Zootaxa 3568: 81–88 (2012)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

urn:lsid:zoobank.org:pub:F74F62A5-4398-4D55-B5AE-751020A3CFFA

Delgadobius amazonensis—a new genus and species of the subtribe Philonthina from Amazonia (Coleoptera: Staphylinidae: Staphylininae)

MARIANA CHANI-POSSE[1] & GUY COUTURIER[2]

[1]*Laboratorio de Entomología, Instituto Argentino de Investigaciones de las Zonas Aridas (IADIZA, CCT CONICET, Mendoza), Casilla de Correo 507, 5500 Mendoza, Argentina. E-mail: mchani@mendoza-conicet.gob.ar*
[2]*Museum National d'Histoire Naturelle, Département Systématique et Evolution, case 50, Antenne IRD, Entomologie, 57, rue Cuvier, 75231 Paris Cedex 05. E-mail: couturie@mnhn.fr*

Abstract

Delgadobius amazonensis Chani-Posse & Couturier, **gen. et sp. nov.**, a new genus and species of the subtribe Philonthina (tribe Staphylinini) from Amazonia, is described and illustrated. The potential phylogenetic relationships of *Delgadobius* with other Neotropical genera of Philonthina are discussed. Distributional and bionomic data are also provided. *Delgadobius amazonensis* is reported in association with four species of palm trees (Arecaceae).

Key words: Staphylinini, Philonthina, *Delgadobius*, new genus, systematics, Amazonia, Arecaceae

Introduction

Philonthina is the largest of the nine subtribes in the tribe Staphylinini (Bouchard *et al.*, 2011). Philonthina has been characterized as broadly distributed in all zoogeographical regions and particularly speciose in tropical areas (Herman, 2001; Newton and Thayer, 2005). Among the 65 genera of Philonthina, 28 genera are known to occur in the Neotropical Region (Newton and Thayer, 2005), with 18 of them recognized as probably endemic to this area (Chani-Posse, in press). Members of Philonthina are considered generalist predators as both larvae and adults (Smetana, 1995).

The examination of material collected several years ago in the Amazonian rainforest, led the second author to the discovery of *Delgadobius*, a new genus of Philonthina, probably endemic to the Neotropical Region. Additional material was studied from a more recent collecting trip in northeastern Peru.

The objectives of this study are to describe *Delgadobius* using characters from external morphology and genitalia, to describe the new species, to make a preliminary assessment of the phylogenetic relationships between this genus and the other Neotropical genera of Philonthina and to provide information about its distribution and association with palm trees in Amazonia. The phylogenetic hypotheses discussed herein are part of a major revisionary study of the Neotropical genera of Philonthina (Chani-Posse, in press), in which the first author studied the type species of all relevant genera.

Material and methods

Material on which this paper is based is or will be deposited in the following institutions:

FMNH	Field Museum of Natural History, Chicago, USA.
IADIZA	Instituto Argentino de Investigaciones de las Zonas Aridas, Mendoza, Argentina.
INPA	Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil.
MNHN	Muséum National d'Histoire Naturelle, Paris, France.
MNHUB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany.

Accepted by A. Solodovnikov: 29 Oct. 2012; published: 30 Nov. 2012

NMW	Naturhistorisches Museum Wien, Austria.
UNALM	Museo de Entomología, Universidad Nacional Agraria La Molina, Lima, Peru.
UTCI	University of Tennessee at Chattanooga, USA.
ZMUC	Zoological Museum, University of Copenhagen, Denmark.

Beetles were examined as pinned dry specimens, some of which were first relaxed in warm soapy water, rinsed, dissected and examined as wet preparations in glycerin for more detailed morphological study. Dissected genitalia were macerated in 10% KOH, washed in distilled water and placed in plastic genitalia vials with glycerin and pinned under the respective specimens. Observations were made using a Leica MZ6 dissecting microscope. Photographs were taken using a Leica DC 150 digital camera attached to the dissecting microscope. Measurements (given in millimeters) were made with an ocular micrometer. Overall body length was measured from the apex of the labrum to the apex of the abdomen. Other measurements were taken and abbreviated as follows: HW—maximum head capsule width; HL—length of head capsule, from anterior margin of frontoclypeus to neck constriction (along midline); PW—pronotum maximum width; PL—pronotum length (along midline); EL—eye length (seen from above); TL—temple length (from the posterior margin of the eye to the nuchal ridge; seen from above); NW—neck width; S1—first segment of hind tarsus length; S5—last segment of hind tarsus length; EtL—elytra length at sides (from humerus to apex; seen from above); Etl—elytra length along suture; EtW—elytra width at base. Terminology mainly follows Blackwelder (1936), Smetana (1995), Smetana and Davies (2000), Schillhammer (2000) and Solodovnikov and Newton (2005).

Exact label data are cited only for the type material and separate labels are indicated in brackets.

Taxonomy

Delgadobius Chani-Posse & Couturier, new genus

(Figs. 1–13)

Type species. *Delgadobius amazonensis* Chani-Posse and Couturier, new species.

Diagnosis. The anterolateral margins of pronotum distinctly deflected forming a ridge above the superior marginal line of hypomeron, the hypomeron with an additional line running obliquely between the superior and inferior marginal lines and the tarsi with the third segment apically bilobed and enclosing a rather minute fourth segment, allow prompt recognition among other Philonthina.

Description. Habitus as in Fig. 1. Length of the body 7.5–7.9 mm. Body elongate, more or less parallel sided, tapering toward sixth visible abdominal segment. Head, thorax, elytra and abdomen from shiny brunneous to piceous-black or black; antennae with first four segments testaceous-brunneous, antennal segments 5 to 11, palpi and legs brunneous to piceous.

Head capsule (Figs.1, 4) rounded with well developed, moderately large eyes; nuchal constriction and nuchal ridge developed laterally and dorsally; infraorbital ridge present, extending to base of mandibles; postgenal and ventral basal ridges well developed; postmandibular ridge and dorsal basal ridge present; epicranium with two pairs of interocular punctures; each side of vertex with three to four postocular punctures forming a triangle or a rhombus; dorsal and ventral surface of head with sparse, fine punctuation and dense, wave-like microsculpture. Antennae inserted nearer to anterior margin of frontoclypeus than to eyes, moderately long, moderately widened toward apex; first four segments bearing only sparse macrosetae, segments 5 to 11 pubescent. Labrum distinctly emarginate and completely sclerotized with numerous and long macrosetae at apical margin. Clypeus entirely fused with frons. Mandible moderately prominent, with setose prostheca well-developed on medial margin; dorsolateral surface grooved (Fig. 2). Maxilla with lacinia elongate and densely setose along entire medial margin, with galea prominent and densely setose at apex (Fig. 2). Maxillary palpus moderately long, segments 1 to 4 glabrous but with sparse setae at apices, segment 1 minute, segment 2 no more than twice as long as maximum width and slightly longer than segment 3, last segment gradually narrowed to subacute apex, longer than preceding segment (Fig. 2). Gular sutures running close to the base of head and not joined before neck (Fig. 4). Mentum transverse, with anterior margin straight to slightly emarginate, and one seta at each latero-apical angle. Ligula small, entire, slightly angulate and sinuate apically. Paraglossae well developed, exceeding ligula in length, each densely setose medially; hypopharynx densely covered by cuticular ciliae. Labial palpus moderately long,

segments 1 and 2 with sparse setae, first two segments subequal in length, segment 3 longer than segment 2 and gradually narrowed to subacute apex (Fig. 2).

Pronotum slightly narrowed anteriad; front margin subtruncate, hind margin broadly arcuate, anterior angles subangulate, posterior angles rounded (Fig. 1); hypomeron with an additional line between the superior and inferior marginal lines (Fig. 5); lateral puncture of pronotum bearing long macroseta separated from superior line of pronotal hypomeron by a distance three times as large as diameter of puncture and rather close to the distinct ridge at the anterolateral margin of pronotum (Fig. 6); dorsal surface of pronotum with two rows of punctures sub-parallel to each other, with two sublateral groups of punctures, each with 4–5 punctures; surface with fine and dense microsculpture of transverse and oblique waves. Prosternum short, triangular, with only a medial prominence, not carinate, not longitudinal along basisternum, basisternum longer than furcasternum, with two medio-apical macrosetae (Fig. 5). Mesoscutellum with two transverse carinae (Fig. 3). Mesoventrite short, with sternopleural suture nearly transverse and sternacostal carina convex posteriad, laterally directed towards sternopleural suture and reaching it; mesoventral intercoxal process subtruncate. Metaventrite in front of hind coxa arcuately emarginate on each side; metaventral process short, split apically. Legs moderately long; front tibia with setae only, mid and hind tibiae spinose on lateral face, with ventral setae denser on front tibia than on mid and hind tibiae; dorsal surface of all tarsal segments glabrous except for scattered, long marginal setae, and pair of setae at apex of last segment about half as long as claws; front tarsus in both sexes with first four segments slightly dilated, ventral surface of segments 1 to 4 with dense, long whitish adhesive setae (Fig. 7); tarsal segment 3 of all tarsi distinctly bilobed apically and with long whitish adhesive setae ventrally, tarsal segment 4 rather small and enclosed by preceding segment (Figs. 7, 8).

Elytra with sub-basal ridge short, immediately adjacent to elytral articulation; punctation moderately coarse, transverse distance between punctures distinctly more than diameter of one puncture. Hind wings with veins CuA and MP4 fused in one vein, MP3 present.

Abdomen with paired prototergal glands on tergum 1 manifested by invaginated capsules with small openings (Fig. 3); terga 3 to 5 with anterior and posterior transverse basal carinae; tergum 7 (fifth visible) with whitish apical seam of microtrichae; surface with fine and dense microsculpture of transverse and oblique waves; hind margin of tergum 8 (sixth visible) subtruncate in both sexes.

Male genitalia. Sterna 7 and 8 emarginate medio-apically, emargination with semi-membranous extension. Genital segment with styli of tergum 9 stout and moderately setose apically; tergum 10 subangulate at apex (Fig. 9); sternum 9 with proximal portion long, asymmetrical (Fig. 10). Aedeagus with parameres fused to one short sclerite only attached to median lobe at base; median lobe elongate, with apical part distinctly narrowed (Figs. 11, 12).

Female genitalia. Sterna 7 and 8 straight to slightly sinuate apically. Ovipositor consisting of paired proximal and distal gonocoxites, the latter bearing styli with two apical setae (Fig. 13).

Etymology. The genus name is dedicated to Dr. César Delgado, entomologist and friend of the second author, in recognition of his long research activity in the locality where this genus was found (Iquitos).

Distribution and diversity. *Delgadobius* is a Neotropical genus with only one species known at present, recorded from Iquitos (Peru) and Manaus (Brazil), which are included in the Amazonian subregion (Morrone, 2009).

Taxonomic notes and relationships. With exception of the condition shown by the infraorbital ridge in *Delgadobius* which is well-developed and extends far beyond the postgenal ridge, all other characters meet those that define Philonthina according to Smetana and Davies (2000): maxillary and labial palpus each no more than moderately slender and long; neck with dorsal basal ridge; middle portion of disc of neck virtually impunctate; ligula entire; pronotal hypomeron no more than moderately inflexed below anterior angle of pronotum, meeting prosternum at a very flat angle, with both sclerites fused, and notosternal suture absent; superior marginal line of pronotal hypomeron deflexed under anterior angle of pronotum before continuing onto anterior margin of pronotum; tarsal formula 5, 5, 5; empodial setae between claws of all tarsi absent. Smetana and Davies (2000) describe the infraorbital ridge as “usually rudimentary” in Philonthina, “extending at most very little in front of postgenal ridge”. Although *Delgadobius* does not share this condition with most members of Philonthina, exceptions for this character are also observed in *Philonthoblerius* Tottenham 1949, *Endeius ovaliceps* Coiffait 1981 and *Flohria* Sharp 1884.

Current available keys to genera of Philonthina are mostly based on the Holarctic fauna (Smetana 1995,

Smetana and Davies 2000, Newton *et. al.* 2000, Navarrete-Heredia *et al.* 2002) and they do not reflect the diversity present in other zoogeographical regions. This is the case for this new genus, which does not fit into any of those keys.

An assessment of the phylogenetic affinities of *Delgadobius* with the other Neotropical genera of the subtribe and representatives from other regions (Chani-Posse, in press) supports the statement that *Delgadobius* is probably endemic to the Neotropical Region. According to this assessment, the genera *Atopocentrum* Bernhauer, *Chroaptomus* Sharp and the new genus may constitute a derived lineage within the group of Neotropical Philonthina. Although each of these three genera is characterized by striking morphological features (e.g. Chani-Posse, 2006 for *Chroaptomus*), they share the following characters: lateral puncture of pronotum with long seta at a distance about three times as large as diameter of puncture; prosternum without mid-longitudinal carina; sternopleural (anapleural) suture transverse or nearly transverse; mesoventrite with medial carina in coxal acetabulum and intercoxal process rounded. On the other hand, the presence of an additional oblique line connecting the superior and inferior lines of the pronotal hypomeron in *Delgadobius* is at present only found in *Craspedomerus* Bernhauer within Philonthina and in *Holisus* Erichson (Hyptiomina).

A more complete understanding of the phylogenetic affinities of *Delgadobius* will require further studies on a broader scale that include both pantropical elements of Philonthina and a thorough evaluation of the current classification at a supra-generic level.

Delgadobius amazonensis Chani-Posse & Couturier, new species

(Figs. 1–13)

Diagnosis. As for the genus (see above).

Description. Length of the body 7.5–7.9 mm (3.8–4.2 mm, abdomen excluded). Coloration as for the genus.

Head of rounded-quadrangular shape, slightly broadened at distal third and with obtuse hind angles, as long as to slightly wider than long (HW/HL= 1.00–1.11) (Fig. 1), slightly narrower than pronotum at widest point (HW/PW= 0.88–0.91); postmandibular ridge present; epicranium with medial interocular punctures separated by a distance less than 1.5 times as large as distance separating medial punctures from lateral punctures. Eyes distinctly longer than temples seen from above (EL/TL= 1.75) (Fig. 1). Antennae with segment 1 shorter than segments 2 and 3 combined, segment 3 slightly longer than segment 2, segments 4 and 5 longer than wide, segment 6 about as long as wide, segments 7 to 10 transverse, last segment minutely emarginate. Mandibles (right and left) with a single tooth (Fig. 2). Maxillary palpus with last segment gradually narrowed to subacute apex from apical half, about 1.5 times as long as preceding segment and not appreciably narrower (Fig. 2). Mentum and submentum subequal in length. Labial palpus with segment 3 distinctly longer than segment 2 and gradually narrowed to subacute apex (Fig. 2).

Pronotum slightly longer than wide (PW/PL= 0.89–0.95) (Fig. 1), slightly narrowed anteriad; dorsal surface of pronotum with two rows of punctures, each with four punctures. Legs with front and middle tarsi as long as front and middle tibiae, hind tarsi shorter than hind tibiae; front tarsus with first segment shorter than segments 2 and 3 combined (Fig. 7); mid and hind tarsus with first segment longer than segments 2 and 3 combined (Fig. 8); first segment of hind tarsus longer than last segment (S1/S5= 1.3–1.5).

Elytra at sides distinctly longer than pronotum at midline (EtL/PL=1.2–1.3).

Abdomen. Terga 3 to 5 with posterior transverse basal carina, acutely extended medially on terga 3 and 4, incomplete on tergum 5; terga 6 to 8 with only anterior transverse basal carina.

Male genitalia. Sternum 7 slightly emarginate medio-apically; sternum 8 deeply emarginate medio-apically; tergum 10 subangulate at apex, with several apical setae and two to four long and strong subapical setae (Fig. 9); sternum 9 acutely emarginate apically, with several apical setae at each side of emargination and one to two long subapical macrosetae (Fig. 10). Aedeagus with parameres fused as one short sclerite only attached to median lobe at base, without sensory peg setae; median lobe elongate, with apical part distinctly narrowed into a thin rod-like apex; internal sac with sclerotized structures (Figs. 11, 12).

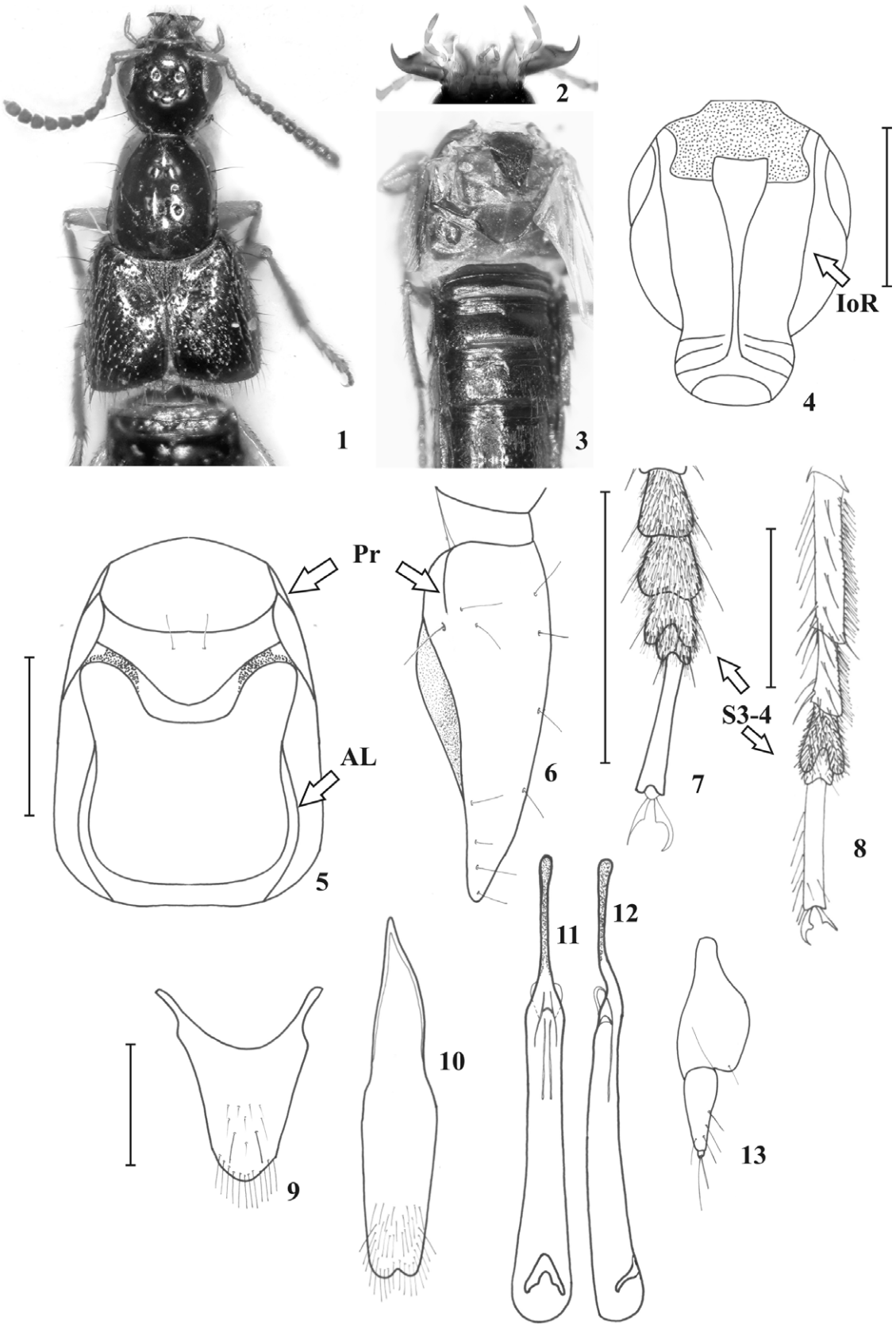
Female genitalia. Sterna 7 and 8 straight to slightly sinuate apically. Genital segment with styli of tergum 9 similar to those of male; tergum 10 similar to that of male; gonocoxites strongly developed, second gonocoxites rather short, each with two to five strong setae along its outer margin, with a minute stylus (Fig. 13) and two long apical setae.

Etymology. The name refers to the species distribution.

Type material. Holotype ♂, with labels: "Peru – Loreto – 30.X.2010/ Iquitos Nauta road, km 46/ 04° 02´S 73° 24´W/ G. Couturier, C. Delgado col.", "on inflorescence ♂ in anthesis of *Mauritia flexuosa* Arecaceae", "Holotype *Delgadobius amazonensis* Chani-Posse & Couturier 2012" (red label) (MNHN). Twenty-four paratypes with same data, 1 ♂ 3 ♀ (FMNH), 2 ♂ 3 ♀ (IADIZA), 1 ♂ 5 ♀ (MNHN), 2 ♂ 3 ♀ (UNALM), 1 ♂ 3 ♀ (UTCI). Other thirty-seven paratypes, with labels: "Peru – Loreto – 16.X.2008/ Pucaurquillo (Pevas)/03°20´S, 72°04´W/ G. Couturier, W. Gonzáles col.,"on inflorescence *Euterpe precatoria* Arecaceae (beginning anthesis)", "Paratype *Delgadobius amazonensis* Chani-Posse & Couturier 2012", 2 ♂ 1 ♀ (IADIZA), 1 ♂ 1 ♀ (MNHN), 1 ♂ 1 ♀ (MNHUB), 1 ♂ 1 ♀ (NMW); "Peru Loreto Iquitos/ Carretera Iquitos Nauta km/31.X.1991/K. Mejia Col.", "Host plant *Mauritia carana*", "Paratype *Delgadobius amazonensis* Chani-Posse & Couturier 2012", 1 ♂ 1 ♀ (MNHN); "PEROU/ Iquitos/ Sept. 1985/ F. Kahn Réc.", "sur "Huassai"/ *Euterpe precatoria*", "Paratype *Delgadobius amazonensis* Chani-Posse & Couturier 2012", 1 ♂ (MNHN), 1 ♂ 1 ♀ (ZMUC); "PEROU/ Iquitos/ Sept. 1985/ F. Kahn Réc.", "sur "Ungurahui""/ *Jessenia bataua*", "Paratype *Delgadobius amazonensis* Chani-Posse & Couturier 2012", 3 ♂ 2 ♀ (IADIZA), 2 ♂ 2 ♀ (MNHN), 2 ♂ 1 ♀ (MNHUB), 2 ♂ 1 ♀ (NMW), 2 ♂ 1 ♀ (UNALM);"Brésil – Amaz./ Manaus/ 19.V.1996/ G. Couturier & F. Kahn", "Km. 130/ Br134/ Rodovia Boa Vista", "*Mauritia flexuosa* Palmae sur inflorescence mâle", "Paratype *Delgadobius amazonensis* Chani-Posse & Couturier 2012" 1 ♂, (IADIZA), 3 ♂, (INPA), 1 ♂, (MNHN).

Distribution and habitat. *Delgadobius amazonensis* has been recorded from Peru (Iquitos) and Brazil (Manaus). It was found in association with palm trees (Arecaceae) during anthesis, on male inflorescences of *Mauritia flexuosa* L. f., *Mauritia carana* Wallace, *Oenocarpus bataua* Martius *(=Jessenia bataua)* and *Euterpe precatoria* Martius.

The occurrence of the new species in *Mauritia flexuosa* was reported from two localities in Peru (Iquitos) and Brazil (Manaus). Given this association, it seems probable that both the insect and the host plant may share a common distribution. *Mauritia flexuosa* is an Amazonian native palm species (Figs. 14–21), that is distributed all over the American tropics and the East Andes, mainly in the Amazonian basin, in areas such as Peru, Bolivia, Colombia, Ecuador, Venezuela, Brazil, the Guyanas, north of Trinidad and Panama (Henderson *et al.*, 1995). This palm species plays a major role in the economic, social and ecological systems of the Peruvian Amazonia (Vásquez *et al.*, 2008, Trujillo-González *et al*., 2011). Because of its importance and in order to avoid its overexploitation, this plant is in process of domestication to be cultivated as a dwarf form (Vásquez *et al.*, 2008). However, the development of the crops involves the proliferation of harmful insects and knowledge about potential natural enemies is required. *Mauritia flexuosa* grows naturally on flooded soils, on rivers and stream borders forming dense monospecific gatherings known in Peru as "aguajales" (Figs. 14, 15). When they are associated with other palm species such as *Oenocarpus bataua* (as it is also the case here for the occurrence of *Delgadobius*), they are called "sacha-aguajales" (Delgado *et al.*, 2007). In *M. flexuosa*, the new species has been observed actively running among the rachillae (Figs. 17–19) of the palm together with adults and larvae of *Mystrops dalmasi* Grouvelle (Coleoptera: Nitidulidae), which is quite abundant (Couturier, pers. obs.) and may be potential prey. Nitidulidae has also been reported as the most abundant family visiting male inflorescences of *M. flexuosa* among Coleoptera, which in turn has shown the highest representation among the insect orders associated with this palm species in Manaus, Brazil (Storti, 1993). The presence of *D. amazonensis* in *M. flexuosa* has only been observed during the flowering event, at the end of which the insect disappears (G. Couturier, pers. obs.). The host plant, *Mauritia flexuosa* or "aguaje" (Fig. 14, 15) as it is called in the Peruvian Amazonia ("buriti" or "miriti" in Brazil) starts its commercial fructification at the age of 12–15 years when it naturally grows. Given its height (35–40 m), it has been a common practice to cut the whole female individual in spite of the detrimental effects on the palm-tree populations (G. Couturier, pers. com.). The dwarf form or "aguaje enano" (Fig. 14) has not been found in natural conditions but only in culture. Its fructification happens at the age of 5 years, before the stem is less than 1 m high. The precocity of its fructification and its short stem allows easy collection of both the fruit and the flower-visiting insects (Fig. 18, 21). Flowering can occur during the whole year. The anthesis of female and male flowers usually begins at 16 h and lasts an average of 24 h. When the flowers open, they produce a fragrance that may act as a mechanism for attracting insects (Delgado *et al.*, 2007). A great amount of insects associated with this palm has been reported from male and female inflorescences during anthesis (Storti, 1993). Since *M. flexuosa* is a dioecious palm, pollination by insects may be crucial.



FIGURES 1–13. *Delgadobius amazonensis*: 1, habitus; 2, mouthparts; 3, mesonotum, metanotum and first abdominal segments; 4, head, ventral view (IoR= infraorbital ridge); 5, prosternum and hypomeron (aL= additional line, Pr= pronotal ridge); 6, pronotum and hypomeron, lateral view; 7, front tarsus, ventral view (S=segment); 8, mid tarsus, lateroventral view; 9, tergum 10 (male); 10, sternum 9; 111, aedeagus, dorsal view; 12, aedeagus, lateral view; 13, gonocoxites of female genital segment. Scale bars=0.4 mm.

FIGURES 14–21. *Mauritia flexuosa*: 14, dwarf form; 15, palms in human-settled area; 16, rachillae before anthesis (male); 17, portion of rachilla at the beginning of anthesis (male); 18, Guy Couturier harvesting rachillae for insect sampling; 19, male inflorescence; 20, portion of rachilla during anthesis (female); 21, César Delgado next to a dwarf form with fruits.

A common feature among the genera of palm trees from which *D. amazonensis* has been recorded (*Mauritia*, *Euterpe* and *Oenocarpus*) is the rather sparse structure of their inflorescence compared to other genera of

Arecaceae, such as *Astrocaryum*, *Elaeis* and *Phytelephas*. These genera have been also examined in the field but *D. amazonensis* was not either observed or reported. We assume that the structure of the inflorescence may be a limiting factor in the predatory behavior of *D. amazonensis*. Because of its association with a dominant plant species of economic and cultural importance in Amazonia, the ecological role of *D. amazonensis* in the "aguajal" ecosystem may deserve further studies of applied interest in the future.

Acknowledgements

We gratefully acknowledge Dr. Stylianos Chatzimanolis for his support with the execution of this work. Special thanks to Dr. César Delgado, entomologist at the IIAP (Instituto de Investigaciones de la Amazonia Peruana, Iquitos), Dr. Francis Kahn, botanist at the IRD (Institut de Recherche pour le Développement, France) and Wilson Gonzales, research technician at the IIAP Iquitos, who participated in the insect sampling. This study was partially supported by the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina, and CONICET PIP 112-200801-00162 to A. E. Marvaldi and G. E. Flores. The majority of the field work was supported by IIAP, Iquitos.

References

Blackwelder, R.E. (1936) Morphology of the coleopterous family Staphylinidae. *Smithsonian Miscellaneous Collection* 94, 1–102.

Bouchard P., Bousquet, Y., Davies, A. E. , Alonso-Zarazaga, M.A. , Lawrence, J.F. , Lyal, C.H.C. , Newton, A.F. , Reid, C.A. M. , Schmitt, M. , Ślipiński, A. , Smith, A.B.T. (2011) Family-group names in Coleoptera (Insecta). *ZooKeys*, 88, 1–972. doi: 10.3897/zookeys.88.807.

Chani-Posse, M. (2006) Systematic revision and cladistic analysis of the Neotropical genus *Chroaptomus* Sharp (Coleoptera: Staphylinidae), with descriptions of two new species. *Insect Systematics & Evolution*, 37, 361–383.

Chani-Posse, M. In press. Toward a natural classification of the subtribe Philonthina (Coleoptera: Staphylinidae: Staphylinini): a phylogenetic analysis of the Neotropical genera. *Systematic Entomology*, 45 Ms pp.

Delgado C., Couturier G., Mejia K. (2007) *Mauritia flexuosa* (Arecaceae: Calamoideae), an Amazonian palm with cultivation purposes in Peru. *Fruits*, 62 (39), 157–169.

Henderson, A.H., Galeano, G. & Bernal, R. (1995) *Field guide to the palms of the Americas*. Princeton University Press, Princeton, N.J.

Herman, L.H. (2001) Catalog of the Staphylinidae (Insecta: Coleoptera). 1758 to the end of the second millennium. Part V. *Bulletin of the American Museum of Natural History*, 265, 2441–3020.

Morrone, J.J. (2009) *Evolutionary Biogeography: An Integrative Approach with Case Studies*. 304 pp. ISBN: 978-0-231-14378-3. Columbia University Press, New York.

Navarrete-Heredia, J.L., Newton, A.F., Thayer, M.K., Ashe, J.S. & Chandler, D.S. (2002) *Guía ilustrada para los géneros de Staphylinidae (Coleoptera) de México. Illustrated guide to the genera of Staphylinidae (Coleoptera) of México.* Universidad de Guadalajara y Conabio, México, 401 pp.

Newton, A.F., Thayer, M.K., Ashe, J.S. & Chandler, D.S. (2000) *Staphylinidae Latreille, 1802. American Beetles*, Vol. 1. Archostemata, Myxophaga, Adephaga, Polyphaga: Staphyliniformia (ed. by R. H. Arnett, Jr and M. C. Thomas), pp. 272–418. CRC Press, Boca Raton, Florida.

Newton, A.F. & Thayer, M.K. (2005) *Catalog of higher taxa of Staphyliniformia and genera and subgenera of Staphylinoidea* [online]. Field Museum of Natural History, Chicago. Available from: http://www.fieldmuseum.org/peet_staph/db_1a.html (last updated 03 November 2005; date of access: 18 April 2012).

Schillhammer, H. (2000) Revision of the East Palaearctic and Oriental species of *Philonthus* Stephens-Part 3. The *politus* complex. *Koleopterologische Rundschau*, 70, 113–176.

Smetana, A. (1995) Rove beetles of the subtribe Philonthina of America north of Mexico (Coleoptera: Staphylinidae): Classification, phylogeny and taxonomic revision. *Memoirs on Entomology, International*, 3, 1–946.

Smetana, A. & Davies, A. (2000) Reclassification of the north temperate taxa associated with *Staphylinus* sensu lato, including comments on relevant subtribes of Staphylinini (Coleoptera: Staphylinidae). *American Museum Novitates*, 3287, 1–88.

Solodovnikov, A.Y. & Newton, A.F. (2005) Phylogenetic placement of Arrowinini trib. n. within the subfamily Staphylininae (Coleoptera: Staphylinidae), with revision of the relict South African genus *Arrowinus* and description of its larva. *Systematic Entomology*, 30, 398–441.

Storti E. (1993) Biologia floral de *Mauritia flexuosa* L.f. na Região de Manaus, AM, Brasil. *Acta Amazonica*, 23 (4), 371–381.

Trujillo-Gonzalez, J. M., Torres-Mora, M.A. & Santana-Castaneda, E. (2011) La palma de Moriche (*Mauritia flexuosa* L.f) un ecosistema estratégico. *Orinoquia*, 15 (1), 62–70

Vásquez, J., Delgado, C., Couturier, G., Mejia, K., Freitas, L., Del Castillo, D. (2008) Pest insects of the palm tree *Mauritia flexuosa* L.f., dwarf form, in Peruvian Amazonia. *Fruits*, 63 (4), 227–238.