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## RESEARCH ARTICLE

### A remarkable new genus and species of Lixini (Coleoptera: Curculionidae: Lixinae) from Madagascar

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**Abstract:** *Klassius* **gen. nov.** with type species *Klassius klassi* **sp. nov.** is described from Madagascar in tribe Lixini, and illustrated. The new genus is close to *Larinus* and related genera from which differs by its elytra triangularly shaped, humeri so strongly inflated as to appear as an hemispherical disc ventrally, prosternum with a faint trace of shallow rostral canal, base of elytra arcuate towards prothorax, metepimeron completely and metanepisternum partly concealed by elytra, lateral intervals angularly curved on abdominal ventrites and flattened. Relationships between close genera are briefly discussed.

**Key words:** New genus, new species, Lixini, Curculionidae, Madagascar.

## Introduction

Madagascar is an island, the fourth largest in the world, located in the western Indian Ocean neighbouring eastern tropical Africa. The island, one of the greatest tropical biodiversity center, is home to 250.000 species, 5% of the world plant and animal ones, of which more than 70% are Madagascan endemic. The newly discovered species is the latest addition to the already impressive array of biodiversity found in this globally-unique landscape (Thompson *et al.* 2011).

The weevils (Insecta: Coleoptera: Curculionoidea) are the most diverse animal superfamily in the Earth with about 62.000 species (Oberprieler *et al.* 2007). The subfamily Lixinae Schoenherr, 1823 is represented by about 1.200 species worldwide (Csiki 1934; Ter-Minassian 1967). The subfamily includes two tribes: Cleonini which have scrobes extending

almost to the apex of rostrum, and Lixini which have scrobes not usually reaching the apex of rostrum (Ter-Minassian 1967). According to Gültekin (2013a), there are two main ecological groups in the tribe, distinguished by their larval feeding habits and body shape, namely the first comprising inflorescence-inhabiting species (*Larinus* and allied genera) and having an oblong ovate body, and the stem-inhabiting species (*Lixus* and allied genera) having an elongate cylindrical body shape. The tribe comprises about 700 species (Csiki 1934) with 16 genera worldwide (Alonso-Zarazaga & Lyal 1999; Talamelli 2008; Gültekin 2012, 2013a, 2013b). The Lixini are most diverse in the Palaearctic with about 325 species (Gültekin & Fremuth 2013). Lixini are represented in the Afrotropical Region by 10 genera: *Afrolarinus* Gültekin, 2013, *Allolarinus* Gültekin, 2012, *Gasteroclisus* Desbrochers, 1904, *Hypolixus* Desbrochers, 1898, *Larinus* Dejean, 1821, *Lixus* Fabricius, 1801, *Microlarinus* Hochhuth, 1847, *Microlixus* Hustache, 1937, *Mycotrichus* Fairmaire, 1896, *Sublarinus* Petri, 1914 (Alonso-Zarazaga & Lyal, 1999; Talamelli, 2008; Gültekin 2012, 2013a, 2013b). Of these, *Mycotrichus* is a monotypical genus endemic of Madagascar. In addition, four species of *Larinus* of the subgenus *Hovalarinus* Hustache, 1956, and 35 species of *Lixus* are described from Madagascar (Hustache 1924; Csiki 1934), although the majority of them were placed traditionally in the genus of *Larinus* and *Lixus* without sufficient justification of their generic status.

During an investigation aimed to discover morphological characters on which to base a sound taxonomy of Lixini, a remarkable sample in the collection of the Senckenberg Natural History Collections of Dresden, was found among unidentified material. In this paper, a new genus of Lixini with a new species are described and compared with related genera.

## Material and methods

**Terminology:** Morphological terminology follows Lyal (1995, 2015), Morimoto (1962), and Thompson (1992).

**Measurements:** The specimen was measured using an ocular micrometer with a stereomicroscope Leica MZ75; body length was measured from anterior margin of eye to posterior margin of elytra; rostrum length from apex of rostrum to anterior margin of eye; prothorax length from apical margin to posterior margin of scutellar corner.

**Dissection:** The dry adult sample was placed in mild clean water overnight, genitalia dissected, muscle covering parts were left overnight in 10% KOH, cleaned with distilled water and 70% ethanol. Terminalia segments and genitalia were glued on a paper card under the pinned specimen from which they were dissected.

**Photographing:** Photographs of morphological characters were taken with a Canon EOS 70D DSLR digital camera attached to a Leica Z16APO macroscope provided with a ring LED light using EOS Utility software. The digital images were then imported into Adobe Photoshop 6.0 for stacking, and the program CorelDRAWX7 was used for labelling and plate composition.

**Collection:** The type is deposited in Senckenberg Natural History Collections, Dresden, Germany.

**Mapping:** The map is produced using Google Earth.

## Results

### *Klassius* gen. nov.

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**Type species:** *Klassius klassi* sp. nov. by present designation.

**Diagnosis:** Moderate-sized weevil, length 7.40 mm, width: 4.40 mm; body triangularly-elliptical (Fig. 1). Head spherical, eyes elliptical, lower apical margin not reaching scrobe, frons narrower than width of rostrum at base, interocular pit present, rostrum subcylindrical, scrobe not reaching anterior margin of rostrum (Fig. 2B). Antennal funicle 7-segmented, club spindle-shaped (Fig. 2E). Ventral surface of head with a deep fovea, occipital and subgenal sutures merged and raised, scrobe not contiguous ventrally at base of rostrum (Fig. 2C). Labial palp 2-segmented, reduced and not passing ligula. Prothorax almost subtrapezoidal, apical fourth collar-shaped, ocular lobes widely triangular, anterior margin of prosternum U-shaped and emarginate internally (Fig. 2A, D), prosternum with trace of shallow rostral canal (Fig. 2D) with not elevate edges, intercoxal process reaching base of coxae with obtuse apex. Procoxal cavities contiguous and procoxae touching each other, hypomerall lobe formed by three raised tubercles behind procoxae, center of tubercles canaliculate. Scutellar shield concealed, mesoventrite strongly raised toward base of metaventrite and with wide truncate apex. Posterior margin of metaventrite deeply emarginate and V-shaped. Metepimeron completely, metanepisternum partly concealed by elytra. Elytra triangular in shape, basal margin arcuate in the form of wide subtriangular plate, humerus strongly inflated (Fig. 1, 2A). Elytral striae formed by subrotundate separated punctures, surface of interstriae transversely wrinkled, lateral interstriae angularly bent on abdominal ventrites and flattened. Legs stout, trochanter subtriangular, femora edentate, inner margin of tibiae with a series of denticles, tarsi pseudotetramerous, pretarsus with two claws. Abdominal ventrites nearly flat. Male tergite VIII subtrapezoidal, sternite VIII contiguous, penis tubular.

**Etymology:** The name of new genus "*Klassius*" refers to the surname of Dr. Klaus D. Klass of the Senckenberg Natural History Collections of Dresden.

### *Klassius klassi* sp. nov. (Figs 1-3)

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**Measurement.** Body length 7.40 mm, width 4.40 mm. Rostrum: length 1.50 mm, width 0.80 mm. Interocular area: width 0.60 mm. Eyes: length 0.55, width 0.35 mm. Prothorax: length 2.10 mm, width 2.80 mm. Elytra: length 4.70 mm, width 4.50 mm.

Integument shining black, anterior margin of prothorax bright chestnut-brown, anterior margin of rostrum, mandibulae, apical part of trochanter, base of scape and apical half of claws dark-brown. Body vestiture of sparse whitish-grey pubescence on dorsal surface (Fig. 1), semi-erect hair-like scales are on legs and funicle (Fig. 2E). Ventral surface clothed with somewhat longer and denser hairs (Fig. 2A). Ventral surface of head with dense sword-shaped whitish scales (Figs 2C, D), of which few are bifurcate.

Head spherical, temple sloped posteriorly and convex, surface minutely and densely punctured, interocular pit distinct, small and deep. Eyes weakly convex, 19 facets present along an ideal line across their widest part. Frons raised anteriorly immediately after forehead, surface flattened medially up to antennal insertion. Surface of forehead and frons



**Figure 1.** *Klassius klassi* sp. nov. holotype, dorsal view.

minutely and densely punctured, frons longitudinally subsulcate. Rostrum shorter than prothorax and subequal in width to profemora, in dorsal view (Fig. 2B) subcylindrical, gradually and very slightly narrowed from base to apex, this 0.92× as wide as base. Ventral

margin of scrobes partly visible dorsally, scrobes distinctly narrowed beyond antennal insertion and inclined internally. Rostrum in lateral view almost straight, epifrons nearly flat, surface minutely punctured. Antenna (Fig. 2E) inserted at  $0.35\times$  the length of rostrum from apex, scape slightly curved dorsoventrally, depressed and  $0.85\times$  as long as funicle, gradually widened from base to apex,  $2.0\times$  as wide as at base and club-shaped, funicular segment 1 asymmetrically subtriangular,  $1.20\times$  as long as and  $1.50\times$  as wide as 2, segments 2 to 7 subconical, 2  $1.50\times$  as long as 3, 3 and 4 as long as wide, 5 to 7 transverse and gradually widened, 7  $1.25\times$  as wide as 6 and  $1.50\times$  as 5. Club elongate,  $1.65\times$  as long as wide.

Prothorax (Fig. 1) subtrapezoidal, basal margin triangularly arched toward elytra, lateral margins gradually narrowed from base to immediately before the abruptly narrowing anterior collar. Pronotum strongly convex, pronotal disc almost flat, distinctly sloping on sides, depressed on antero-lateral third. Surface of pronotum coarsely and densely punctured, intervals of subrounded punctures raised, shining and with sparse micropunctures. Anterior margin of pronotum almost straight behind temples, very slightly and roundly emarginate along lateral declivity, behind eyes with wide triangular ocular lobes.

Elytra (Fig. 1) triangular, base of interstriae 2-6 arched in the form of a triangular plate toward the base of pronotum, humerus strongly inflated on intervals 6-11 making in the form of a somewhat hemispherical disc ventrally (Fig. 1, 2A). Lateral margins of elytra widely and angularly widened from base to hemispherical discal area, behind disc roundly and widely emarginate, beyond basal half gradually, then angularly narrowed toward posterior apex. Preapical prominences distinct, formed by the end of interstriae 4-7 joined, behind prominences transversely depressed. Odd interstriae slightly wider than even ones, surface transversely wrinkled around the large punctures of elytral striae, interstriae 1 and 2 transversely depressed behind scutellar angle. Interstriae formed by separated large ovate punctures, hemispherical discal area lacking punctures.

Legs stout, femora weakly curved, slightly swollen at middle; tibiae curved (Fig. 1, 2F), inner (ventral) margin bearing a series of premucrones, two of them distinctly larger near unculus; apical comb of setae densely sorted. Apical comb of setae of meso- and metatibia nearly twice longer than protibial one. Tarsi stout, segment 1 triangular with asymmetrical base, segment 2 trapeziform, 3 bilobed, 4 reduced and placed among lobes of 3, segment 5 subcylindrical, curved, gradually widened from base to apex. Segment 1  $1.50\times$  as long as 2; segment 5  $0.80\times$  as long as 1 to 3 combined. Claws curved, connected basally.

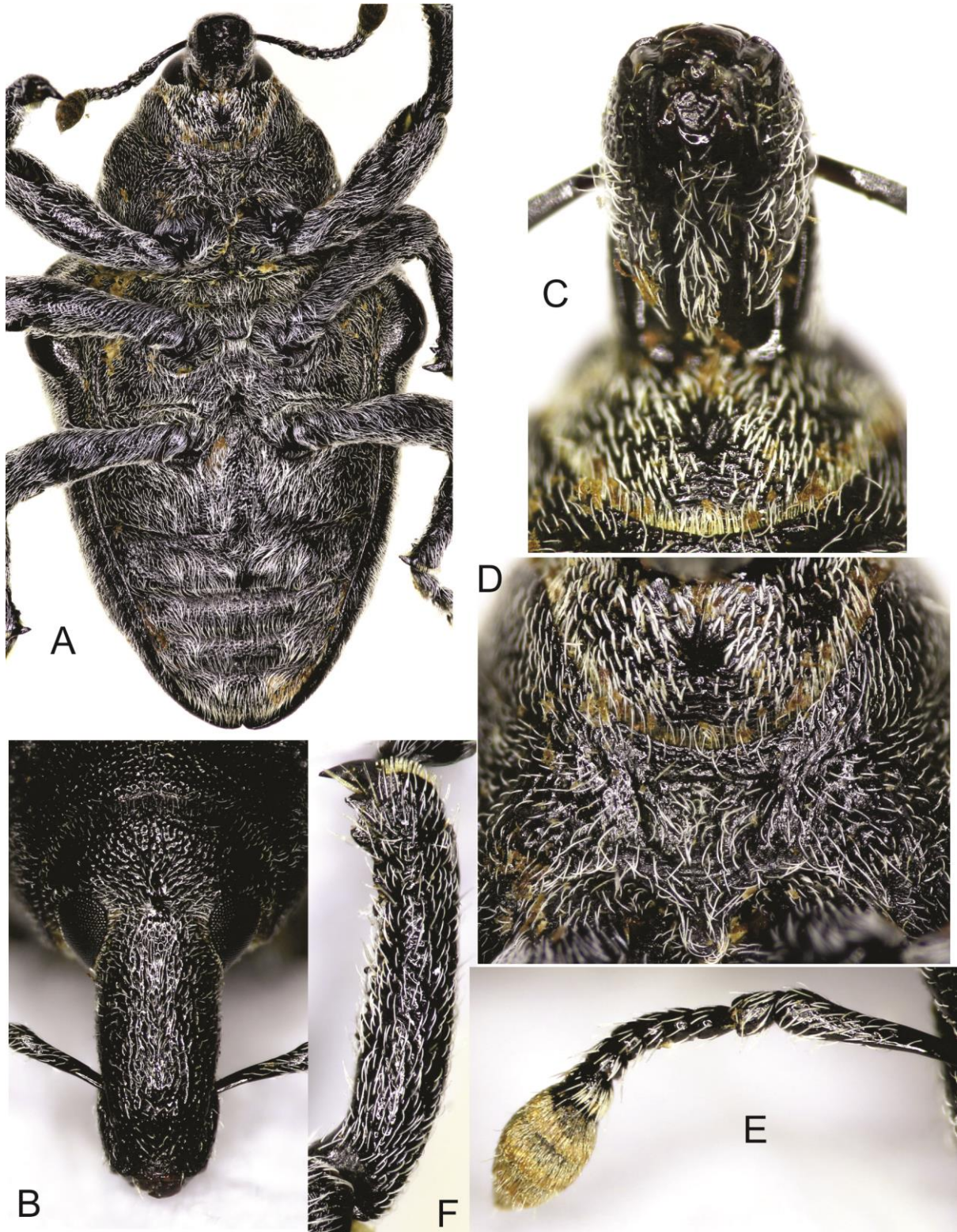
Ventrites nearly flat, 1 depressed medially,  $1.35\times$  as wide as 2 and subequal in width to 3+4, last one trapezoidal and subequal in width to 2.

Tergite 8 subtrapezoidal (Fig. 3A) and well sclerotized, surface of basal half bare, apical half densely clothed by whitish hairs and bifurcate scales; sternite 8 trapeziform (Fig. 3B), hemisternites of it contiguous, posterior-lateral margin bearing a series of sparse hairs, spiculum gastrale (Fig. 3E) in form of a stick, slightly curved, subequal in length to penis.

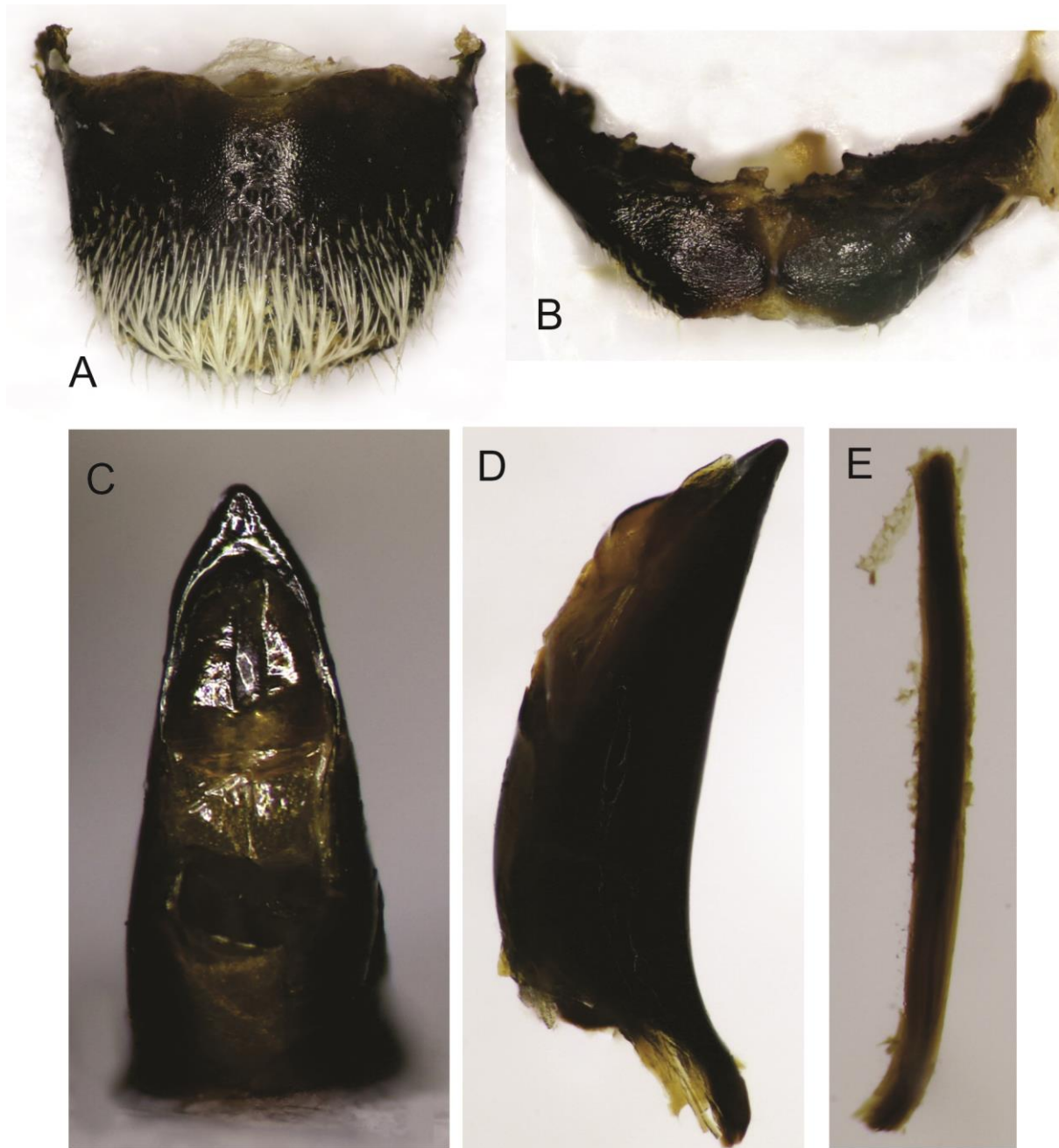
Penis tubular and stout, dorsal wall membranous, lateral and ventral walls well sclerotized, in dorsal view (Fig. 3C) lateral margins gradually narrowed, moderately swollen medially, ventral plate triangular, in lateral view (Fig. 3D) curved and gradually narrowed from base to apex.

**Etymology:** The new species is named for honor of Dr. Klaus D. Klass of the Senckenberg Natural History Collections, Dresden, Germany as a sign of my friendship.

**Type material:** Holotype ♂, MADAGASCAR: "Fianarantsoa, Madagascar" (Fig. 4) printed, "Samml. K. F. Hartmann, Ankauf, 1941.l", printed on blue paper, "Stadl. Museum für Tierkunde, Dresden", printed.



**Figure 2.** *Klassius klassi* sp. nov. (holotype). **A**, ventral view of body; **B**, rostrum, dorsal view; **C**, ventral view of rostrum and head; **D**, prosternum with median rostral canal; **E**, antenna; **F**, protibia.



**Figure 3.** *Klassius klassi* sp. nov. (holotype). **A**, tergite VIII; **B**, sternite VIII; **C**, penis, dorsal view; **D**, penis, lateral view; **E**, spiculum gastrale.

## Discussion

**Tribal placement and comparison with related genera:** The reduced labial palp behind ligula and contiguous procoxal cavities allow the new genus to be included in the subfamily Lixinae, and the shape of scrobes which do not reach apex of rostrum places it into the tribe Lixini. General body shape of *Klassius* makes it similar to *Larinus* Dejean, 1821 and related genera. Distinctive characters of the new genus are triangular-elliptical body shape, triangular elytra, strongly inflated humeri making hemispherical disc, superficial rostral canal on prosternum, and anteriorly prolonged elytral base. Triangular elytra resembles those of the

Madagascan *Hovalarinus* Hustache, 1956 which was described (Hustache 1956) as a subgenus of *Larinus* and placed as a synonym of it by Alonso-Zarazaga & Lyal (1999). Although beyond the scope of current paper, this taxon deserves to be promoted at subgeneric or generic level, and its revision is in preparation. Despite this, humeri of *Hovalarinus* are not in the form of kind of disc, and their swollen part does not reach marginal interstria 11, behind scutellar corner the depressed base of disc of elytra is M- or X-shaped, and prosternum does not show any trace of rostral canal. Rostral canal with raised edge is well developed on prosternum in the Palaearctic genus *Bangasternus* Gozis, 1882 (Lixini) (Ter-Minassian 1967; Colonnelli & Whitehead 1990), but *Klassius* cannot be confused with any member of this genus which have body much smaller and subcylindrical. The characters of anteriorly prolonged convex elytral base and distinct swollen humerus are shared with the Afrotropical molytine *Alcidodes brevirostris* (Boheman, 1836), but of course this species is strikingly different already by its separate procoxal cavities, wide scutellum shield, dentate femora to be in no way possible to confuse it with *Klassius*. Narrow interocular area and large elytral stria punctures of the new genus resemble those of the Oriental *Larinodontes* Faust, 1898, however the latter has dentate femora and without rostral canal on prosternum (Gültekin & Lyal 2014). Another Madagascan endemic genus, *Mycotrichus* Fairmaire, 1896 currently comprised in Lixini, differs from the new one according to Fairmaire (1896) by its vestiture with long erected tuft of hairs, prothorax strongly sinuate on each side at the base and with very strong median lobes completely covering shield, elytra strongly lobed at the base and slightly indented before shoulder, mesosternum very narrow, intercoxal projection broad and obtusely rounded, femora thick, and last tarsomere short. However, the tribal position of *Mycotrichus* is still unclear.



Figure 4. Type locality of *Klassius klassi* sp. nov. in Madagascar.



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