

A new subspecies of *Boletoxenus mixtus* Grimm, 2014 (Coleoptera: Tenebrionidae: Tenebrioninae)

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Telnov D. 2023. A new subspecies of *Boletoxenus mixtus* Grimm, 2014 (Coleoptera: Tenebrionidae: Tenebrioninae). *Baltic J. Coleopterol.*, 23(2): 295 - 300.

Boletoxenus mixtus dynastes ssp. nov., a new subspecies of mycetophagous Bolitophagini darkling beetles from mainland SE Asia, is described and illustrated.

Key words: Taxonomy, Malay Peninsula, mycetophagous darkling beetles

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INTRODUCTION

The tenebrionid genus *Boletoxenus* was erected by Motschulsky (1858:63) to hold *B. gibber* Motschulsky, 1858 from ‘Birma’ (now Myanmar), the type species of the genus by monotypy. The genus is currently attributed to Bolitophagini W. Kirby, 1837 of Tenebrioninae Latreille, 1802 (Tenebrionidae Latreille, 1802) (Bouchard et al. 2021). About 25 species were subsequently placed to *Boletoxenus* (e.g., Gebien 1914, 1922, 1925, 1944; Kaszab 1965; Masumoto 1982; Masumoto & Akita 2001, 2003; Masumoto et al. 2008; Ando & Yamasako 2013; Grimm 2014; Ando et al. 2022 and other). The genus is distributed from the eastern Palaearctic (seven species are restricted to SE India (Arunachal Pradesh), Japan including the Ryukyus, Primorsky Krai of Russia including Sakhalin and the southern Kuril Islands, and Taiwan; Iwan et al. (2020)) to the Greater Sunda Islands (not

recorded from Java and Sulawesi), the Philippine Archipelago, Indian Subcontinent and most of the mainland SE Asia (e.g., Gebien 1944; Grimm 2014 and other). *Boletoxenus* are known as saproxylo-mycetophagous darkling beetles with larvae developing in sporophores of various species of wood-decaying fungi (e.g., Jung 2012 and references therein).

The aim of the present paper is to present description of *Boletoxenus mixtus dynastes* ssp. nov., a new subspecies from Peninsular Malaysia.

MATERIAL AND METHODS

Paired morphological structures are generally treated as singular in text. For morphological studies, a Leica S6D binocular stereomicroscope (Leica Microsystems, Wetzlar, Germany) was used. Habitus images were

produced with a Canon EOS 77D SLR camera (Canon Co., Tokyo, Japan) and a Canon MP-E 65 mm macro lens (Canon Co., Tokyo, Japan). Helicon Focus 7 software (Helicon Soft, Kharkiv, Ukraine) was used for image stacking. Further image manipulations were done using GNU Image Manipulation Program (GIMP).

Label text is reproduced *verbatim*. All type specimens of the new subspecies are provided with a black framed label on red paper with “HOLOTYPUS” or “PARATYPUS”, respectively. Labels, if more than one on the same specimen, are separated by a double slash. Author’s comments are placed in square brackets.

The material discussed below is housed in the following collections:

BMNH – Natural History Museum (former British Museum, Natural History), London, United Kingdom;

DTC – Collection Dmitry Telnov, Rīga, Latvia;

NME – Naturkundemuseum Erfurt, Germany;

ZIN – Zoological Institute Russian Academy of Sciences, St. Petersburg, Russia.

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RESULTS

Boletoxenus mixtus dynastes ssp. nov.
(Figs 1–3)

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Type material designated. Holotype male ZIN: W Malaysia Perak E Taiping 0–100m 7. 02. 1999 Kurbatov [printed, black frame] // *Bolitoxenus* [sic!] sp. n.! [handwritten] det. O.Merkl [printed], 2003 [handwritten]. Paratypes 3 females. 1 specimen BMNH, 1

DTC, 1 NME: same locality label as holotype.

Derivatio nominis. Named after *Dynastes* Macleay, 1819, a genus of enigmatic gigantic American beetles, to highlight the visual similarity of processes (often referred as ‘horns’) of male head and pronotum in the new taxon with those in males of some *Dynastes* species. Noun in apposition.

Measurements. Holotype male, total body length including epistomal and pronotal processes 8.3 mm. Head including epistomal process 1.4 mm long, maximum width across canthus 2.05 mm. Pronotum including anterior process 3.1 mm long, without process 2.2 mm long, maximum width across base 3.5 mm. Elytra 4.5 mm long, maximum width across basal third 3.6 mm. Female paratypes 6.8–7 mm long.

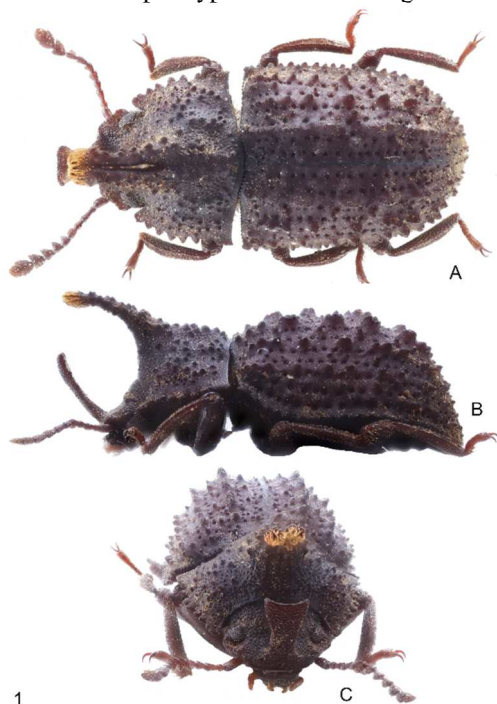


Fig. 1. *Boletoxenus mixtus dynastes* ssp. nov. holotype male. A – Habitus, dorsal view; B – ditto, lateral view; C – ditto, anterior view [not to scale].

Description. Holotype male (Figs 1, 3). Dorsum and venter entirely dark brown. Maxillary and labial palpi, antenna and legs reddish brown. Terminal setae of prothoracic processes pale rufous. Body moderately elongate-elliptical, strongly convex in dorsal aspect, opaque to subopaque. Head transverse, somewhat flattened on frons in dorsal aspect. Labrum anterior margin subtruncate. Epistoma separated from frons by weak suture. Epistoma with a long, irregularly transversely rugulose, apically slightly widened and subtruncate to shallowly emarginate process directed anterodorsad; apex of epistomal process with a row of short erect pale rufous setae. In lateral aspect, epistomal process very slightly arched. Back of epistomal process slightly concave, covered with short erect setae. Length of epistomal process 1.7 mm or lightly shorter than length of lateral margin of pronotum (~1.8 mm). Frons anterior to eyes slightly depressed, irregularly punctate, intervening spaces subopaque, microstriate. Vertex and occiput with irregularly pentagonal punctures with strongly raised, narrow intervening spaces. Gena flattened in dorso-ventral aspect, produced laterad in front of compound eye. Genal canthus rather strongly protruding from lateral outline of head, partially concealing basal antennomere. Frons with narrow, short, subacute supraocular ridge, shortly concealing inner eye margin from above. Compound eye strongly reniform, rather short, not protruding from lateral outline of head. Dorsal cranial setae pale rufous to yellowish, inconspicuous, short and sparse leaving large areas of head glabrous. Antenna extending towards base of elytra, antennomeres 6–11 compose flattened club. Antennomere two strongly transverse, short. Antennomere three about 2.3–2.4× as long as second antennomere. Antennomeres 5–9 strongly asymmetrical, each with subtriangular lobe at anterior margin. Antennomere 9 asymmetrical, emarginate

apically to accommodate less wide basal portion of terminal antennomere. Terminal antennomere elliptical, apically rounded, about 0.8–0.9× as long as maximum length (including lateral lobe) of penultimate antennomere. Terminal maxillary palpomere subcylindrical, slightly arched, apically subtruncate. Terminal labial palpomere subcylindrical, slightly arched, apically rounded. Pronotum widest in basal third, transverse, opaque, convex in dorsal aspect, gently sloping laterad. Pronotal disc in anterior half with paired, slightly arched and nearly fused median process directed anteriorly. Suture between two processes narrow but distinct, processes nearly conjoining in apical part, here with a brush of long and dense pale rufous anteriorly-pointed setae. Length of pronotal process 1.7–1.8 mm (apical setation not included). Lateral and dorsal surface of a process with irregular, subacute conical tubercles, inner margin (facing another process) nearly smooth. Anterior pronotal margin broadly emarginate, anterolateral angles produced anteriorly, nearly right-angled, indistinctly bifurcate, meets with canthus and encircles corresponding compound eye when head is retracted into pronotum. Basal pronotal margin slightly concave medially, shallowly emarginate laterally (bisinuous), somewhat narrowly flattened, non-punctate or tuberculate. Posterolateral angle acute-angulate, slightly produced posteriorly. Lateral margin of pronotum explanate, slightly narrows anteriorly, with a row of eight acute denticles (counting also denticle on each antero- and posterolateral angles). Pronotal disc except at anterior margin with irregular, variably sized subacute conical tubercles and much smaller punctures of variable size on intervening spaces between tubercles. Tubercles posterior to pronotal processes arranged into two rows from base of processes towards nearly base of pronotum; small, shallow, non-tuberculate depression each side of these rows. Near anterior margin pronotum is with numerous

subparallel longitudinally sulci. Intervening spaces microstriate. Prothoracic hypomeron rather coarsely punctate with opaque intervening spaces, non-tuberculate. Pronotal setation inconspicuous, generally as that on head. Scutellar shield subtriangular, opaque, glabrous. Elytra about 1.2–1.3× as long as combined wide, laterally slightly constricted posteriad, convex in dorsal aspect. Anterior margin of elytron with numerous short notches all along except on humeral area. Humerus near right-angled, humeral callosity small but distinctly convex. Elytral disc with series of conical tubercles of variable size and height. Four rather high, acutely-ridged, three- to multifurcate (in lateral profile) tubercles each side of and some distance from suture. Remaining tubercles comparatively smaller, with single peak in lateral profile. Lateral margin of elytron densely denticulate; denticles somewhat smaller and denser than those on lateral margin of pronotum. Lateral margin of elytron slightly sinuous in lateral view. Intervening spaces between tubercles with variably large circular punctures; on each elytron punctures arranged into nine longitudinal rows strongly interrupted and disorganized by tubercular pattern of elytral dorsum. Intervening spaces between punctures microstriate. Elytral setae inconspicuous, narrowly scale-like, very sparse, suberect. Suture not or barely raised. Epipleuron wide, extending towards elytral apex, strongly narrows at inner sutural angle. Metathoracic wings fully developed. Mesoventrite V-shapely impressed to accommodate prosternal intercoxal process. Intercoxal process of first visible abdominal ventrite wide, apically widened, slightly convex in ventral aspect. Legs moderately long. Femur not clavate, densely transversely rugulose, distinctly surpassing beyond lateral margin of elytron. Each tibia dorsally with three complete carinae. Terminal tarsomere thickened, slightly arched, distinctly longer than combined length of remaining tarsomeres. Pretarsal claws with short empodium. Male last visible tergite yellowish, broadly

rounded at apical margin. Male last visible ventrite broadly rounded at posterior margin. Aedeagus as in Fig. 3, apicale of is entire, not bifurcate in dorsal view.

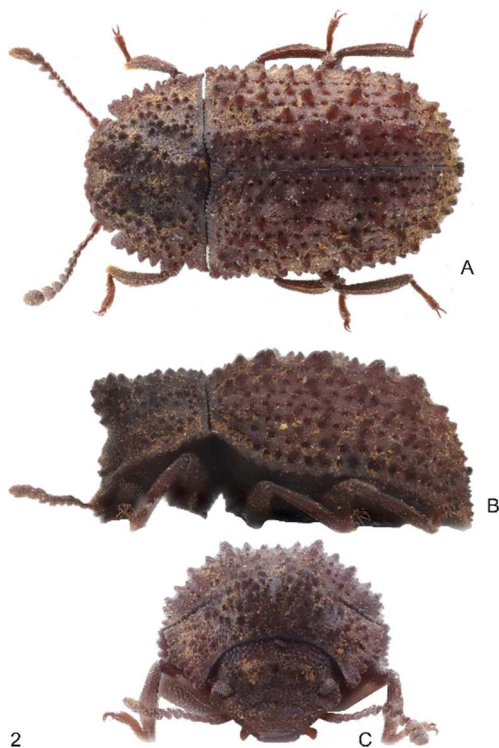


Fig. 2. *Boletoxenus mixtus dynastes* ssp. nov. paratype female. A – Habitus, dorsal view; B – ditto, lateral view; C – ditto, anterior view [not to scale].

Sexual dimorphism. Female (Fig. 2) generally smaller than male. Epistoma with transverse, medially somewhat depressed costa. Frons with two pairs of tubercles at mid-length of compound eye and posterior to that; posterior pair stronger prominent dorsal and stronger transverse ridge-like. Antennomeres 5–9 with distinct subtriangular lobe. Paired pronotal process short and broad, moderately widely separated, covered with dense, acutely conical tubercles. No regular rows of tubercles posterior to base of pronotal processes. Lateral margin of elytral more regularly subparallel, comparatively

less strongly constricted apicad, stronger rounded at apex. Femur slightly surpassing beyond lateral margin of elytron, its apex visible in dorsal view.



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Fig. 3. *Boletoxenus mixtus dynastes* ssp. nov. holotype male, aedeagus. A – Dorsal view; B – Ventral view; C – Lateral view.

Differential diagnosis. The new subspecies is similar to some congeners but specifically different primarily in the combination of the very closely positioned pronotal processes and the long, apically widened epistomal process. Pronotal processes are closely positioned in the Bornean *Boletoxenus mixtus mixtus* Grimm, 2014, *B. spathifer* Gebien, 1925 and *B. spectabilis* (Gebien, 1914), but the epistomal process absent in the male of the latter and the pronotal processes widely separated in *B. spathifer* which do possess a long epistomal process. The nominative *B. mixtus mixtus*, known only from males, has the intercoxal process of the first visible abdominal ventrite convex in ventral aspect (flattened in *B. mixtus dynastes* ssp. nov.), the presutural row of elytral punctures is distinctly impressed (not so in *B. mixtus dynastes* ssp. nov.) and the apicale of the ae-

deagus distinctly bilobate, with a dorsal median suture (see Grimm 2014 fig. 8a) (the apicale of the aedeagus is entire in *B. mixtus dynastes* ssp. nov., lacking the median suture), the length ratio of the basale to apicale is about 4.1 in *B. mixtus dynastes* ssp. nov. versus about 4 in *B. mixtus mixtus*.

Ecology. Occurs in lowland rainforests; collected from an unidentified sporophore (S. Kurbatov, pers. comm.).

Distribution. So far only known from Perak State in Peninsular Malaysia. The nominative subspecies is known from E and SE Borneo (East Kalimantan & Sabah provinces).

Note. The elytral length to width ratio in *Boletoxenus mixtus mixtus* is described as 1.1 (Grimm 2014: 185) but in fact is about 1.3 according to the specimen figured in the original description (Grimm 2014 fig. 8).

ACKNOWLEDGEMENTS

The author is indebted to Sergey Kurbatov (Moscow, Russia) for providing the highly interesting material for study. Kiyoshi Ando (Entomological Laboratory, Ehime University, Matsuyama, Japan) and Enrico Ruzzier (Department of Science, Università Roma Tre, Roma, Italy) are thanked for valuable comments on the new subspecies. Anonymous reviewers are acknowledged for improving the overall quality of the manuscript.

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Received: 22.04.2023

Accepted: 08.12.2023.