

**A NEW TRIBE, GENUS AND SPECIES OF NITIDULID BEETLE
(COLEOPTERA: NITIDULIDAE: NITIDULINAE) FROM BOLIVIA**

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Abstract

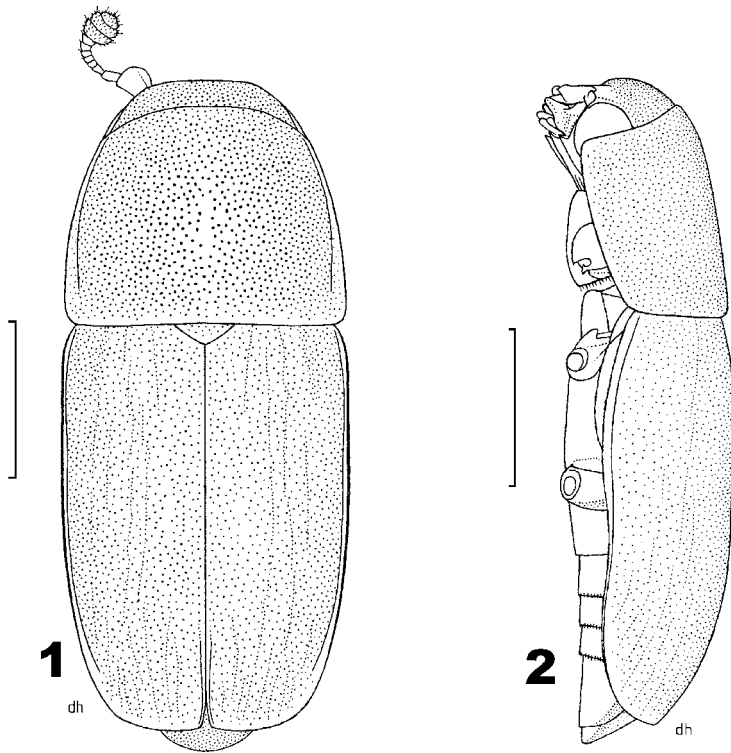
Amborotubus clarkei, **new genus** and **species** from a lowland transitional forest in the Department of Santa Cruz de la Sierra, Bolivia, is described and illustrated based on two female specimens. It is placed into the monotypic Amborotubini **new tribe** based on the following characters: clypeus bilobed, epipharynx with two anterior setose lobes visible in dorsal view, antennal fossa contiguous with subclypeal area and anterior portion of labrum excavated, mentum platelike and concealing labium and maxilla, pronotal carina asetose, hypomeron with glabrous ocular rests, mesoventrite visible in ventral view, femora and tibiae flattened, tarsal pads transverse and poorly developed, ovipositor with apical styli. The relationship of *Amborotubus* to other nitidulines is unknown. It is similar in appearance to members of the Australian tribe Cychramptodini, but differs in many morphological details.

An inordinate number of loose ends remain in the classification and taxonomy of Nitidulinae due to the diversity of described species and genera that remain to be formally classified into tribes and the large number of undescribed genera and species. The classification currently in use is not supported by modern phylogenetic studies, a current catalogue does not exist, and new taxa are being described regularly. Some have been placed into new higher taxa (*i.e.*, Kirejtshuk 1998) but most have been included in poorly defined informal groups (see discussion in Leschen 1999). In spite of these problems, extraordinary discoveries require documentation because they may contribute to the resolution of some of these issues. Here we describe a new genus and species, *Amborotubus clarkei* Leschen and Carlton, and place it into the new monotypic tribe Amborotubini in the subfamily Nitidulinae.

***Amborotubus* Leschen and Carlton, new genus**
(Figs. 1–13)

Type Species. *Amborotubus clarkei* Leschen and Carlton, n. sp.

Diagnosis. Body tubulate and parallel-sided (Figs. 1–3). Head partially retracted into prothorax. Frons with a concave impression. Notch present above antennal insertion. Clypeus bilobed, transverse anterior ridge or bead absent. Epipharynx with two setose lobes that are visible in dorsal view extending slightly beyond labral margin



Figs 1–2. *Amborotubus clarkei*. 1) Dorsal habitus; 2) lateral view. Scale bars = 1 mm.

(Figs. 6–7). Antennal fossa contiguous with subclypeal area that is excavated with complex ridges. Mentum platelike and concealing prementum and maxillary lobes (Figs. 3, 9). Pronotal lateral carina asetose and explanate. Prosternum (Fig. 3) and hypomeron strongly concave anteriorly and posteriorly, with glabrous ocular rests lying in front of coxae. Notosternal sutures absent. Mesoventrite visible in ventral view; procoxal and prosternal rests absent. Ventrite 1 with relatively narrow intercoxal process. Femora and tibiae flattened and broad (Figs. 4–5); inside margin of femur with deep groove for insertion of tibia. Tarsal pads transverse and not well developed. Tip of pygidium exposed. Ovipositor with apical styli (Figs. 11–12).

Description. Length 3.9 mm. Body tubulate and parallel-sided (Figs. 1–3). Dorsum glabrous, venter with short decumbent golden setae. Head partially visible in dorsal view, partially retracted into prothorax (Figs. 2, 6); wider than long, and lacking a well defined neck; posterior edge dorsally with a pair of shallow incisions; vertex without carina; frons with a concave impression marked posteriorly with a transverse elongate line and anteriorly with a short transverse line; notch present above antennal insertion; frontoclypeal suture absent; clypeal apex bilobed with a deep notch, transverse anterior ridge or bead absent. Labrum articulated and visible between clypeal lobes; dorsally weakly carinate at middle; anteriorly excavated. Epipharynx with two well developed setose lobes, anteriorly protruding and visible in dorsal view (Fig. 7). Eyes weakly protuberant, entire; interfacetal setae absent. Antennae with scape longer than wide and longer than pedicel, which is shorter than antennomere 3; funicle short; club compact and setose. Antennal insertions

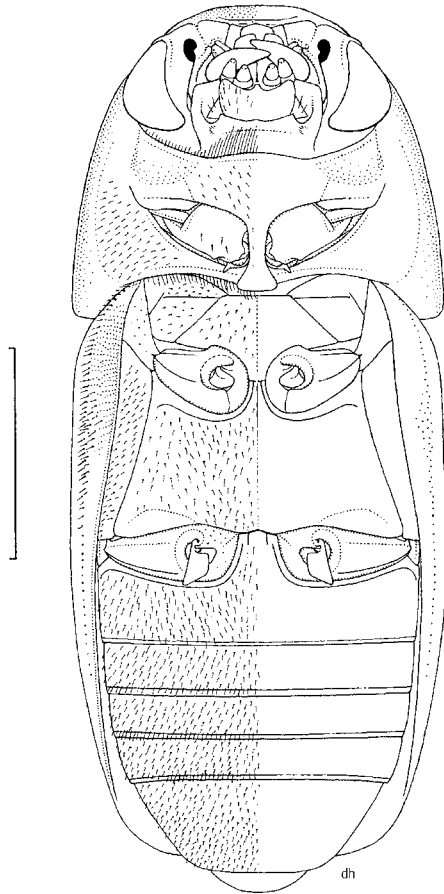
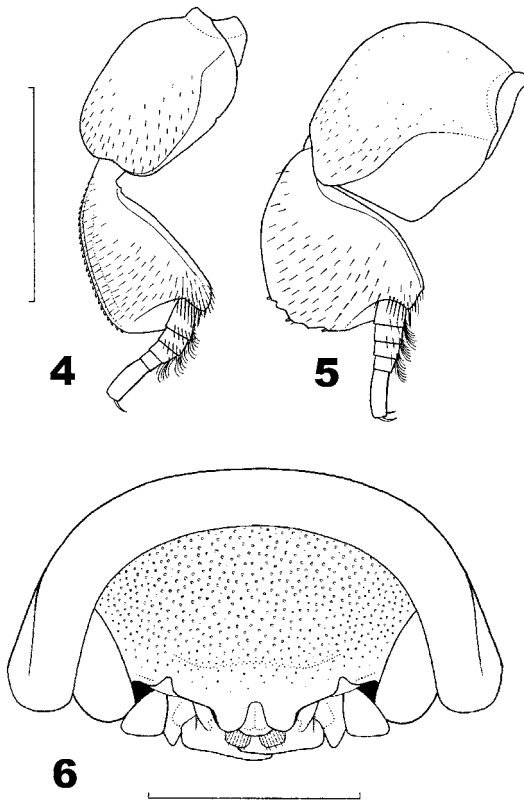


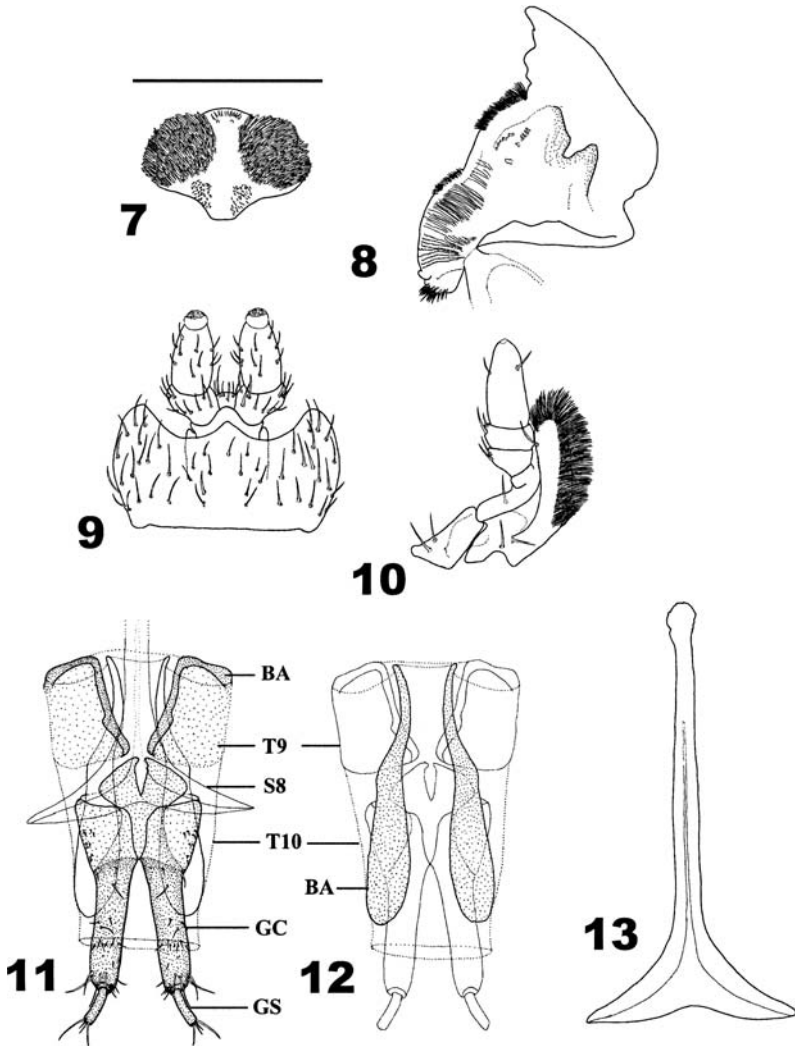
Fig. 3. *Amborotubus clarkei*, ventral habitus. Scale bar = 1 mm.

hidden from dorsal view; antennal fossa contiguous with excavate subclypeal area and possessing complex ridges; subantennal groove present and deep; bounded by eye and genae; genae produced well beyond mandibular articulations and apices slightly rounded. Gula extending only a short distance (not reaching level of eye). Posterior margin of head weakly excavate on each side of gular base. One pair of small transverse cervical sclerites present. Tentorium with deep apical pits present in antennal grooves; tentorial bridge bearing a well developed anterior median process. Mandible about equally as long as wide (Fig. 8); apex unidentate with subapical tooth lying in more or less the same horizontal plane; prostheca present, moderately setose; basal mola present and weakly dentate, striate. Maxilla (Fig. 10) and labium (Fig. 9) retracted below mentum; palpomeres elongate, about 2× as long as wide. Maxilla with narrow lacinia, width equal to that of terminal palpomere, lacking apical teeth, bearing a complete fringe of fine setae; terminal palpomere about 3× longer than combined width of palpomeres 1 and 2. Labium with prementum rather narrow, apex of ligula rounded; terminal labial palpomere about 3× longer than basal palpomere. Mentum platelike, transverse, lacking carinae, and concealing prementum and maxillary lobes; apical margin trilobed, with lateral lobes broader and longer than middle lobe. Pronotum about as long as wide, widest at base; disc convex; sides subparallel at basal 1/4; lateral carinae complete, visible from above, simple, without marginal bead, glabrous and explanate, more predominately so posteriorly; anterior



Figs. 4–6. *Amborotubus clarkei*. **4)** Anterior view of right front leg; **5)** anterior view of hind left leg; **6)** anterior view of head and pronotum. Scale bars = 1 mm.

angles not produced; posterior angles rounded; posterior margin straight, simple, without marginal bead. Prosternum and hypomeron strongly concave anteriorly and posteriorly, with glabrous ocular rests lying in front of coxae; prosternum at middle about as long as median length of prosternal process, moderately convex; anterior margin produced at middle. Notosternal sutures absent. Prosternal process parallel-sided, but abruptly expanded laterally at apex; apex with straight margin. Procoxal cavities transverse, closed externally by notal projections that fit into lateral expansions of prosternal process. Visible portion of scutellum transverse and apically angulate, about half as long as wide. Elytra about 1.5 times as long as wide and 2 times as long as pronotum; humerus absent; narrowly explanate throughout its lateral length, with margins visible above; epipleuron oblique with surface completely visible in lateral view; bearing a row of modified setae. Mesoventrite visible in ventral view; moderately convex at middle, rising ventrally at mesoventral process; procoxal and prosternal rests absent. Mesocoxal cavities narrowly separated by 1/5 width of mesocoxal cavity. Meso-metaventral junction simple, narrowly truncate. Metaventrite moderately short and convex, flattened at center; discrimen present throughout its length, but weakly indicated at middle; subcoxal area present with metaventral space (=axillary space) relatively narrow, delimited by a distinct line that originates at meso-metaventral joint and terminates near the lateral edge of the metaventrite; precoxal lines present and convex. Metacoxae narrowly separated 1/3 width of metacoxal cavity. Hind wing long and narrow, about 2 times longer than wide; anojugal lobe broad with anal notch distal from base, vein AP_{3+4} present; 3 veins present in medial field. Abdominal ventrites moderately convex; ventrites 1 and 2 connate; ventrite 1 with relatively narrow



Figs. 7–13. *Amborotubus clarkei*. **7**) Epipharynx; **8**) right mandible (dorsal view); **9**) mentum and labium (anterior-oblique view); **10**) right maxilla (ventral view); **11**) ventral view of ovipositor (retracted), tergite 9 (paraproct), and relative positions of sternite 8 and tergite 10; **12**) dorsal view of terminalia showing tergite 10 and relative positions of the ovipositor and tergite 9; **13**) sternite 8 (spiculum ventrale). Scale bar = 0.3 mm. BA = baculum, GC = gonocoxite, GS = gonostylus, S8 = sternite 8, T9 = tergite 9, T10 = tergite 10.

intercoxal process that is truncate apically, subcoxal bead present and well developed, lacking apical fringe of setae and membrane (which are present on remaining ventrites). Legs (Figs. 4–5) visible in lateral view, no part concealed by ventral extensions of the pronotum and elytra. Femora flattened and broad; inside margin with deep groove for insertion of tibia, sides of groove sharp; profemur with sides of groove of the same depth; meso- and metafemoral grooves with anterior carinae larger. Tibiae flattened and broad with rounded apices, fitting into grooves present on

femora, with posterior surfaces concave, outer edges spinate, inner edge with a bead, apices bispinate with subapical patches of setae and shallow tarsal insertions; protibia longer than wide, anterior face of protibia with outer submarginal lines (inside line weakly impressed); metatibia with length and width equal, anterior face of metatibia without submarginal lines. Tarsi 5-5-5, tarsomeres 1-4 together 1.4 times longer than tarsomere 5; tarsal pads transverse and not well developed. Tip of pygidium exposed.

Female Terminalia (Figs. 11–13). Sternite 8 with well-developed spiculum ventrale (Fig. 13); base broad and hyaline. Ovipositor with tergite 9 (paraproct, Fig. 11) largely membranous; anterior half quadrate and containing a pair of oblique baculi with extensions continuing dorsally a short distance along anterior rim; posterior portion rather diamond-shape and contacting the gonocoxite posteriorly; tergite 10 (proctiger, Fig. 12) membranous containing a pair of elongate baculi, broad apically and narrowed anteriorly; gonocoxite (Fig. 11) elongate and cylindrical; gonostylus present, 1/6 length of coxite.

Comments. *Amborotubus* is unusual within Nitidulidae. Many of the characters are unique, occurring nowhere else in the family (e.g., antennal fossa contiguous with excavated subclypeal area and labrum, maxillary lobes, prementum and bases of palpi retracted and concealed from view by mentum), which make it easy to recognize. It is superficially similar in appearance to some members of the Cychramptodini (Nitidulinae), a group limited to Australia, but these have the ventral pronotal and elytral edges sharp (the epipleuron completely hidden in lateral view) and other characters that distinguish the members of this tribe from *Amborotubus* (e.g., tarsal pads well developed, mesoventrite hidden in ventral view, etc.). Among the tribe Cychramptodini, *Amborotubus* most closely resembles members of *Cylindroramus* Kirejtshuk and Lawrence by its elongate body form with exposed pygidium, but members of this genus can be distinguished from *Amborotubus* by the legs hidden in lateral view. Some species of *Cylindroramus* have a deeply divided labrum that looks superficially like the epipharyngeal lobes present in *Amborotubus*, but this condition is quite widespread in the family. A notched or emarginate clypeus occurs in some Lawrenceosini and in *Ecnomaeus* (Cillaeinae), but in these, the notch is rather broad and not as deep and narrowed as it is in *Amborotubus*.

Outside of nitidulines, *Amborotubus* is similar to members of *Pityophagus* Shuckard (Cryptarchinae), but the typical Cryptarchinae characters (e.g., fused clypeus and labrum and presence of notosternal sutures) are absent in *Amborotubus*.

Etymology. The name is a combination of the prefix, *Amboro-*, named after the nearby park, Amboro Parque Nacional, established through the efforts of Robin Clarke, and the suffix *-tubus*, Latin for pipe and referring to the tubulate body shape.

Amborotubus clarkei Leschen and Carlton, new species

(Figs. 1–13)

Description. Total length = 3.9 mm. Body length/elytral width = 1.5. Body elongate and highly convex (Figs. 1–2); pronotal depth = 1.08 mm, depth at center of elytra = 1.00. Color of body red-brown. Surfaces glabrous and covered with punctures and microsculpture of points and meshes, microsculpture more pronounced on ventral surfaces, becoming somewhat lineate on flattened leg segments. Head with punctures separated by 1 diameter. Eye finely faceted, greatest length 14 facets, greatest width 24 facets. Pronotum about 0.7 times as long as wide (PL/PW = 0.72); punctures separated by 0.5–1.5 diameters, stronger at center; weak apunctate line present along midline. Hypomeron with anteromesal surface glabrous. Scutellum well developed; apically angulate. Elytra about 1.4 times as long as wide (EL/EW = 1.44) and 2 times as long as pronotum (EL/PL = 2.0); punctures separated by 1.0–1.5 diameters, weakly impressed and forming weak lines at apex; apices slightly rounded with inside corners angulate; epipleuron visible in lateral view, greatest width subequal to width of mesocoxa. Pygidium with punctation similar to that on head. Ovipositor with the apex of gonocoxite bearing 4 setae; apex of gonostyli bearing 4–5 setae (Fig. 11).

Comments. The holotype specimen was largely intact, but was missing the mesotibiae and tarsi. After drawings of the body were completed, the specimen was dissected so that the mouthparts and genitalia could be examined and drawn. Prior to dissection it was soaked in weak KOH that turned the cuticle darker than the original color. The head (and its appendages), right hind wing, and genitalia are preserved in glycerin and placed in a genitalia vial while the remainder of the specimen is pinned (two legs are pinned separately below the specimen). The paratype is complete and intact except for the pygidium and genitalia, which are in a glycerin vial.

The hindgut was mainly empty, apart from about 20 dark pigmented fungal spores lacking external features, in particular an apiculus, germ pore, or germ slit, which identifies them as an undetermined Ascomycete.

Type Material. Holotype (female, deposited in the Museo de Historia Natural “Noel Kempff Mercado, Santa Cruz de la Sierra, Bolivia): BOLIVIA: Santa Cruz, 3.7 km SSE Buena Vista, Hotel Flora & Fauna 405 m, 5-15-XI-2001 17°29.949’S; 63°33.152’W, M. C. Thomas & B. K. Dozier, tropical transition forest/ *Amborotubus clarkei* HOLOTYPE designated by R. Leschen & C. Carlton 2003 (red label)/. Paratype (female, deposited Louisiana State Arthropod Museum, Louisiana State University): BOLIVIA Santa Cruz, 4–6 km SSE Buena Vista F & F Hotel, 22–31 Oct 2002 Wappes and Morris/ ♀/ *Amborotubus clarkei* PARATYPE designated by R. Leschen & C. Carlton 2004, det. A. Cline 2004 (yellow label)/.

Etymology. Patronymic for Robin Clarke, conservation activist and owner of the Hotel Flora and Fauna where the specimen was collected. The species epithet honors Robin’s continuing fight to preserve Bolivia’s dwindling pristine habitats.

Biology of *Amborotubus*

The area surrounding the Hotel Flora and Fauna is situated in the Andean foothills 15 km east of the eastern Cordillera in the Department of Santa Cruz de la Sierra, Bolivia, and is part of the Amboró Protected Area and National Park. The immediate location is a complex transition zone of three forest types (based on classification of Holdridge *et al.* 1971): humid tropical Amazonian forest which extends to the northwest, Chiquitano Forest which is part of the Brazilian Cerrado extending north-eastwards, and elements of Chaco forest (or temperate humid forest, see Unzueta (1975) and Clarke and Sagot (1996)), lying to the south. Two light trap stations were set by the Thomas expedition and the catches from each were combined into one sample each night. One trap was set in the Chiquitano forest that starts 400 m to the east, covering the next ridge across the valley at the back of the hotel. The other trap was set in secondary tropical humid forest along a ridge extending from the hotel; but below the ridgeline is subtropical humid forest. *Amborotubus clarkei* could have flown to the light traps from any one of these forest types. Although the paratype label lacks collection method information, J. Wappes recalled that the specimen was collected at a light (A. Cline, pers. comm.).

The hindgut of *A. clarkei* contained fungal spores indicating that it has mycophagous habits, but its natural history is unknown. The unusual characters that are similar to members of Cychramptodini may provide clues to its biology (such as the tubulate body form, modifications of the head and legs), though the biology of Cychramptodini is also poorly known. *Cychramptodes murrayi* Reitter is a predator on scales (Farrel 1985) and Kirejtshuk and Lawrence (1992) suggested that other cychramptodines may have similar habits based on the presence of similar defensive adaptations, presumably against ants that tend the scales on which the beetles feed. Expanded tarsomeres and the highly convex body with the legs largely concealed below suggest that Cychramptodini may be active in exposed habitats, a feature that could be common to all species of the tribe. The legs, which are not concealed in lateral view, and the reduced tarsal pads are

features suggesting that *A. clarkei* may be active in confined habitats such as bark beetle tunnels, and possibly ant and/or termite nests.

Phylogenetic Placement of *Amborotubus*

Amborotubus is a member of Nitidulinae based on a variety of characters, including the separate labrum and clypeus and the pygidium (tergite 7) exposed in dorsal view with the remaining abdominal terga hidden below the elytra (most nitidulines). Nitidulinae is the largest subfamily consisting of over 900 species within nine formal tribes and several informal groups. Placing *Amborotubus* into one of these pre-existing groups is complicated because most have not been formally defined by synapomorphies through detailed cladistic analysis (see review in Leschen 1999). Based on the examination of many members and type genera of each of the tribes and the informal generic groups recognized in the literature, *Amborotubus* cannot be placed easily into any of these groups. *Amborotubus* possesses a relatively even mix of characters that are derived and primitive within Nitidulinae. Almost any group *Amborotubus* could be potentially placed in would have to be redefined significantly to encompass this odd mix of characters.

Amborotubus does come morphologically close to Cychramptodini (as stated above), especially tubular members of *Cylindroramus*. Its placement in the tribe could be argued, and is tempting since an Austral connection can be made between these two groups. But the morphological similarities among *Amborotubus* and Cychramptodini are based on convergent characters, some of which may be associated with specialized aspects of natural history. For example, in members of Cychramptodini the tibial apices have an apical fringe of spines that are absent in *Amborotubus*, and not all genera of Cychramptodini have flattened tibiae (*Miskoramus*). More importantly, many of the derived characters of Cychramptodini are absent from *Amborotubus*, or are shared with other members of Nitidulinae (e.g., the lack of a vertexal line is found also in Cylodini and Cybocephalini). Further, *Amborotubus* has many characters conflicting with its placement in the tribe along with some classic nitidulid plesiomorphies (mesoventrite fully exposed; epipleuron visible in lateral view, ovipositor with apical styli).

Therefore, rather than placing *Amborotubus* in Nitidulinae *incertae sedis*, or expanding currently recognized tribes to fit it into, we erect **Amborotubini, new tribe** for *Amborotubus*. The tribe Amborotubini can be defined based on the following diagnosis (supplemental characters listed in the diagnosis for the genus *Amborotubus*): epipharynx with two anterior setose lobes visible in dorsal view, mentum platelike and concealing prementum and maxillary lobes, pronotal lateral carina asetose, hypomeron with glabrous ocular rests, mesoventrite visible in ventral view, femora and tibiae flattened and broad, tarsal pads transverse and poorly developed, ovipositor with apical styli.

Obviously, a phylogenetic analysis of Nitidulinae is needed to test the limits of the tribes and to test the validity of informal groups and to ultimately place Amborotubini into a broader context.

Acknowledgments

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