



A new species and notes on the subgenus *Deltochilum* (*Deltochilum*) Eschscholtz, 1822 (Coleoptera: Scarabaeidae: Scarabaeinae: Deltochilini)

FRANÇOIS GÉNIER

Coleoptera Section, Canadian National Collection of Insects, Arachnids and Nematodes, Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa, Ontario, K1A 0C6 Canada. E-mail: f.genier@videotron.ca

Abstract

Deltochilum eurymedon **new species** is described and illustrated. Two new synonymies are proposed, *Deltochilum* (*Telhyboma*) Kolbe, 1893 = *Deltochilum* (*Deltochilum*) Eschscholtz, 1822 and *D. (D.) scabriusculum montanum* Howden, 1966 = *D. (D.) scabriusculum* Bates, 1887. Diagnostic characters are given and aedeagi are illustrated for each species currently included in the subgenus *Deltochilum*. Finally, distributional data and literature records are also provided.

Key words: *Deltochilum eurymedon* new species, diagnosis, distribution, synonymy, literature

Résumé

On décrit et illustre la **nouvelle espèce** *D. eurymedon*. Les deux synonymies suivantes sont établies, le second épithète étant valide, *Deltochilum* (*Telhyboma*) Kolbe, 1893 = *Deltochilum* (*Deltochilum*) Eschscholtz, 1822, et *D. (D.) scabriusculum montanum* Howden, 1966 = *D. (D.) scabriusculum* Bates, 1887. Des caractères diagnostics et l'illustration des édéages pour toutes les espèces du sous-genre *Deltochilum* sont présentés. Enfin, les données de répartition géographique pour les spécimens déposés dans la Collection nationale canadienne d'insectes, arachnides et nématodes et la collections du Musée canadien de la nature sont compilées et présentées ainsi que les principales références bibliographiques pour les espèces du sous-genre *Deltochilum*.

Introduction

With 84 species currently known, *Deltochilum* is one of the mega-diverse New World genera and preliminary observation indicates that several additional species remain to be described. *Deltochilum* are large rollers that are ubiquitous in tropical, subtropical and parts of temperate America, reaching as far north as Kentucky in the United States. *Deltochilum* (*D.*) *scabriusculum*, the most northerly member of the subgenus *Deltochilum* has been recorded from southern Texas. In recent years Scarabaeinae species have attracted much attention as they are used as biodiversity indicators and the subject of numerous faunistic studies in Latin America. The purpose of this paper is to describe a species that is known only from Panama and was found among material collected by Robert S. Anderson (Canadian Museum of Nature) in 1996. The Panamanian Scarabaeinae fauna was revised by Howden & Young (1981) and updated by several publications since. Finally, the examination of specimens during the preparation of this publication has led to the proposition of two synonymies in addition to new distributional data and updated literature records.

Methods

All specimen data, gathered from studied specimens, are deposited in the Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Canada (CNC) and the Canadian Museum of Nature, Gatineau, Canada (CMNC), have been compiled using the relational database Mantis. Aedeagi photographs were prepared with a

Zarbeco ZDM Digital Video Microscope equipped with a 2-megapixel camera and the images were stacked using the CombinedZM software. Measurements were rounded to the nearest 0.5 mm. The habitus was produced with a Pentax K10D digital camera coupled to a 90 mm macro lens. Nomenclatural combinations are reported verbatim from the original publication.

Deltochilum (Deltochilum) Eschscholtz, 1822

Eschscholtz 1822: 37 original description

Synonym: *Telhyboma* Kolbe, 1893, **new synonymy**

Kolbe 1893: 192 original description

Remarks. While examining species belonging to the subgenus *Deltochilum*, it became apparent that the status of the single species (*D. orbiculare* van Lansberge) included in the subgenus *Telhyboma* Kolbe should be reconsidered. After a careful examination, it appears that the only apomorphic character separating *D. orbiculare* from all other species included in the subgenus *Deltochilum* is the development of the 7th interstitial carina. In *D. orbiculare* this carina is present on most of the length of the 7th interstria and overlaps the elytral edge and the 9th interstitial carina on most of the elytral length. The development of this carina is clearly linked to gender. Hyperthelic males always exhibit a much more developed structure than females, suggesting that the development of this carina in *D. orbiculare* is an additional secondary sexual character. In their study of the subgenera *Calhyboma*, *Hybomidium* and *Telhyboma* for Colombia, González *et al.* (2009) also noted the asymmetrical parameres and the additional internal sac sclerites, which conform to other species in the subgenus *Deltochilum*.

The following apomorphies define the subgenus *Deltochilum* in its current sense: overall body shape in dorsal view with widest portion at mid-distance or slightly past mid-distance to elytral apex; elytral surface with a distinct network of irregular glossy bulges (not glossy in *D. enceladus* Kolbe) sharply contrasting from remaining surface; protibia lacking tarsus in both sexes; male protibia with a modification on internal edge basal third; male profemur with a teeth past mid-distance on internal edge; male mesofemur with a denticle on basal half; male metafemur with posterior surface completely matte, with punctures weakly impressed, more widely separated than remaining surface or absent; male sternite 3 with a strong bulging structure medially (note: this structure is absent in both Central American species, *D. scabriusculum* Bates and *D. tumidum* Howden. However, in some specimens of *D. scabriusculum* and *D. tumidum* the surface shows wrinkles that would correspond to the lateral edges of the bulge, suggesting that in these species there is a reversal to the primitive state); parameres with strong ventral projections, slightly asymmetrical.

Deltochilum (Deltochilum) dentipes Eschscholtz, 1822

(Figs. 1–2)

Eschscholtz 1822: 38 original description (combination: *Deltochilum dentipes*)

Laporte 1840: 73 diagnosis, distribution (combination: *Hyboma dentipes*)

Burmeister 1848: 134 diagnosis, distribution, comment (combination: *Deltochilum dentipes*)

Guérin-Méneville 1855: 586 mention (combination: *Hyboma dentipes*)

Lacordaire 1856: 80 mention (combination: *Deltochilum dentipes*)

Lucas 1859: 97 distribution (combination: *Deltochilum dentipes*)

Harold 1869: 995 catalogue (combination: *Deltochilum dentipes*)

Bates 1870: 176 comment (combination: *Deltochilum dentipes*)

Harold 1875: 59 comment (combination: *Deltochilum dentipes*)

Kolbe 1893: 193 diagnosis (combination: *Deltochilum dentipes*)

Shipp 1897: 196 mention (combination: *Deltochilum dentipes*)

Heyne 1900: 61 comment, distribution (combination: *Deltochilum dentipes*)

Gillet 1911: 35 catalogue (combination: *Deltochilum dentipes*)

Lucas 1920: 228 mention (combination: *Deltochilum dentipes*)

Paulian 1938: 250 monograph (combination: *Deltochilum (Meghyboma) dentipes*)

Pessôa & Lane 1941: 430 diagnosis, distribution (combination: *Deltochilum dentipes*)

Blackwelder 1944: 202 catalogue (combination: *Deltochilum dentipes*)



FIGURES 1–12. Figs. 1, 3, 5, 7, 9, 11: aedeagus lateral view; Figs. 2, 4, 6, 8, 10, 12: parameres dorsal view. Figs. 1–2: *D. dentipes* (parameres length (p.l.) 8.0 mm); Figs 3–4: *D. enceladus* (p.l. 8.5 mm); Figs. 5–6: *D. orbiculare* (p.l. 4.0 mm); Figs. 7–8: *D. rosamariae* (p.l. 4.0 mm); Figs. 9–10: *D. scabriusculum* (p.l. 4.5 mm); Figs. 11–12: *D. tumidum* (p.l. 5.0 mm).



FIGURES 13–16. *D. eurymedon*. Figs. 13–14, habitus dorsal view. Fig. 13: holotype male (length 30.0 mm); Fig. 14: allotype female (length 29.0 mm). Figs. 15: aedeagus lateral view; Fig. 16: parameres dorsal view (p.l. 7.0 mm).

Lane 1946: 174 mention (combination: *Deltochilum dentipes*)
 Lange 1947: 308 distribution (combination: *Deltochilum dentipes*)
 Pereira & Martínez 1956: 121 mention (combination: *Deltochilum dentipes*)
 Vulcano & Pereira 1964: 640 catalogue (combination: *Deltochilum (D.) dentipes*)
 Vulcano & Pereira 1967: 555 identification key (combination: *Deltochilum dentipes*)
 Medina *et al.* 2001: 136 comment, distribution (combination: *Deltochilum dentipes*)
Synonym: *Anamnesis macleayii* Vigors
 Vigors 1826: 512 original description (combination: *Anamnesis macleayii*)
 Lacordaire 1856: 80 mention (as synonym) (combination: *Anamnesis Mac-Leayi*)
 Shipp 1897: 194 mention (as synonym) (combination: *Anamnesis Macleayi*)
 Gillet 1911: 35 mention (as synonym) (combination: *Deltochilum Mac-Leayi*)
 Blackwelder 1944: 202 mention (as synonym) (combination: *Anamnesis macleayii*)

Type locality. Brasilien, St. Catharina.

Distribution. Bolivia, Brazil, Colombia, Paraguay.

Material examined (1 male, 1 female). **BRAZIL:** PARANÁ, Col. Ing. Vitoria, x.1945, coll. F. Justus - 1 male (CMNC); **PARAGUAY:** CAAGUAZÚ, Caaguazú, (25°26'48"S, 56°1'43"W), x.1948, coll. F.H. Schade - 1 female (CMNC).

Remarks. Only two specimens have been examined. Easily separated from all other species by the shape of parameres (Figs. 1–2) and the lustreless dorsal surface, which is strongly contrasting with the small glossy bulges on elytra.

Deltochilum (Deltochilum) enceladus Kolbe, 1893

(Figs. 3–4)

Kolbe 1893: 192 original description (combination: *Deltochilum enceladus*)

Shipp 1897: 196 mention (combination: *Deltochilum Enceladas*)

Gillet 1911: 36 catalogue (combination: *Deltochilum enceladus*)

Paulian 1938: 249 monograph (combination: *Deltochilum (Meghyboma) enceladus*)

Blackwelder 1944: 202 catalogue (combination: *Deltochilum enceladus*)

Vulcano & Pereira 1967: 556 identification key (combination: *Deltochilum enceladus*)

Type locality. Xingu (Central-Brasilien).

Distribution. Bolivia, Brazil.

Material examined (14 males, 3 females). **BRAZIL:** MATO GROSSO, 13.4 km S Posto do Gil, elev. 240 m (14°37'55"S, 56°16'23"W), 11.i.2001, coll. Génier & Vaz de Mello (2001-17) - 1 male (CMNC); same locality, 13.i.2001, coll. Génier & Vaz de Mello (2001-29) - 5 males (CMNC); Fazenda São João, Município Diamantino, elev. 400 m (14°14'10"S, 56°8'11"W), 11.i.2001, coll. Génier & Vaz de Mello (2001-04) - 1 female, 1 male (CMNC); same locality, 13.i.2001, coll. Génier & Vaz de Mello (2001-46) - 1 female, 1 male (CMNC); same locality, 13.i.2001, coll. Génier & Vaz de Mello (2001-39) - 2 males (CMNC); same locality, 13.i.2001, coll. Génier & Vaz de Mello (2001-45) - 1 male (CMNC); MINAS GERAIS, Vespasiano, (19°40'S, 43°55'W), xii.1951, coll. P. Pereira - 1 male (CMNC); PARÁ, IPEAN [=Instituto de Pesquisas e Experimentação Agropecuárias do Norte], Belem, (1°26'32"S, 48°25'59"W), xi.1984, coll. L. Arnaud - 1 male (CMNC); Mujo, xii.1921, coll. [anonymous] - 1 male (CMNC); SÃO PAULO, Fazenda Fugueira, Guararapes, (21°15'S, 50°38'W), 23.ii.1941, coll. N. Sannomia - 1 female (CMNC).

Remarks. *Enceladus* is the proper epithet spelling. The name is derived from the Greek deity Enceladus, son of Gaia and brother of Eurymedon. The largest species of the subgenus, which can easily be separated by the shape of parameres (Figs. 3–4) and externally by the evenly dull dorsum.

Deltochilum (Deltochilum) eurymedon Génier, new species

(Figs. 13–16)

Type locality. PANAMA: DARIÉN, Estación Ambiental Cana (7°45.32'N, 77°41.07'W), 600–750 m, 5-7.vi.1996, coll. R.S. Anderson, 1996-110 - male holotype (CMNC)

Diagnosis. *D. eurymedon* is unique in the genus *Deltochilum* in having the 7th interstrial carina complete and reaching the elytral anterior edge combined with the sharply defined cephalic punctures throughout and from *D. rosamariae* in having the second interstria distinctly tuberculate apically. The shape of parameres (Figs. 15–16), especially the very long and curved dorsal projections, will also separate *D. eurymedon* from all other species in the genus.

Description. Holotype male (Fig. 13). Length 30.0 mm, width 21.0 mm. **Colour.** Black with feeble coppery sheen; antennal club and pubescence fulvous. **Head.** Clypeus with two sharp, upturned and widely separated teeth anteriorly, anterior margin slightly lobate medially and on each side of teeth. Head dorsal surface with sharply defined punctures throughout, punctures larger and more widely separated on disc; surface between punctures weakly microreticulated anteriorly, microsculpture becoming sharply defined posteriorly giving the surface a silky aspect. Eyes and ocular canthus unmodified. **Pronotum.** Moderately convex, anterior portion slightly gibbous anteriorly; surface completely punctate, punctures dense and evenly spaced, gradually becoming larger and umbilicate laterally; surface between punctures finely microreticulated on disc and anteriorly, microsculpture becoming strong laterally giving the surface a strong silky sheen on anterior and posterior angles; posterior edge distinctly bisinuate on each side, produced into a small denticle medially. **Elytra.** broadly arcuate in dorsal view, largest portion just behind mid distance; elytral striae 1–6 fine and distinct from base to elytral apex, with widely spaced oval punctures; interstriae with a network of strong irregular and glossy bulges, base surface with weakly-defined umbilicate punctures; interstria 7 with a strong carina from base to apex; interstria 8 with surface nearly perpendicular to dorsal surface, widest past middle; stria 9 visible and connecting to stria 2 apically; interstriae 8-9 strongly

sericeous on most of surface, umbilicate punctures weakly-defined; apical portion with well-defined glossy calluses on interstriae 2–6, calluses gradually becoming longer externally. **Thoracic sternites.** Mesosternum with anterior margin raised and sinuous medially, remaining surface with coarse umbilicate punctures laterally and a double row of punctures along anterior margin medially. Metasternal median lobe with a more or less rectangular and glossy raised area medially, lateral portions with coarse umbilicate punctures throughout, disc with a more or less oval depression posteriorly, depression lacking tubercle anteriorly. Lateral lobe covered with closely set coarse umbilicate punctures. **Legs.** Profemur with a dent on anterior edge at about mid-distance to apex, dent almost triangular in shape, with pubescence covering ventral portion; protibia inwardly bent on apical half, with a wide lobate projection before mid-distance on internal edge; mesocoxa with a distinct triangular teeth on posterior edge, with a setal brush on internal side; mesofemur with a ventrally bent triangular process, posterior third surface strongly sericeous, sharply contrasting with glossy anterior surface; metatrochanter with a narrow setal brush ventrally to posterior edge, posterior edge produced into a ventrally bent lobate projection; metafemur strongly arcuate in ventral view, narrowest portion just before mid-distance, posterior surface completely matte and lacking punctures, dorsoposterior edge produced into a lobate projection separated from the trochantofemoral suture by its own width; metatibia sinuous and produced into a wide triangular tooth internally on basal fifth, apex spatulate, internal surface broadly concave. **Abdomen.** Sternite 3 produced into a strong approximately equilateral triangular process medially, widest portion of process in line with sternite 4. Pygidium approximately as wide as long; surface with transversally oval umbilicate punctures, punctures smaller and more widely separated basally; surface between punctures completely matte; margin very wide apically, internal edge broadly and evenly arcuate. **Aedeagus.** Parameres nearly symmetrical, with two straight and spiniform processes in lateral view, dorsal process longer, acute and more curved in dorsal view than the ventral one.

Female (Fig. 14). Similar to male, lacking processes or modifications on legs; protibia wider, external teeth larger and obliquely directed. Sternite 3 unmodified medially.

Variation. No variation except for body size and development of secondary sexual characters in males.

Measurements (11 males, 5 females). Body length: male 22.0–30.0 (26.3 ± 2.5), female 26.0–28.5 (27.1 ± 1); body width: male 15.0–21.0 (17.8 ± 1.8), female 16.5–19.0 (17.8 ± 1.2) mm.

Material examined (11 males, 5 females). **PANAMA:** DARIÉN, Estación Ambiental Cana, elev. 460 m ($7^{\circ}45.5'N$, $77^{\circ}41'W$), 3-9.vi.1996, coll. Stockwell - 2 males (including 2 paratypes) (CMNC); same locality, 5-7.vi.1996, coll. R.S. Anderson (1996-110) - 3 females, 2 males (including holotype, 3 paratypes) (CMNC); same locality, 7-10.vi.1996, coll. R.S. Anderson (1996-117) - 2 females, 7 males (including 9 paratypes) (CMNC).

Etymology. Eurymedon, a Giant of Greek mythology, son of Gaia and brother of Enceladus, relating to the large size and close relationship to *D. enceladus*.

Natural history. All specimens with data have been collected in human feces baited pitfall traps set up during the afternoon. Current distributional data suggest that it is most likely an endemic of the Eastern Panamanian Mountain Forest. However, the elevation at which specimens were collected (460–700 m) is overlapping the Eastern Panamanian Mountain Forest which ranges from 500–1800 m and the Chocó-Darién Moist Forest which lies at elevations below 500 m. Further collecting will be necessary to settle the issue.

Deltochilum (Deltochilum) orbiculare van Lansberge, 1874

(Figs. 5–6)

van Lansberge 1874: 6 original description (combination: *Deltochilum orbiculare*)

Kolbe 1893: 194 comments, distribution (combination: *Deltochilum orbiculare*)

Shipp 1897: 196 mention (combination: *Telhyboma orbiculare*)

Gillet 1911: 36 catalogue (combination: *Deltochilum orbiculare*)

Paulian 1938: 244 monograph (combination: *Deltochilum (Telhyboma) orbiculare*)

Pessôa & Lane 1941: 429 identification key, diagnosis, distribution (combination: *Deltochilum orbiculare*)

Balthasar 1941: 344 distribution (combination: *Deltochilum (Telhyboma) orbiculare*)

Blackwelder 1944: 203 catalogue (combination: *Deltochilum orbiculare*)

Lane 1946: 174 mention (combination: *Deltochilum (Telhyboma) orbiculare*)

Pereira & Martínez 1956: 121 mention (combination: *Deltochilum (Telhyboma) orbiculare*)

Vulcano & Pereira 1964: 647 catalogue (combination: *Deltochilum (Telhyboma) orbiculare*)

Vulcano & Pereira 1967: 555 identification key (combination: *Deltochilum (Telhyboma) orbiculare*)

Escobar 2000: 201 faunistic (combination: *Deltochilum orbiculare*)
Vaz-de-Mello 2000: 192 faunistic (combination: *Deltochilum (Telhyboma) orbiculare*)
Medina *et al.* 2001: 136 faunistic (combination: *Deltochilum orbiculare*)
Medina *et al.* 2003: 65 mention (combination: *Deltochilum orbiculare*)
Pulido *et al.* 2003: 54 faunistic (combination: *Deltochilum orbiculare*)
Noriega-Alvarado 2004: 40 faunistic (combination: *Deltochilum orbiculare*)
Celi *et al.* 2004: 43 faunistic (combination: *Deltochilum orbiculare*)
Pulido *et al.* 2007: 307 faunistic (combination: *Deltochilum orbiculare*)
Carpio *et al.* 2009: 463 faunistic (combination: *Deltochilum orbiculare*)
Medina & Pulido 2009: 59 faunistic (combination: *Deltochilum orbiculare*)
González *et al.* 2009: 271 monograph (combination: *Deltochilum (Telhyboma) orbiculare*)
Larsen 2011: 99 faunistic (combination: *Deltochilum orbiculare*)

Type locality. Bahia.

Distribution. Bolivia, Brazil, Colombia, Ecuador, French Guiana, Peru.

Material examined (38 males, 45 females). **BOLIVIA:** Alto Beni, elev. 1100 m, i.1976, coll. Peña - 1 female, 1 male (CMNC); Río Ichilo, elev. 350 m, [no date], coll. Steinbach - 1 female (CMNC); COCHABAMBA, 124 km E Cochabamba at Río Espíritu Santo, elev. 700 m (17°3'45"S, 65°38'38"W), 1-6.ii.1999, coll. F. Génier (1999-31) - 1 female, 1 male (CMNC); 16.7 km W Villa Tunari, Avispas, elev. 500 m (17°1'13"S, 65°32'46"W), 10-12.ii.1999, coll. F. Génier (1999-67) - 1 female, 1 male (CMNC); Estación Biológica El Valle del Sajta, Universidad Mayor de San Simón, elev. 300 m (17°6.48'S, 64°46.94'W), 16-27.xii.2005, coll. S. & J. Peck (2005-47) - 1 female, 1 male (CMNC); Estación Biológica El Valle del Sajta, Universidad Mayor de San Simón, 67.5 km E Villa Tunari, elev. 300 m (17°6'19"S, 64°46'57"W), 7-9.ii.1999, coll. F. Génier (1999-45) - 2 females (CMNC); same locality, 7-9.ii.1999, coll. F. Génier (1999-48) - 2 females (CMNC); same locality, 7-9.ii.1999, coll. F. Génier (1999-46) - 1 male (CMNC); same locality, 7-9.ii.1999, coll. F. Génier (1999-47) - 1 male (CMNC); same locality, 7-9.ii.1999, coll. R. Hanley (1999-57) - 1 male (CMNC); same locality, 9-13.ii.1999, coll. F. Génier (1999-73) - 1 female (CMNC); same locality, 9-13.ii.1999, coll. F. Génier (1999-74) - 1 female (CMNC); same locality, 9-13.ii.1999, coll. R. Hanley (1999-78) - 1 female (CMNC); same locality, 9-13.ii.1999, coll. F. Génier (1999-71) - 1 male (CMNC); same locality, 9-13.ii.1999, coll. F. Génier (1999-75) - 1 male (CMNC); Villa Tunari, Hotel El Puente, elev. 357 m (16°59.02'S, 65°24.5'W), 15-27.xii.2005, coll. S. & J. Peck (2005-45) - 1 male (CMNC); Provincia Chapare, Chimoré, elev. 250 m (16°59'56"S, 65°9'17"W), i.1972, coll. A. Martínez - 2 males (CMNC); Región subandina, elev. 400 m, [no date], coll. Zischka - 1 male (CMNC); Villa Tunari, (16°58'48"S, 65°25'43"W), xii.1985, coll. Martínez - 2 females, 2 males (CMNC); same locality, xi.1992, coll. Arriagada - 1 female (CMNC); EL BENI, Guanay, (12°31'17"S, 66°49'39"W), xi.1992, coll. L. Peña - 1 female (CMNC); LA PAZ, Chalalán, Río Tuichi, elev. 320 m (14°25.6'S, 67°55.2'W), 10-20.viii.1995, coll. S. Spector - 1 male (CMNC); SANTA CRUZ, Hotel Flora y Fauna, 3.7 km SSE Buena Vista, (17°29'S, 63°33'W), 7-12.v.2004, coll. A.R. Cline - 1 female (CMNC); Hotel Flora y Fauna, 4-6 km SSE Buena Vista, elev. 420-450 m (17°29'S, 63°33'W), 2-12.ii.2000, coll. J.E. Wappes - 1 female, 1 male (CMNC); Hotel Flora y Fauna, 5 km SSE Buena Vista, elev. 440 m (17°29.925'S, 63°39.128'W), 6-15.xii.2003, coll. S. & J. Peck (2003-130) - 1 female, 1 male (CMNC); same locality, 15-24.xii.2003, coll. S. & J. Peck (2003-131) - 3 females, 1 male (CMNC); Provincia Ichilo, Buenavista, (17°27'32"S, 63°39'33"W), x.1949, coll. Martínez - 1 female (CMNC); same locality, ii.1950, coll. Martínez - 3 males (CMNC); same locality, iii.1951, coll. Martínez - 1 male (CMNC); **BRAZIL:** AMAZONAS, Rio Parauary, (4°36'S, 57°47'W), 15.iii.1937, coll. Zellibor-Hauff - 1 female (CMNC); MATO GROSSO, Fazenda São João, Municipio Diamantino, elev. 400 m (14°14'10"S, 56°8'11"W), 11.i.2001, coll. Génier & Vaz de Mello (2001-04) - 3 females (CMNC); same locality, 13.i.2001, coll. Génier & Vaz de Mello (2001-45) - 2 females (CMNC); same locality, 13.i.2001, coll. Génier & Vaz de Mello (2001-46) - 1 female, 1 male (CMNC); PARÁ, Tucuruí, (3°46'26"S, 49°41'19"W), i.1979, coll. Alvarenga - 1 female, 1 male (CMNC); **COLOMBIA:** META, Villavicencio, elev. 500 m (4°9'38"N, 73°39'43"W), 29.ii.-5.iii.1972, coll. S. & J. Peck - 1 female, 1 male (CMNC); **ECUADOR:** MORONA-SANTIAGO, Untsuants sitio 7, elev. 900 m, 23.i.2002, coll. J. Celi & M. Ortega - 1 female, 1 male (CMNC); **PERU:** HUANUCO, Tingo María, elev. 700 m (7°10'S, 76°0'W), vii.1974, coll. Bordón - 1 female, 1 male (CMNC); same locality, x.1977, coll. P. Arnaud - 1 female, 1 male (CMNC); Universidad, Tingo María, (9°10'S, 76°0'W), xii.1974, coll. Martínez - 8 females, 5 males (CMNC); same locality, vii.1974, coll. Martínez - 1 male (CMNC); MADRE DE DIOS, Castañal Trail, Estación. Biológicas Pakitza, Parque Nacional del Manú, elev. 317 m (11°56'41"S, 71°17'0"W), 15-16.x.2000, coll. R. Brooks (2000-13) - 1 female (CMNC); SAN MARTÍN,

Alto Porongo, near Tocache, 18.x.1976, coll. J. Schunke L. - 1 male (CMNC); Río Huallaga, near Tocache, (8°11'20"S, 76°30'51"W), 13.viii.1975, coll. J. Schunke L. - 1 female (CMNC); UCAYALI, Loreto, Pucallpa, (8°21'57"S, 74°33'8"W), 11.ix.1978, coll. J. Schunke L. - 1 male (CMNC); Pucallpa, (8°23'58"S, 74°34'39"W), 19.xi.1974, coll. J. Schunke L. - 1 male (CMNC).

Remarks. Aside the characteristic shape of the parameres (Figs. 5–6), this species can be separated externally from all others by the shape of the 7th interstrial carina, which overlaps the elytral lateral edge on most of the length.

Deltochilum (Deltochilum) rosamariae Martínez, 1991

(Figs. 7–8)

Martínez1991: 390 original description (combination: *Deltochilum rosamariae*)

Type locality. Ecuador, provincia Los Ríos, Quevedo, Pichilingue, XII.1978, A. Martínez.

Distribution. Ecuador.

Material examined (6 males, 15 females). ECUADOR: LOS RÍOS, Estación Experimental Tropical Pichilingue, Quevedo, (1°0'13"S, 79°27'50"W), v.1976, coll. Martínez - 14 females, 5 males (including 19 paratypes) (CMNC); same locality, iv.1976, coll. Martínez - 1 female (paratype) (CMNC); same locality, viii.1976, coll. Martínez - 1 male (paratype) (CMNC).

Remarks. As for *D. eurymedon*, this species is known only from the original type specimens collected from a single locality. Interestingly, no additional specimens of this species were collected at the Estación Científica Río Palenque located only 50 km north of Estación Experimental Tropical Pichilingue with only a 200 m elevation difference despite extensive dung beetle trapping by H.F. Howden, S.B. Peck and others on several occasions from 1975 to 1979. Externally *D. rosamariae* is most closely related to *D. eurymedon* from which it can be separated by its smaller size and the shape of parameres (Figs. 7–8).

Deltochilum (Deltochilum) scabriusculum Bates, 1887

(Figs. 9–10)

Bates 1887: 38 original description (combination: *Deltochilum scabriusculum*)

Kolbe 1893: 193 diagnosis (combination: *Deltochilum scabriusculum*)

Shipp 1897: 196 mention (combination: *Deltochilum Scabriusculum*)

Gillet 1911: 36 catalogue (combination: *Deltochilum scabriusculum*)

Leng 1920: 248 catalogue (combination: *Deltochilum scabriusculum*)

Paulian 1938: 247 monograph (combination: *Deltochilum (Meghyboma) scabriusculum*)

Blackwelder 1944: 203 catalogue (combination: *Deltochilum scabriusculum*)

Vulcano & Pereira 1964: 641 catalogue (combination: *Deltochilum scabriusculum*)

Deloya *et al.* 1987: 169 faunistic (combination: *Deltochilum scabriusculum*)

Deloya 1992: 22 faunistic (combination: *Deltochilum scabriusculum scabriusculum*)

Deloya *et al.* 1993: 21 faunistic (combination: *Deltochilum scabriusculum scabriusculum*)

Synonym: *Deltochilum (D.) scabriusculum montanum* Howden, 1966, **new synonymy**

Howden 1966: 737 original description (combination: *Deltochilum (Deltochilum) scabriusculum montanum*)

Woodruff 1973: 33 biology (combination: *Deltochilum scabriusculum montanum*)

Edmonds 2004: 124 natural history (combination: *Deltochilum scabriusculum montanum*)

Smith 2009: 39 checklist (combination: *Deltochilum scabriusculum montanum*)

Type locality. Jalapa, Mexico.

Distribution. Belize, Costa Rica, El Salvador, Guatemala, Mexico, Nicaragua, United States.

Material examined (69 males, 61 females, 1 specimen). **BELIZE:** 39 mi. W Hwy. at beaver dam, 6-12.viii.1972, coll. S. & J. Peck - 1 female (CMNC); CAYO, Caves Branch, (17°8'N, 88°42'W), 23-29.viii.1972, coll. S. & J. Peck - 1 male (CMNC); **COSTA RICA:** PUNTARENAS, R. Priv. Karen Morgensen, Send. El Viejo Nispero, 315 m, 23 Jun – 10 Jul 2003, D. Briceño, Tp. de Intersección, L_N_205600_420300 #74609, 9.8670900 N 85.0600000 W - 1 specimen (INBio); **GUATEMALA:** BAJA VERAPAZ, 16.5 km N Salama, (15°13'N, 90°18'W), 3.vii.1993, coll. F. Génier - 4 males (CMNC); PETÉN, Tikal, (17°12'46"N, 89°37'3"W), 23-

26.viii.1972, coll. S. & J. Peck - 1 female (CMNC); same locality, 28-30.vii.1978, coll. Helava & Kukal - 2 females (CMNC); same locality, 12-28.v.1991, coll. R. Limoges - 1 female (CMNC); SUCHITEPÉQUEZ, Cuyotenango, (14°32'N, 91°56'W), v.1902, coll. Riedel - 1 male (CMNC); **MEXICO**: CAMPECHE, 87 mi. E Escárcega, elev. 244 m (18°30'55"N, 89°29'49"W), 14.viii.1971, coll. A. Newton (337) - 1 female (CMNC); Chicaná, 10 km W Xpujil, (18°30'25"N, 89°29'11"W), 12-14.vii.1983, coll. S. & J. Peck - 2 males (CMNC); CHIAPAS, 11 mi. E Trinitaria, elev. 1585 m (16°8'15"N, 91°53'43"W), 24.viii.1971, coll. A. Newton (349) - 1 female, 1 male (CMNC); 4 mi. S Palenque, elev. 183 m (17°27'22"N, 91°57'59"W), 15.viii.1971, coll. A. Newton (326) - 1 female (CMNC); 5 km E Ocozacoautla, (16°44'35"N, 93°19'42"W), 4.vi.1990, coll. H. & A. Howden - 1 male (CMNC); Mirador La Coyota, Parque Nacional Cañón del Sumidero, elev. 1700 m (16°49'52"N, 93°4'27"W), 21.vi.1989, coll. H. Howden - 1 male (CMNC); Parque Nacional Cañón del Sumidero, elev. 1000 m (16°51'N, 93°7'W), 25.v.-1.vi.1990, coll. B. Gill, H. & A. Howden - 2 females, 4 males (CMNC); same locality, 29.v.1990, coll. H. & A. Howden - 1 female, 1 male (CMNC); same locality, 1.vi.1990, coll. H. & A. Howden - 1 female (CMNC); same locality, 7.vi.1990, coll. H. & A. Howden & B. Gill - 3 females, 1 male (CMNC); GUERRERO, 12.0 km SW Xochipala, elev. 1700 m (17°41'N, 99°38'W), 14.vii.1992, coll. R.S. Anderson (1996-06) - 1 female (CMNC); 9 mi. NE Iguala, elev. 1341 m (18°23'39"N, 99°28'47"W), 29.viii.1971, coll. A. Newton (378) - 1 female, 1 male (CMNC); JALISCO, 10 mi. SW Autlán, elev. 1280 m (19°41'48"N, 104°23'49"W), 19.ix.1971, coll. A. Newton (422) - 1 male (CMNC); 16.5 mi. SW Autlán, elev. 701 m (19°40'6"N, 104°25'52"W), 12-20.ix.1971, coll. A. Newton (420) - 1 male (CNC); 8 mi. W Atenquique, elev. 1798 m (19°31'45"N, 103°31'17"W), 10-18.ix.1971, coll. A. Newton (410) - 4 females, 4 males (CMNC, CNC); MORELOS, Yau-tepec, (18°53'N, 99°4'W), 13.vii.1963, coll. F.D. Parker & L.A. Stange - 1 female (CMNC); NUEVO LEÓN, 10 mi. W Linares, (24°45'51"N, 99°41'58"W), 31.v.1971, coll. A. Newton (224) - 1 male (CMNC); S. Rosa Can., 29 km W Linares, (24°44'56"N, 99°48'33"W), 3-5.vi.1983, coll. S. & J. Peck - 1 male (CMNC); OAXACA, 15 mi. S Sola de Vega, elev. 1829 m (16°23'18"N, 96°58'12"W), 30-31.v.1971, coll. S. Peck - 2 females, 2 males (CMNC, CNC); 15 mi. S Sola de Vega on route 131, elev. 1829 m (16°23'18"N, 96°58'12"W), 30.v.1971, coll. H.F. Howden - 1 female, 2 males (CMNC, CNC); 6 mi. S Valle Nacional, elev. 610 m (17°43'14"N, 96°19'2"W), 18-20.v.1971, coll. H. Howden - 1 male (CMNC); QUINTANA ROO, 20 mi. S Felipe Carrillo Puerto, elev. 30 m (19°17'18"N, 88°5'40"W), 13.viii.1971, coll. A. Newton (341) - 1 female, 1 male (CMNC); Felipe Carrillo Puerto, (19°34'N, 88°3'W), ix.1984, coll. A. Martínez - 8 females, 9 males (CMNC); Kohunlich, 68 km W Chetumal, (18°25'11"N, 88°47'29"W), 15-17.vii.1982, coll. S. & J. Peck - 1 female (CMNC); SAN LUIS POTOSÍ, 3 mi. W El Naranjo, (22°31'19"N, 99°21'49"W), 10-18.vi.1971, coll. A. Newton (233) - 1 female, 2 males (CMNC, CNC); 50 km E Ciudad del Maíz, (22°24'N, 99°23'W), 12.vii.1952, coll. F. Werner - 1 male (CMNC); 7 mi. W El Naranjo, elev. 732 m (22°29'54"N, 99°22'49"W), 10-18.vi.1971, coll. A. Newton (235) - 1 female, 1 male (CMNC, CNC); 8 mi. E Xilitla, (21°20'19"N, 98°51'41"W), 28.vi.1971, coll. A. Newton (252) - 1 female (CMNC); SINALOA, 15 mi. W El Palmito, elev. 1524 m (23°34'N, 105°57'W), 5.viii.1964, coll. H.F. Howden - 1 female (paratype) (CNC); 31 mi. NE Concordia, elev. 1433 m (23°28'50"N, 105°50'19"W), 28.ix.1971, coll. A. Newton (438) - 2 females, 2 males (CMNC); 8 mi. SW Concordia, elev. 91 m (23°13'22"N, 106°8'46"W), 28.ix.1971, coll. A. Newton (430) - 2 females (CMNC); SONORA, Yécora, (28°22'N, 108°55'W), 20-22.v.1961, coll. Gibson, Howden, Martin - 3 females, 2 males (including 4 paratypes) (CMNC, CNC); same locality, 12.vii.1961, coll. W.W. Gibson - 2 females, 7 males (including holotype, 8 paratypes) (CMNC, CNC); TAMAULIPAS, El Abra S of Ciudad Mante, (23°7'N, 98°59'W), 7-9.vii.1969, coll. S. & J. Peck - 2 females, 2 males (CMNC); El Nacimiento del Río Frío, Gómez Farías, (23°1'49"N, 99°8'52"W), 29.vi.1969, coll. S. Peck - 1 female (CMNC); VERACRUZ, Lago de Catemaco, elev. 366 m (18°21'27"N, 95°3'36"W), 8-16.viii.1960, coll. H.F. Howden - 2 females (CNC); same locality, 31.vii.-4.viii.1970, coll. A. Newton - 1 female (CMNC); Misantla, (19°56'10"N, 96°49'56"W), [nodate], coll. Hoge - 1 male (paralectotype) (CNC); Palma Sola, (21°22'24"N, 98°17'13"W), vi.1972, coll. G. Halffter & P. Reyes - 1 female (CMNC); YUCATÁN, 3 mi. S Muná, (20°26'50"N, 89°44'6"W), viii.1971, coll. A. Newton (346) - 1 male (CMNC).

Remarks. After examining nearly 130 specimens from 42 unique localities, it must be concluded that although type specimens of *D. scabriusculum montanum* Howden vary slightly in the convexity of the elytra and in fine details of the parameres, the separation as a separate entity is hard to maintain. The variation, especially the length of the 7th interstitial carina and the apical shape of the parameres (Figs. 9–10), is found in other populations. For example the length of the 7th interstitial carina is extremely variable and recently examined specimens from a unique locality show a range covering the difference from *D. s. scabriusculum* and *D. s. montanum*. Similarly, the apical shape of the parameres is extremely variable, even within specimens from the same locality. All attempts to

find a pattern with the variation have been unsuccessful. A much larger sample might be required. For the moment the following synonymy is proposed, the second epithet being valid: *D. (Deltochilum) scabriusculum montanum* Howden, 1966 = *Deltochilum (Deltochilum) scabriusculum* Bates, 1887 **new synonymy**. Externally, *D. scabriusculum* may be separated from all other species by the reduced 7th interstitial carina, which covers the apical half to eight of the elytral length combined with the absence of the sternite 3 bulge in the male. The characteristic shape of the parameres (Figs. 9–10) and distinctly carinate 6th interstria apically will separate it from *D. tumidum* Howden.

***Deltochilum (Deltochilum) tumidum* Howden, 1966**

(Figs. 11–12)

Howden 1966: 738 original description (combination: *Deltochilum (Deltochilum) tumidum*)

Deloya & Morón 1994: 28 distribution, ecology (combination: *Deltochilum tumidum*)

Deloya *et al.* 1995: 11 faunistic (combination: *Deltochilum tumidum*)

Deloya 1996: 43 faunistic (combination: *Deltochilum tumidum*)

Deloya 2003: 266 faunistic (combination: *Deltochilum tumidum*)

Type locality. Mexico, Sinaloa, 5 miles north Mazatlán, 27.vii.1964, at black light, Chemsak, Howden & Powell, (CNC No. 9146).

Distribution. Mexico.

Material examined (7 males, 1 female). **MEXICO:** ESTADO DE MÉXICO, Tejupilco de Hidalgo [to] Temascaltepec de González, (18°58'N, 100°4'W), vi.1933, coll. H.E. Hinton & R.L. Usinger - 2 males (including 2 paratypes) (CMNC, CNC); SINALOA, 26 mi. NE Villa Unión, elev. 305 m (23°29'N, 106°10'W), 17.viii.1963, coll. E. Sleeper, W. Agnew, G. Noonan & P. Sullivan - 1 female (paratype) (CNC); 5 mi. N Mazatlán, (23°21'N, 106°25'W), 27.vii.1964, coll. H.F. Howden, Chemsak & Powell - 1 male (holotype) (CNC); Rio Piaxtla, 29.vi.1962, coll. [anonymous] - 1 male (paratype) (CNC); Villa Unión, elev. 700 m (23°12'N, 106°14'W), vii.1968, coll. A. Martínez - 3 males (CMNC).

Remarks. Separated from other species by the shape of the parameres (Figs. 11–12) and the strongly reduced and blunt 7th interstitial carina.

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