *Laemophloeus mathani* GROUVELLE, 1889, ♂; body length: 2.72 mm.

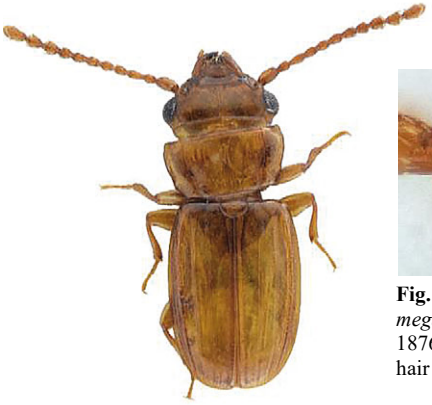

Fig. 7a: *Laemophloeus megalocephalus* GROUVELLE, 1876, ♂; body length: 2.53 mm.

Fig. 7b: *Laemophloeus megalocephalus* GROUVELLE, 1876, male scape focused (see hair tuft on scape).

Fig. 8: *Laemophloeus planaclavatus* THOMAS, 2014, ♂; body length: 2.28 mm.

Fig. 9: *Laemophloeus sexarticulatus* KESSEL, 1926, ♂; body length: 1.63 mm.

Fig. 10: *Laemophloeus suturalis* REITTER, 1876; body length: 2.45 mm.

Fig. 11: *Laemophloeus taurus* THOMAS, 2014, ♂; body length: 2.00 mm.

Fig. 12: *Laemophloeus* **species 1**, ♀; body length: 1.58 mm

Photographs of species of the genus *Charaphloeus* CASEY, 1926 from Panguana:

Fig. 13: → *Charaphloeus* **species 1**; body length: 2.04 mm.

Fig. 14: *Charaphloeus* **species 2**; body length: 1.60 mm

Fig. 15: *Charaphloeus* **species 3**, ♂; body length: 1.28 mm.

Fig. 16: *Charaphloeus* **species 4**, head focused; body length: 1.43 mm.

Fig. 17: *Charaphloeus* **species 5**; body length: 1.61 mm.

Fig. 18: *Charaphloeus* **species 6**, ♂; body length: 1.25 mm.

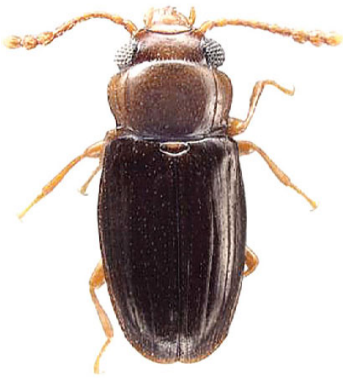

Fig. 19: *Charaphloeus* **species 7**; body length: 1.36 mm.

Fig. 20: *Charaphloeus* **species 8**, head and pronotum focused; body length: 1.26 mm.

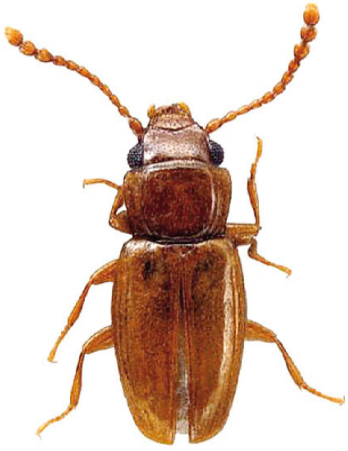

Fig. 21: *Charaphloeus* **species 9**, ♀; body length: 1.32 mm.

Fig. 22: *Charaphloeus* **species 10**, ♂; body length: 1.66 mm.

Fig. 23: *Charaphloeus* **species 11**, ♂; body length: 1.92 mm.

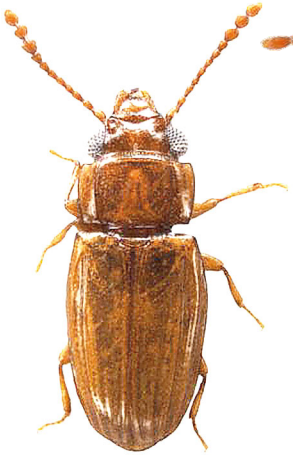

Fig. 24: *Charaphloeus* **species 12**, ♀; body length: 1.93 mm.

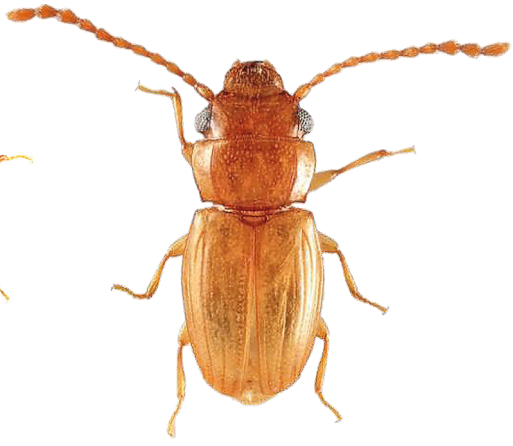

Fig. 25: *Charaphloeus* **species 13**, ♂; body length: 1.81 mm.

Fig. 26: *Charaphloeus* **species 14**; body length: 1.66 mm.

Fig. 27: *Charaphloeus* **species 15**, ♂; body length: 1.98 mm.

Fig. 29: *Charaphloeus* **species 17**, ♂; body length: 1.48 mm.

Fig. 28a: →
Charaphloeus **species 16**; body length: 1.67 mm.

Fig. 28b:
Charaphloeus **species 16**, pronotum focused.

Genus & species 1 (*Charaphloeus* Casey, 1926):

Fig. 30: S*pecies* of **genus 1**; body length: 1.89 mm

Genus & species 2:

Fig. 31: *Species* of **genus 2**, ♂; body length: 1.68 mm.

Photographs of species of the genus *Phloeolaemus* CASEY, 1916 from Panguana:

Fig. 32: *Phloeolaemus curtus* (GROUVELLE, 1876), ♂; body length: 2.11 mm.

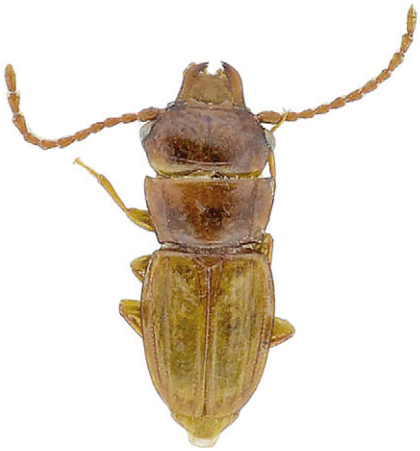

Fig. 33: *Phloeolaemus sharpi* (HETSCHKO,1920), ♂; body length: 1.80 mm.

Fig. 34: *Phloeolaemus anticus* SHARP, 1899; body length: 1.50 mm.

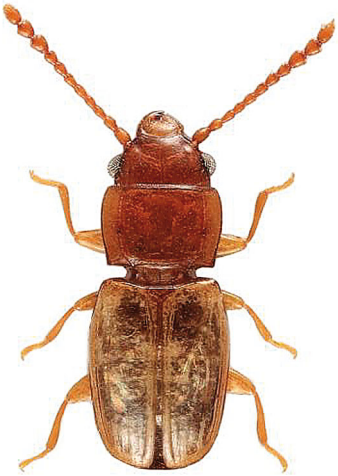

Fig.35: *Phloeolaemus reitteri* (GROUVELLE, 1877); body length: 1.51 mm.

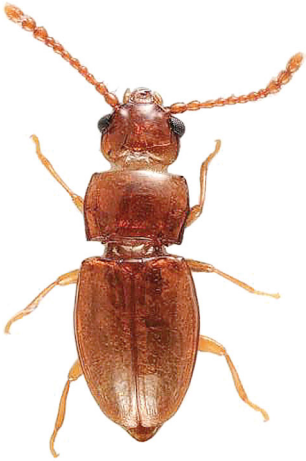

Fig. 36: *Phloeolaemus* **species 1**; body length: 1.17 mm.

Fig. 37: *Phloeolaemus* **species 2**; body length: 1.19 mm.

Fig. 38: *Phloeolaemus* **species 3**; body length: 1.60 mm.

Photographs of the species of the genus *Placonotus* MACLEAY, 1871 from Panguana:

Fig. 39: *Placonotus politissimus* (WOLLASTON, 1867); body length: 1.62 mm.

Fig. 40: *Placonotus pallentipennis* (GROUVELLE, 1876); body length: 1.82 mm.

Photographs of the species of the genus *Cryptolestes* GANGLBAUER, 1899 from Panguana:

Fig. 41: *Cryptolestes uncicornis* (REITTER, 1876), ♂; body length: 1.46 mm.

Fig.42: *Cryptolestes robinclarkei* THOMAS, 2002, ♀; body length: 2.16 mm.

Fig. 43: *Cryptolestes* ?*trinidadensis* THOMAS, 1992, ♂; body length: 1.30 mm.

Fig. 44: *Cryptolestes thomasi* HAUTH & BREMER **sp. n.**, ♂; body length: 1.23 mm.

Fig. 45: *Cryptolestes* **species 1**, ♂; body length: 1.48 mm.

Fig. 46: *Cryptolestes* **species 2**, ♂; body length: 1.60 mm.

Fig. 47: *Cryptolestes* **species 3**, ♂; body length: 1.40 mm.

Photograph of a species of *Lathropus* ERICHSON, 1845:

Fig. 48: *Lathropus* **species 1**; body length: 1.02 mm.

Photograph of the species of the genus *Odontophloeus* THOMAS, 1984 from Panguana:

Fig. 49: *Odontophloeus kesseli* (HETSCHKO, 1928); body length: 1.40 mm.

Photographs of the species of the genus *Rhabdophloeus* SHARP, 1899 from Panguana:

Fig. 50: *Rhabdophloeus chiriquensis* SHARP, 1899, ♂; body length: 1.95 mm.

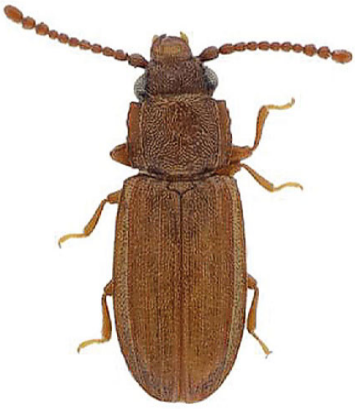

Fig. 51: *Rhabdophloeus* **species 1** (affine *R. concolor* SHARP, 1899); body length: 2.15 mm.

Fig. 52: *Rhabdophloeus* **species 2** (affine *R. dispar* SHARP, 1899, species 1), ♀; body length: 1.81 mm.

Fig. 53: *Rabdophloeus* **species 3** (affine *R. dispar* SHARP, 1899, species 2), ♂; body length: 1.96 mm.

Fig. 54: *Rhabdophloeus* **species 4** (affine *R. costatus* (GROUV., 1876), species 1), ♀; body length: 1.80 mm.

Fig. 55: *Rhandophloeus* **species 5** (affine *R. costatus* (GROUVELLE, 1876) species 2), ♂; body length: 1.67 mm.

Fig. 56: *Rhabdophloeus* **species 6** (affine *R. costatus* (GROUV., 1876) species 3), ♂; body length: 1.93 mm.

Photographs of the species of the genus *Dysmerus* CASEY, 1884 from Panguana:

Fig. 57: *Dysmerus caseyi* (GROUVELLE, 1898), ♂.

Fig. 58: *Dysmerus skelleyi* THOMAS, 2009, ♂; body length: 1.87 mm.

Fig. 59: *Dysmerus symphilus* THOMAS, 2009, ♂; body length: 2.02 mm.

← **Fig. 60a:** *Dysmerus monstrosus* THOMAS 2009, ♂; body length: 1.77 mm.

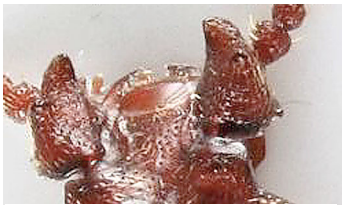

Fig. 60b: *Dysmerus monstrosus* THOMAS, 2009: Anterior part of head magnified; slightly oblique view.

Fig. 61: → *Dysmerus rondoniensis* THOMAS, 2009, ♂; body length: 1.79 mm.

← **Fig. 62:** *Dysmerus* **species 1**, ♂; body length: 1.56 mm.

Fig. 63: *Dysmerus* **species 2**, ♀; body length: 2.08 mm.

Fig. 64: *Dysmerus* **species 3**, ♂; body length: 1.38 mm.

Photographs of species of the genus *Rhinomalus* Gemminger, 1899 from Panguana:

Fig. 65: *Rhinomalus* **species 1**; ♂; body length: 2.28 mm.

Photographs of the species of the genus *Metaxyphloeus* Thomas, 1984 from Panguana:

Fig. 66: *Metaxyphloeus germaini* (Grouvelle, 1896); body length: 2.24 mm.

Fig. 67: *Metaxyphloeus zeus* Thomas, 1984; body length: 2.38 mm.

Fig. 68: *Metaxyphloeus* **species 1**; body length: 1.93 mm.

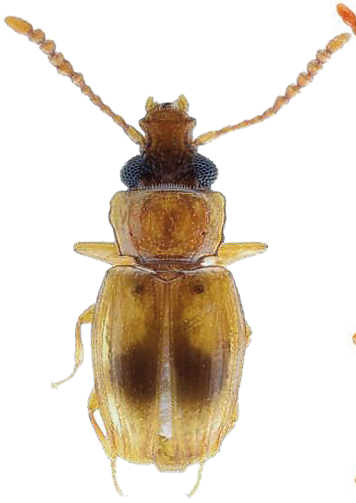

Fig. 69: *Metaxyphloeus* **species 2**; body length: 1.67 mm.

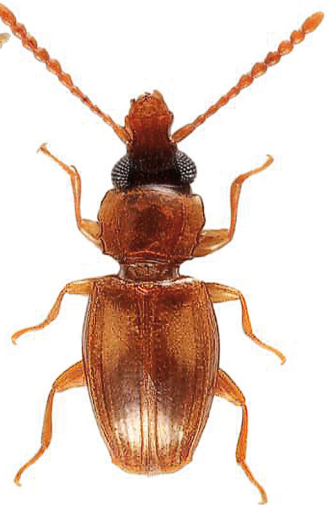

Fig. 70: *Metaxyphloeus* **?species 2**.

Photograph of Genus & Species 3:

Fig. 71: Species of **genus 3**; body length: 1.95 mm.

Photographs of species of the genus *Rhinophloeus* Sharp, 1899 from Panguana:

← **Fig. 72:** *Rhinophloeus* **species 1**; body length: 1.81 mm.

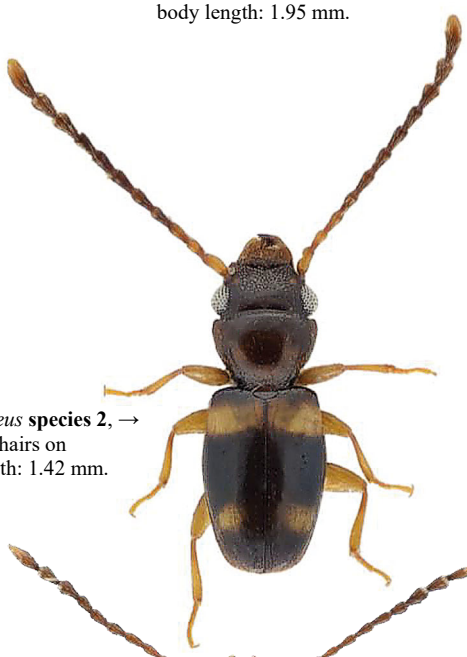

Fig. 73: *Rhinophloeus* **species 2**, → ♂ (with recumbent hairs on clypeus); body length: 1.42 mm.

← **Fig. 74:** *Rhinophloeus* **species 3**, ♀; body length 1.58 mm.

Fig. 75: *Rhinophloeus* **species 4**, → ♂ (hairs on pronotum and apex of elytra); body length: 1.93 mm.

New Combinations:

Fig. 76: *Laemophloeus flavescens* SHARP, 1899 = *Charaphloeus flavescens* (SHARP, 1899) **[comb. n.]**; holotype, BMNH.

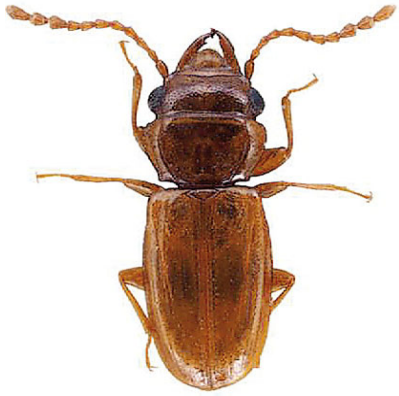

Fig. 77: *Laemophloeus convexus* GROUVELLE, 1876 = *Charaphloeus convexus* (GROUVELLE, 1876) **[comb. n.]**, ♂; specimen from Guatemala.

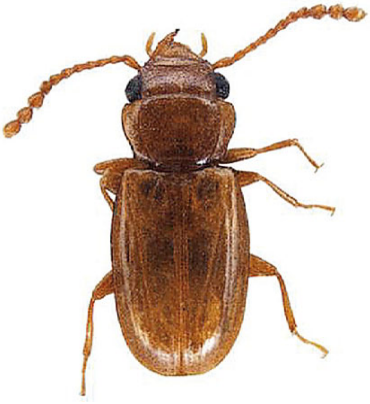

Fig. 78: *Laemophloeus convexus* GROUVELLE, 1876 = *Charaphloeus convexus* (GROUVELLE, 1876) **[comb. n.]**, ♀; specimen from Guatemala.

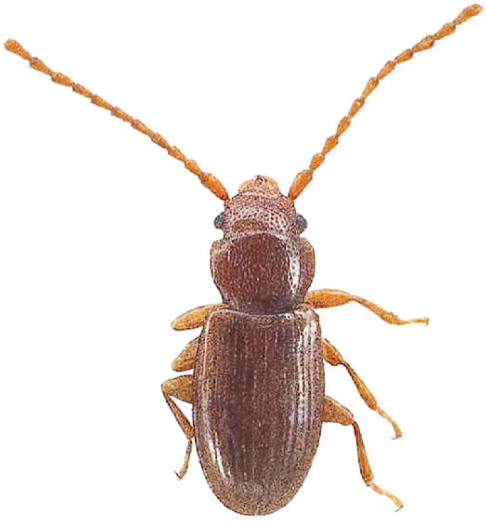

Fig. 79: *Laemophloeus guatemalenus* SHARP, 1899 = *Charaphloeus guatemalenus* (SHARP, 1899) **[comb. n.]**; holotype, BMNH).

Fig. 80: *Phloeolaemus endomychus* (SHARP, 1899); holotype, from BMNH.

Fig. 81: *Rhinomalus chiriquensis* SHARP, 1899; holotype, from BMNH.

Zusammenfassung

Die Laemophloeidae (Coleoptera) des primären Tiefland-Regenwaldes des Panguana ACP-Reservates des Amazonas-Gebietes von Peru wurden untersucht (ACP = Área de Conservación Privada). Die Käfer wurden innerhalb eines definierten Areals von 2 km² mit verschiedenen Methoden gesammelt (Lichtfang, Malaise-Fallen, Gesiebe von Bodenproben und Fallaub, Vernebelung von Baumkronen). Vierundsiebzig Arten/Taxa konnten nachgewiesen werden. Die meisten von ihnen waren bisher für Peru nicht dokumentiert worden. Alle Arten wurden durch ein Foto und – soweit nötig – durch eine kurze Beschreibung in dieser Arbeit dokumentiert. Die Zahl der in dem untersuchten Areal nachgewiesenen Arten übersteigt deutlich die Zahl der aus ganz Südamerika bisher bekannten Arten.

Folgende Arten wurden erstmalig für Peru nachgewiesen: *Cryptolestes robinclarkei* THOMAS, 2004, *C. uncicornis* (REITTER, 1976), *Dysmerus monstrosus* THOMAS, 2009, *D. rondoniensis* THOMAS, 2009, *D. symphilus* THOMAS, 2009, *Laemophloeus buenavista* THOMAS, 2013, *L. dozieri* THOMAS, 2014, *L. lecontei* GROUVELLE, 1876, *L. macrognathus* REITTER, 1876, *L. mathani* GROUVELLE, 1889, *L. megacephalus* GROUVELLE, 1876, *L. planaclavatus,* THOMAS, 2014, *L. sexarticulatus* KESSEL, 1926, *L. suturalis* REITTER, 1876, *L. taurus,* THOMAS, 2014, *Metaxyphloeus germaini* (GROUVELLE, 1896), *M. zeus* THOMAS, 1984, *Odontophloeus kesseli* (HETSCHKO, 1928), *Phloeolaemus curtus* (GROUVELLE, 1876), *P. sharpi* (HETSCHKO, 1930), *P. reitteri* (GROUVELLE, 1877), *P. anticus* (SHARP, 1899), *Placonotus politissimus* (WOLLASTON, 1867), *Rhabdophloeus chiriquensis* SHARP, 1899.

Da einige Genera der Laemophloeidae nicht adaequat definiert oder revidiert worden sind, konnten einige Arten nicht genau einem Genus zugewiesen werden. Dieses ist bei der folgenden Zuweisung der Arten zu Genera zu berücksichtigen. In Panguana wurden Arten folgenden Genera nachgewiesen (in Klammern die Zahl der Arten des betreffenden Genus): *Laemophloeus* DEJEAN, 1835 (12), *Charaphloeus* CASEY, 1916 (17), *Phloeolaemus* CASEY, 1916 (7), *Cryptolestes* GANGLBAUER, 1899 (7), *Lathropus* ERICHSON, 1835 (1), *Placonotus* MACLEAY, 1871 (2), *Odontophloeus* THOMAS, 1984 (1), *Rhabdophloeus* SHARP, 1899 (7), *Dysmerus* CASEY, 1884 (8), *Rhinomalus* GEMMINGER, 1870 (1), *Metaxyphloeus* THOMAS, 1984 (4), *Rhinophloeus* SHARP, 1899 (4), Arten unbeschriebener Genera (3).

Folgende Arten wurden von der Gattung *Laemophloeus* DEJEAN, 1835 zu der Gattung *Charaphloeus* CASEY, 1915 transferiert:
Laemophloeus convexus GROUVELLE, 1876) = *Charaphloeus convexus* (GROUVELLE, 1876) [comb. n.];
Laemophloenus flavescens SHARP, 1899 = *Charaphloeus flavescens* (SHARP, 1899) [comb. n.];
Laemophloeus guatemalenus SHARP, 1899 = *Charaphloeus guatemalenus* (SHARP, 1899) [comb. n.].

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