Zootaxa 5446 (1): 077–087
https://www.mapress.com/zt/

Article

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

https://doi.org/10.11646/zootaxa.5446.1.4
http://zoobank.org/urn:lsid:zoobank.org:pub:A2CC8E7D-0766-4EC7-80F6-412A269E465D

New taxa of Afrotropical Toktokkies (Coleoptera: Tenebrionidae: Molurina) from the Natural History Museum of Basel

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Abstract

Investigation of the darkling beetle (Tenebrionidae) specimens from the Natural History Museum Basel (Switzerland) resulted in the discovery of two new species of Afrotropical toktokkies (tribe Sepidiini). Both taxa provided novel morphological data which, in the light of previously acquired molecular evidence, challenged the taxonomic coherence of the genus *Dichtha*. To accommodate this information a new genus *Bouchardium* **gen. nov.** is hereby proposed. The three following species were assigned to this new genus: *Bouchardium chillygonzalesi* **sp. nov.** (type species), *B. cubicum* (Guérin-Méneville, 1845) **comb. nov.** (transferred from *Dichtha*), *B. mariae* **sp. nov**. The placement of *Bouchardium* within the subtribe Molurina is briefly discussed. Additionally, a new species of the genus *Toktokkus* (*T. zofiae* **sp. nov.**) is described from South Africa.

Key words: darkling beetles, Sepidiini, Natural History Museum Basel, species discovery

Introduction

Due to its worldwide coverage and taxonomic diversity, the Frey Beetle Collection—housed in the Natural History Museum Basel, Switzerland (NHMB)—constitutes one of the most important holdings of darkling beetle (Coleoptera: Tenebrionidae) specimens in the World (Sprecher-Uebersax *et al.* 2013). It contains entomological exemplars collected by prominent specialists such as Hans Gebien (1874–1947) and Carl Koch (1904–1970) (Schawaller 2018, 2020). It is also home to countless name-bearing type specimens concerning the family (e.g., Iwan 2002, Kamiński 2011, Kamiński *et al.* 2019). Furthermore, despite being relatively well studied, the collection still holds a vast amount of undescribed taxa. The specimens of the afrotropical tribe Sepidiini, informally referred to as toktokkies (Kamiński *et al*. 2019), constitute an especially good example. Namely, several undescribed taxa representing this group were labeled in the collection by Koch as new species but never officially introduced within the framework of zoological nomenclature.

Despite recent phylogenetic efforts (Kamiński *et al*. 2019, 2021, 2022, Gearner *et al*. 2022), the taxonomy of Sepidiini remains insufficiently studied. This is reflected in the unstable nature of some of the most iconic genera representing this group, such as *Psammodes* Kirby, 1819, which was drastically revised due to recent verification of the type materials (see Kamiński *et al*. 2022). Several problems are linked to this state of things; however, the following two seem to contribute most importantly. Primarily, many of the over 1,000 species representing Sepidiini were described without consulting the type materials of the taxa introduced before. This created a chain of events, in which initial misidentifications became a foundation for subsequently introduced taxonomic decisions. At the species level, this contributed to the introduction of countless synonyms (Kamiński *et al*. 2019), while at the generic level, it led to the incoherence of the currently designated genera. Secondly, as revealed by Kamiński *et al*. (2021) for the genus *Toktokkus* Kamiński & Gearner, 2021, the observable morphological diversity of some lineages representing toktokkies is extremely hard to grasp within the species-level categories. This often leads to the taxonomic over-splitting of some populations and description of narrowly defined species/subspecies known from single collecting events.

As the type materials concerning toktokkies are dispersed throughout at least 59 institutions worldwide (Kamiński

Accepted by M. Lillig: 26 Mar. 2024; published: 29 Apr. 2024

et al. 2019), a comprehensive treatment of all the species at once is currently challenging. Nevertheless, in light of the presently available molecular and morphological data (Kamiński *et al.* 2021, 2022, Gearner *et al.* 2021), partial generic revisions seem to be an efficient way of improving the overall taxonomy of Sepidiini. The primary long-term goal of the author is to propose well-distinguishable genera that will be the foundation for subsequent alpha taxonomic studies. The main driver for the present paper was the discovery of two new species tentatively assigned to the genus *Dichtha* Haag-Rutenberg, 1871. This newly identified material was used to test the coherence of the generic concept *Dichtha*. Additionally, a new species of *Toktokkus* has been identified and described below.

Material and methods

The specimens of the newly described species were identified within the Frey Beetle Collection in NHMB. However, a few additional specimens were found in the entomological collection of the Museum and Institute of Zoology Polish Academy of Sciences, Warsaw, Poland (MIZ PAN), and the private collection of Martin Lillig, Saarbrücken, Germany (MLPC). Additional reference material for the investigation presented below originated from several entomological collections of the world, such as the Ditsong Museum in Pretoria, South Africa, the Natural History Museum in London, United Kingdom, and the Muséum National d'Histoire Naturelle in Paris, France. A full list of investigated collections can be seen in Appendix S2 in Kamiński *et al*. (2021). Description style and morphological terminology follow that of Kamiński *et al*. (2022). Original label data for specimens are given in quotation marks and separated by a comma. Images were taken using a Canon 77D body with a Canon EF 100 mm macro lens. The distribution of species was illustrated using QGIS version 2.4. Distributional records for previously recognized species were taken from Kamiński *et al.* (2019, 2021) and https://www.inaturalist.org/ *via* GBIF. In the latter case only records with voucher photographs were selected (GBIF.org 2023). Country-level records were not mapped.

Taxonomy

Bouchardium **gen. nov.**

Type species. *Bouchardium chillygonzalesi* **sp. nov.**; here designated.

Diagnosis. The specific structure of the prosternum (elongate and projecting tip of prosternum, in lateral view, Figs 1A, 3F, K), elytra (presence of sharp lateral costae, Figs 1–3), and scutellum (apex with deep transverse grooves, Fig. 3A–C) place *Bouchardium* close to the following genera (Kamiński *et al.* 2021, Gearner *et al.* 2022): *Amiantus* Fåhraeus, 1870, *Arturium* Koch, 1951, *Brachyphrynus* Fairmaire, 1882, *Dichtha, Distretus* Haag-Rutenberg, 1871, *Euphrynus* Fairmaire, 1897, *Glyptophrynus* Fairmaire, 1899, *Melanolophus* Fairmaire, 1882, *Phrynocolus* Lacordaire, 1859, *Phrynophanes* Koch, 1951, and *Physophrynus* Fairmaire, 1882. Among these, *Bouchardium* displays the greatest affinity towards *Distretus* and *Dichtha* as all share a similar structure of elytra (sharply carinate humeral edge and flattened surface of elytra). Nevertheless, *Bouchardium* can be differentiated from all of the abovementioned genera, including *Dichtha* and *Distretus*, by a unique arrangement of pronotal punctures (sides of the pronotal disc with large, confluent punctures; center of the disc with small punctures, 4–5 diameters apart vs pronotal disc evenly covered with large sometimes confluent punctures—Figs 2A, F, 3D, F, G, I) and subquadrate shape of the body (frontal/posterior views) (Fig. 1C, 2C, D, 3E).

Notes. According to Kamiński *et al.* (2022), the morphology of female terminalia is relatively invariable within the '*Dichtha* clade'. All analyzed members of this grouping, including *Bouchardium chillygonzalesi* **sp. nov.**, *B. cubicum* (Guérin-Méneville, 1845) **comb. nov.** and *B. mariae* **sp. nov.** possess 3-lobed ovipositors, where the merged lobes 1 (valvifer) and 2 are strongly emarginate basally. Proctigers were reported to be widely indented medially, while bursae were simple (no sclerites were detected) and accompanied by multibranched spermatheca. Finally, spicula ventrali were reported to be Y-shaped (Fig. 4C). Nevertheless, some variability of the apical coxites (c4 plates) has been recovered for different *Bouchardium* species. In particular, the c4 plates of the newly described *B. chillygonzalesi* **sp. nov.** are relatively short and only slightly projected above the outline of the c3 plate (Fig. 4A, B). In the case of *B. cubicum* and *B. mariae* **sp. nov.** the c4 plates are elongated (Fig. 4D).

The aedeagal morphology is relatively invariable within the subtribe Molurina (Kamiński *et al.* 2021). Up to now, the shape of male terminalia has not been used for diagnostic purposes at the species or generic levels. Morphology of aedeagal tegmen and spiculum gastrale of *Bouchardium mariae* **sp nov.** is illustrated in Fig. 2I, J. Present investigation did not reveal any substantial differences in male terminalia morphology between that species and its other congeners.

Distribution. Botswana (Eastern part of the Country), Mozambique, South Africa (Provinces: Gauteng, Limpopo, Mpumalanga, North West), Zimbabwe (Southern part of the Country) (Fig. 5).

Etymology. This genus is named in honor of Dr. Patrice Bouchard (Canadian National Collection of Insects, Arachnids and Nematodes, Agriculture and Agri-Food Canada, Ottawa, Ontario, Canada), a specialist in Tenebrionidae and zoological nomenclature in gratitude for his professional support during the first years of my career.

***Species included* (3)**. *B. chillygonzalesi* **sp. nov.**, *B. cubicum* (Guérin-Méneville, 1845) **comb. nov.**, *B. mariae* **sp. nov.**

Key to the species of *Bouchardium*

1. Prosternal process with elongate appendages (Fig. 1E). Elytral disc relatively narrow leaving sides of the epipleura exposed in dorsal view (Fig. 1B). Ovipositor with short c4 plates (not extending beyond the tip of c3) (Fig. 4A, B) . . . . ***B. chillygonzalesi* sp. nov.**

-. Prosternal process rounded (in lateral view) (Fig. 2G). Elytral disc relatively wide covering sides of epipleura in dorsal view (Fig. 1B). Ovipositor with elongate c4 plates (extending beyond the tip of c3) (Fig. 4D) 2

2. Elytra entirely black. Elytral disc relatively flat (Fig. 3E) . . . . ***B. cubicum* comb. nov.**

-. Elytra with two red stripes along the sides of the disc. Elytral disc convex (Fig. 2A, C, D). . . . . ***B. mariae* sp. nov.**

***Bouchardium chillygonzalesi* sp. nov.**

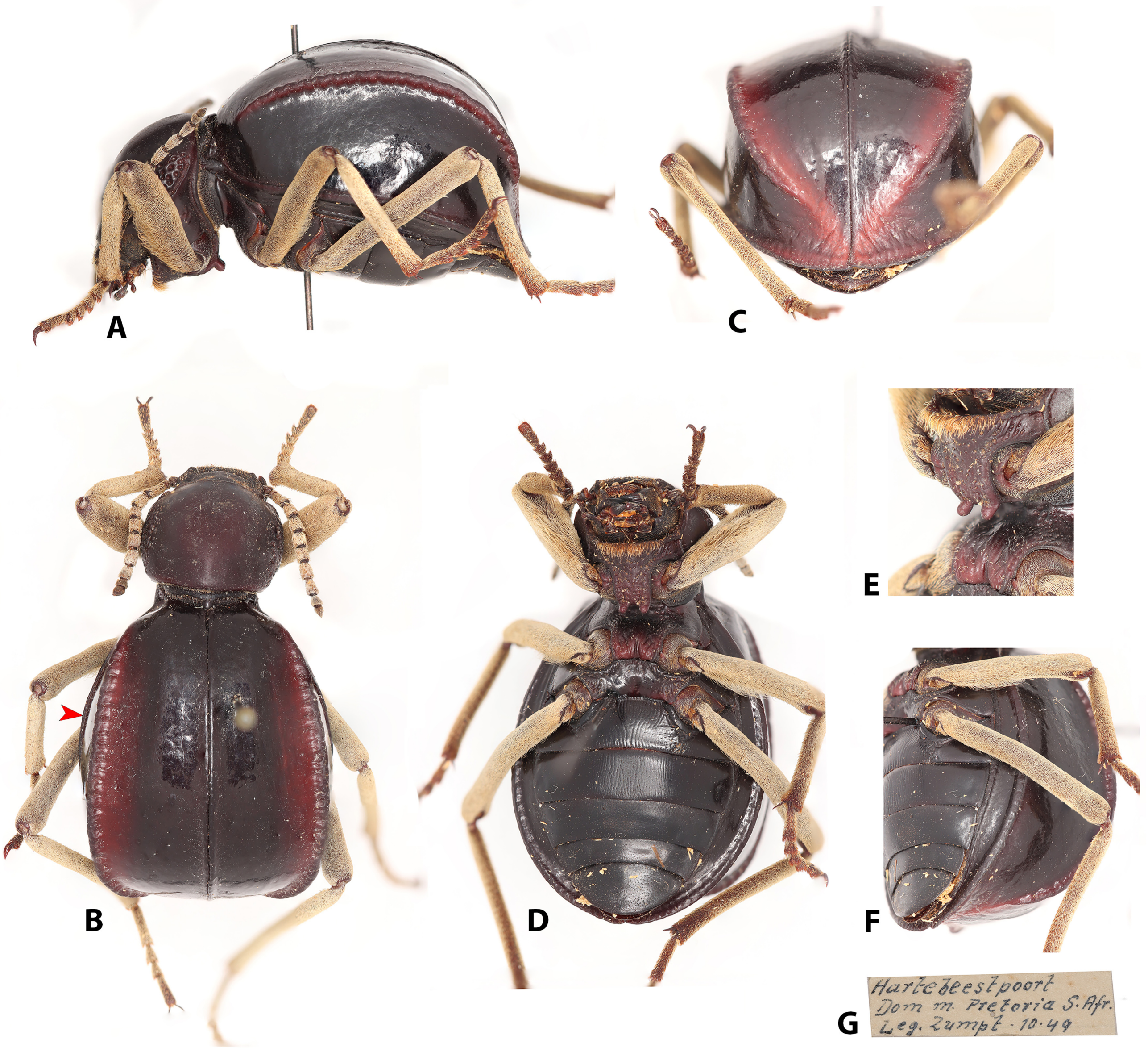
(Figs 1, 4A, B, 5)

Type material. **Holotype** (NHMB), male: “Hartebeestpoort Dom m. Pretoria S. Afr. Leg. Zumpt—10.49”. **Paratypes** (NHMB): two specimens same data as holotype, single specimen: “Syringa S Rhodesia R. West [unreadable] 08”, female (MLPC): “ZIMBABWE SE, Matobo National Park, 10–15.III.1999, leg. St. Roth ”, “coll. Lillig ex Naturkundemuseum Erfurt”, single specimen (MLPC): “Central Zimbabwe, Mvuma, route Gutu-Chatsworth, 24.XI.1998, M. Snizek leg.”, “coll. Lillig ex Zoologische Staatssammlung München”.

Diagnosis. Due to the similar color pattern of elytra (presence of two red stripes along the sides of the disc) this new species superficially resembles *Bouchardium mariae* **sp. nov.** (see diagnosis below). Nevertheless, *Bouchardium chillygonzalesi* **sp. nov.** can be distinguished from all its congeners by the presence of posteriorly projecting appendages on the prosternal process (Fig. 1E) and by having short c4 plates of ovipositor, which do not extend beyond the tip of c3 (Fig. 4A, B).

Description. Length 20.0–24.0 mm, width of pronotum 5.0 mm, and elytra 10.0–13.0 mm.

Head: Hypognathous. Frons finely punctate (~6 diameters apart); frontoclypeal suture coarse, presenting as deep groove in middle; apical clypeal margin not emarginate; labrum coarsely punctate laterally with shallow groove along apical margin bearing yellow, acuminate setae. Eyes comma-shaped, with ventral portion reduced, strongly emarginate around epistomal base. Antennae slender, relatively short (only slightly reaching beyond base of pronotum), bearing acuminate yellow setae; length of antennomere 2 equal to ~0.2 of antennomere 3; length of antennomere 4 about 0.6 of length of antennomere 3. *Prothorax*: Pronotum laterally with coarse, confluent punctures; widest in anterior half. Disc dull, finely punctate (4–5 diameters apart); anterior angles slightly produced. Hypomeron convex, dull, and impunctate. Prosternal process with pair of appendages, with wide bordering (ventral view). *Pterothorax*: Scutellum apically covered with dense setation. Elytra widest in half, disc relatively flat, sharply angled below margin; disc dark brown, impunctate, without tubercles; edges of disc red, with corrugated borders. Elytral slope steep, impunctate, elytral apex rounded. Epipleura impunctate and without tubercles, clearly differentiated from neighbouring portion of elytra and encircling ventrite 5. Lateral regions of metaventrite (between coxae) extremely short. Metaepisternal suture abbreviated posteriorly. *Legs*: Densely covered in golden setae, slender. Tarsi narrow, covered with golden setation. *Abdomen*: Ventrites 1–4 extremely finely and sparsely punctate laterally (>5 diameters apart); ventrite 5 with denser and coarser punctuation (3–4 diameters apart).



Hartebeestpoort
Dom m. Pretoria S.Afr.
Leg. Zumpt · 10·49

FIGURE 1. Morphology of *Bouchardium chillygonzalesi* **sp. nov.** (holotype). Lateral (A), dorsal (B), posterior (C), and ventral (D) views of the body; prosternal process (E); epipleuron (F); label (G). Arrow indicates edge of epipleuron.

Etymology. This species is named in honor of Jason Charles Beck (20 March 1972)—professionally known as Chilly Gonzales—Grammy-winning pianist and composer from Canada.

Distribution. South Africa (Provinces: Gauteng), Zimbabwe (Fig. 5).

Bouchardium mariae **sp. nov.**

(Figs 2, 4C, 5)

Type material. **Holotype** (NHMB), male: "Francistown Bechuanaland Zumpt XII.55". **Paratypes** (NHMB)**:** four specimens: "Kanye Bechuanaland Zumpt XII.55", single specimen: "Zoutpan, Pta 9/XII/1926 G. v. Son, Dichtha incantatoris", female: "Museum Paris Rhodesia du Sud Selukwe, A. Ellenberger 1915", single specimen: "Museum Paris Matebele Penda-ma-tenka E. Holub 170-94", male a1 "Rhodesia", male (MIZ PAN): "Mozambique", "MIZ PAN COL011552", "Dichtha cubica guer", Dichtha cubica Guer. H. Gebien det. 1939", male, female, and single specimen (MLPC): "ZIMBABWE Great Zimbabwe ca. 20°16'21"S 30°56'03"E, 20.IV.1990, leg. Martin Lillig", "coll. Lillig", two specimens (MLPC): "ZIMBABWE centr., MASVINGO lake MUTIRIKWI, 25.11.2998, M. Snížek leg.", "coll. Lillig ex Zoologische Staatssammlung München", single specimens (MLPC): "RSA (Limpopo) Farm Zulani 1000 m ca. 20 km s. Vivo 3/5.II.2014, Heinz leg.", "coll. Lillig ex Naturkundemuseum Erfurt", "collection NATURKUNDE-MUSEUM ERFURT".

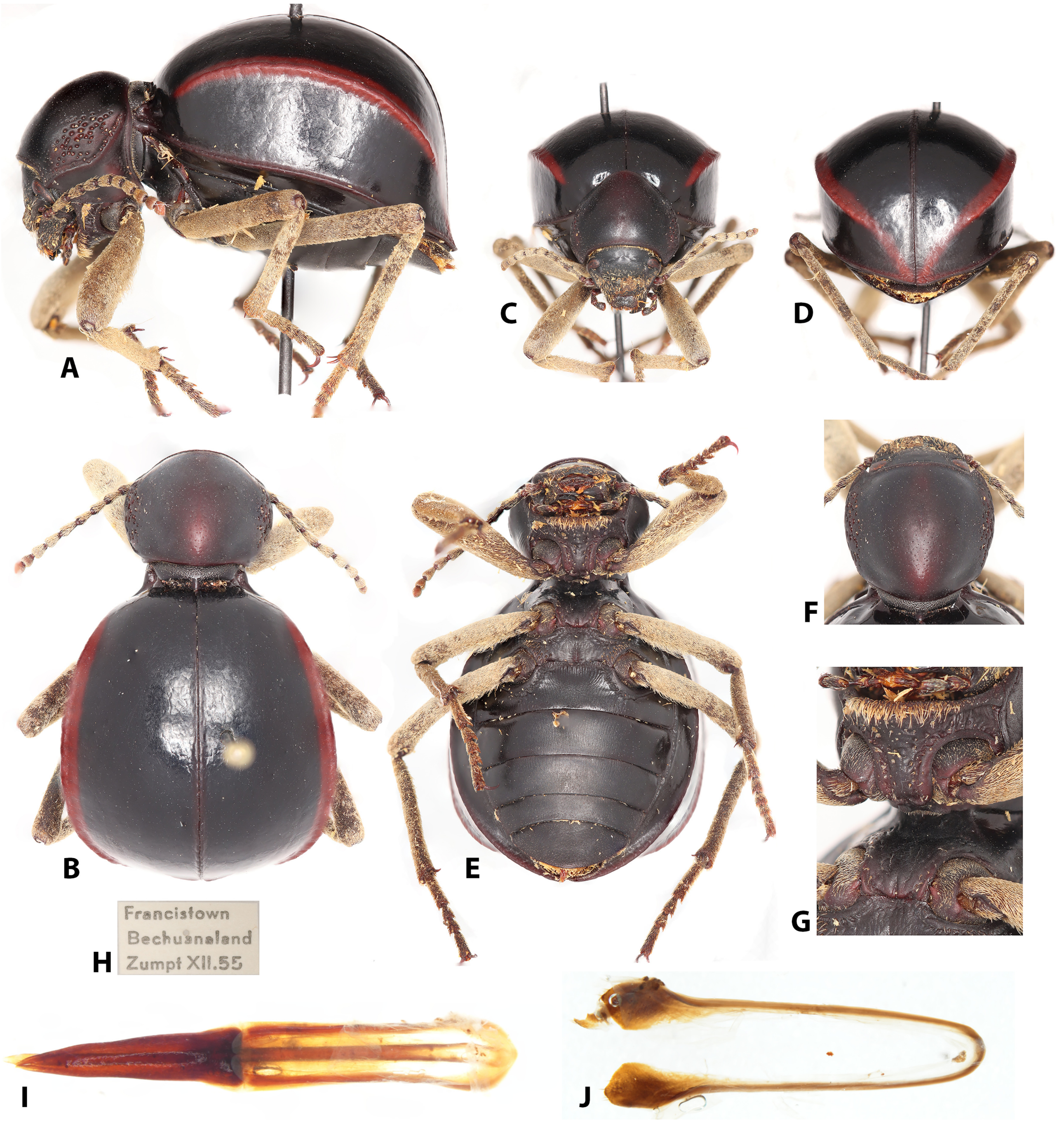


FIGURE 2. Morphology of *Bouchardium mariae* **sp. nov.** (holotype and paratype). Lateral (A), dorsal (B), frontal (C), posterior (D), and ventral (E) views of the body; pronotum (F); prosternal process (G); label (H); aedeagal tegmen (I); spiculum gastrale (J).

Diagnosis. Due to the similar color pattern of elytra (presence of two red stripes along the sides of the disc) this new species resembles *Bouchardium chillygonzalesi* **sp. nov.** These two species can be easily distinguished by the different structure of prosternal process (rounded in lateral view in *B. mariae*; with appendages in *B. chillygonzalesi*—Figs. 1E, 2G). Furthermore, both species differ in the elytral shape and structure (elytra wide with almost smooth borders of the disc in *B. mariae*, elytra narrow with corrugated disc borders in *B. chillygonzalesi*—

Figs 1A–C, 2A–D). Besides the different coloration of elytra, *B. mariae* differs from *B. cubicum* by having a more prominently convex elytral disc (Figs 2, 3E–F).

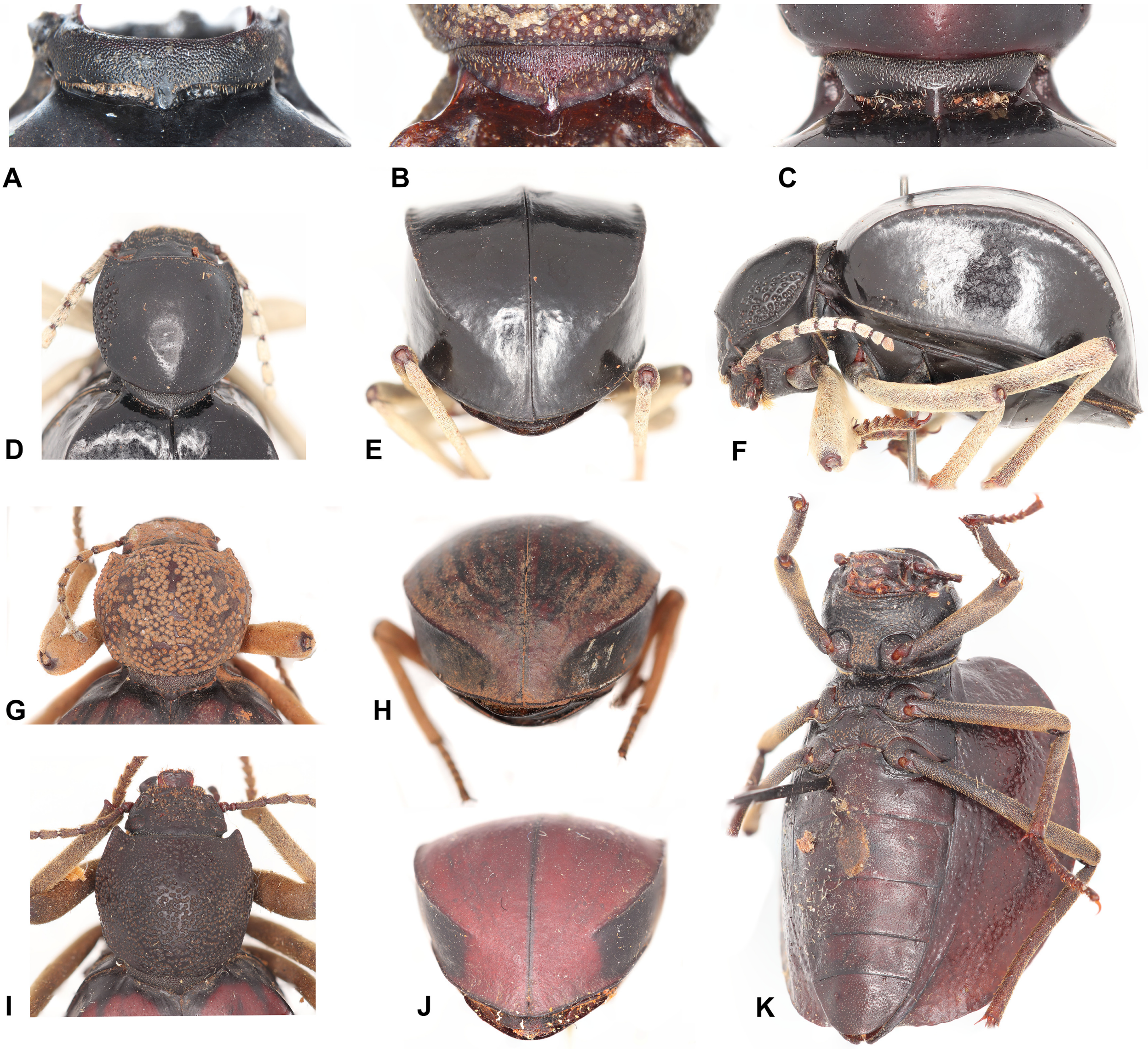


FIGURE 3. Morphology of selected species representing '*Dichtha* clade': *Bouchardium cubicum* (A, D–F), *Amiantus gibbosus* Fåhraeus, 1870 (B), *Bouchardium mariae* (C), *Dichtha inflata* (Gerstaecker, 1854) (G, H), *Dichtha quedenfeldti* Kolbe, 1886 (I, J), *Distretus* (*Perdistretus*) *mormolyce* Koch, 1953, holotype (K). Pronotum (D, G, I); posterior (E, H, J), lateral (F), and ventral (K) views of the body.

Description. Length 19.0–25.0 mm, width of pronotum 7.0 mm, and elytra 12.0–14.0 mm. *Head*: Hypognathous. Frons finely punctate (~6 diameters apart); frontoclypeal suture coarse, presenting as deep groove in middle; apical clypeal margin not emarginate; labrum coarsely punctate laterally with shallow groove along apical margin bearing yellow, acuminate setae. Eyes comma-shaped, with ventral portion reduced, strongly emarginate around epistomal base. Antennae slender, elongate (reaching beyond base of pronotum), bearing acuminate yellow setae; length of antennomere 2 equal to ~0.2 of antennomere 3; length of antennomere 4 about half antennomere 3. *Prothorax*: Pronotum laterally with coarse, confluent punctures; widest in anterior half. Disc dull, finely punctate (4–5 diameters apart); anterior angles slightly produced. Hypomeron convex, dull, and impunctate. Prosternal process rounded in lateral view, with wide bordering (ventral view). *Pterothorax*: Scutellum apically covered with dense setation. Elytra widest in basal third, disc convex, sharply angled below margin; disc black, impunctate, without tubercles; edges of disc red. Elytral slope steep, impunctate, elytral apex rounded. Epipleura impunctate and without tubercles, clearly differentiated from neighbouring portion of elytra and encircling ventrite 5. Lateral regions of metaventrite (between coxae) extremely short. Metaepisternal suture abbreviated posteriorly. *Legs*: Densely covered in golden setae, slender. Tarsi narrow, covered with golden setation. *Abdomen*: Ventrites 1–4 extremely finely and sparsely punctate laterally (>5 diameters apart); ventrite 5 with denser and coarser punctuation (3–4 diameters apart).

Etymology. This species is named in honor of my daughter, Maria Antonina Kamińska, born on June 9, 2016 (Warsaw, Poland).

Distribution. Botswana, South Africa (Provinces: Gauteng), Mozambique, Zimbabwe (Fig. 5).

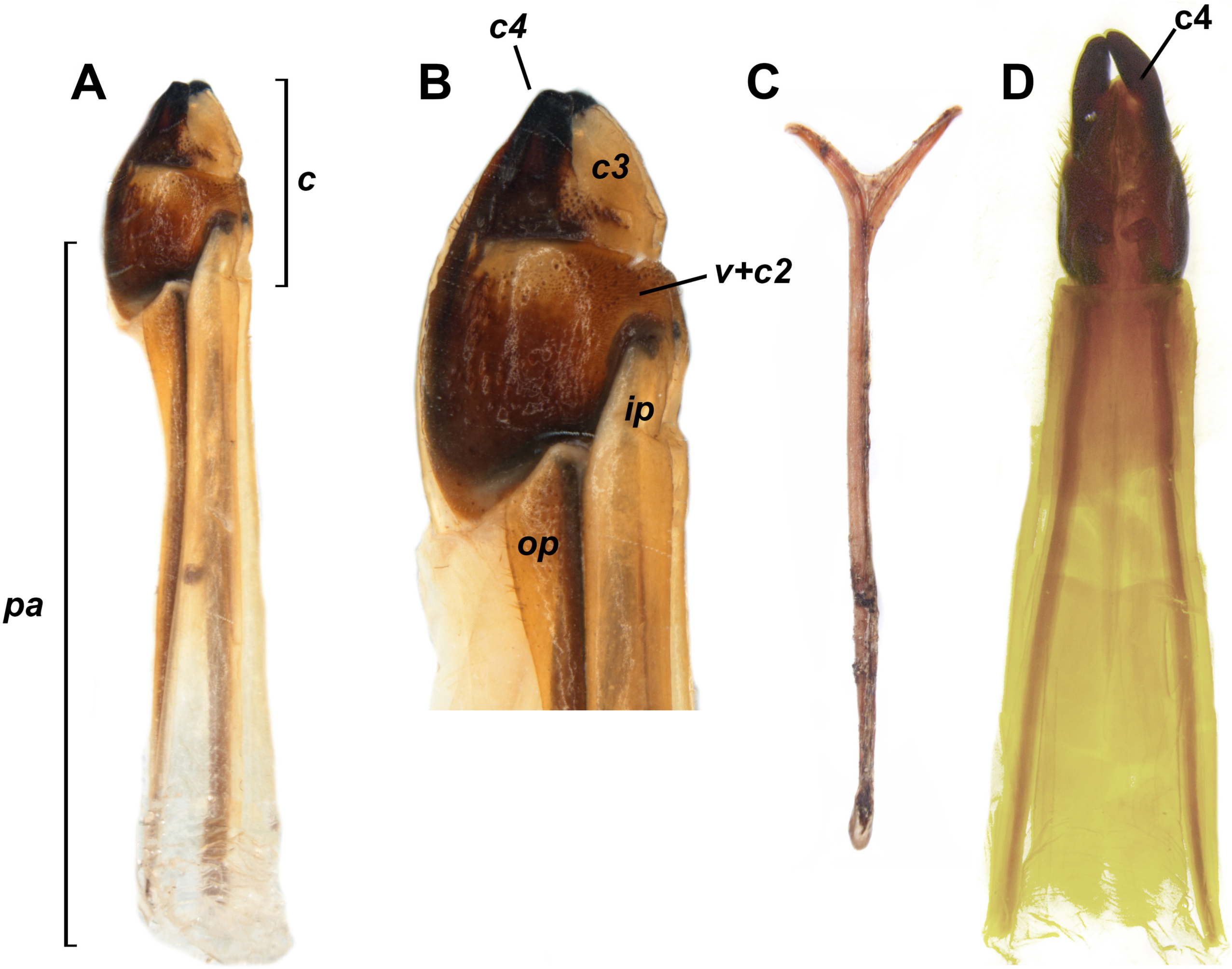


FIGURE 4. Morphology of female terminalia within the genus *Bouchardium* **gen. nov.** *Bouchardium chillygonzalesi* **sp. nov.** (A, B), *B. mariae* **sp. nov**. (C), *B. cubicum* (D). Ovipositor (A, B, D), spiculum ventrale (C). ***Abbreviations***: c- coxities, c2-c4- subsequent lobes of coxities, v- valvifer, ip- inner plate of paraprocts, op- outer plate of paraprocts, pa - paraprocts.

Toktokkus Kamiński & Gearner, 2021

Notes. The most recent taxonomic contributions concerning *Toktokkus* were published by Kamiński *et al.* (2021), Gearner *et al.* (2022), and Kamiński (2022).

Species and subspecies included (16). *T. barclayi* Kamiński & Gearner, 2021, *T. congolensis* Kamiński & Gearner, 2021, *T. herero* Gearner, 2021, *T. makuya* Gearner, 2021, *T. mariae* Kamiński, 2022, *T. mashunus* (Péringuey, 1896), *T. mulleri* (Péringuey, 1899), *T. o-serraferrus* Gearner, Lumen, Kamiński, 2022, *T. schultzei* (Péringuey, 1908), *T. tschinkeli* Kamiński & Gearner, 2021, *T. tuberculipennis* (Haag-Rutenberg, 1871), *T. vialis vialis* (Burchell, 1822), *T. vialis sellatus* (Haag-Rutenberg, 1875), *T. vialis tuberculifer* (Haag-Rutenberg, 1871), *T. waclawae* Kamiński, 2021, *T. zofiae* **sp. nov.**

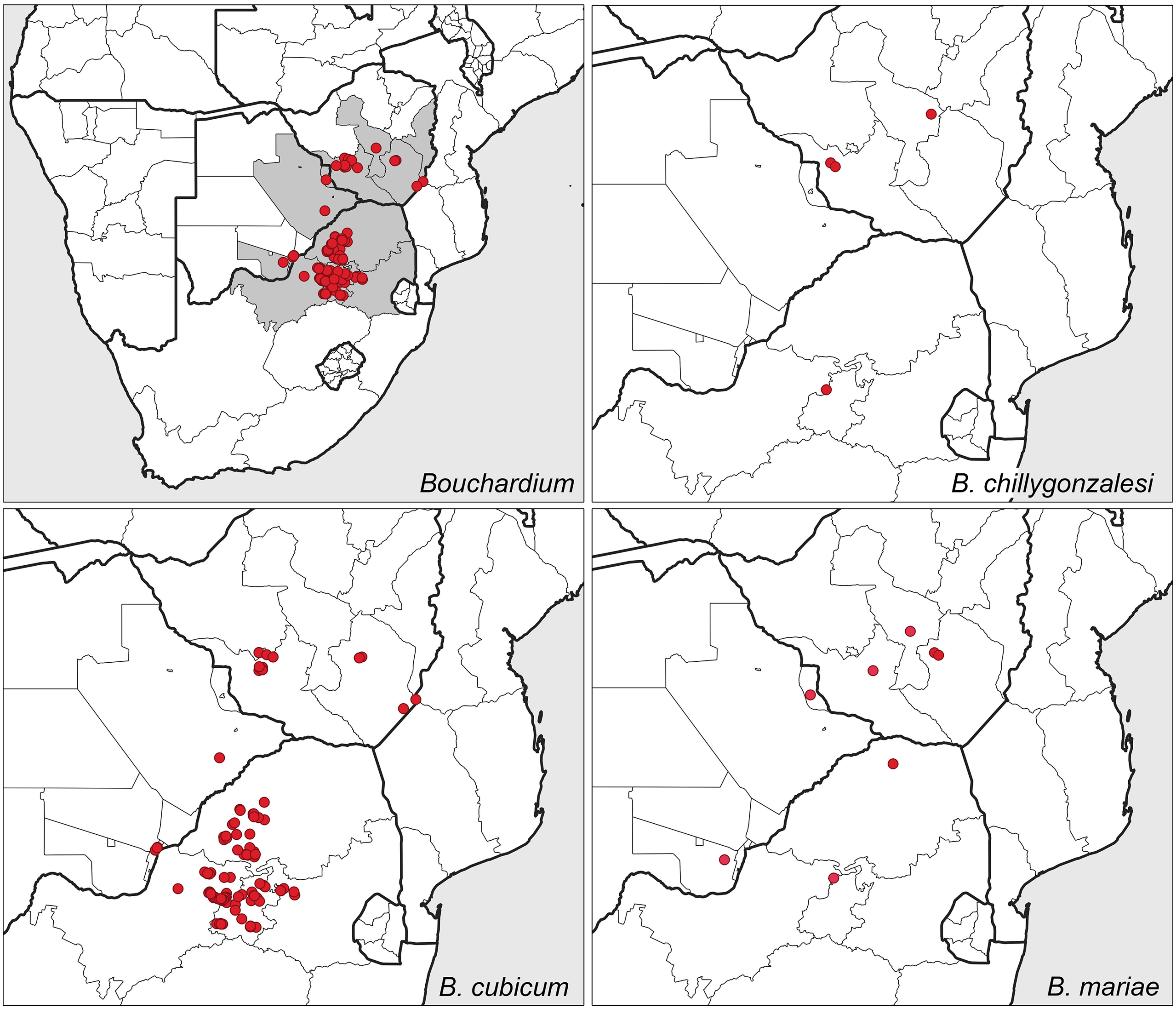


FIGURE 5. Distribution of the genus *Bouchardium* **gen. nov.** and its representatives.

***Toktokkus zofiae* sp. nov.**
(Fig. 6A–F)

Type material. **Holotype** (NHMB), female: "V.-L. Kai. Exp. Gemsbok Pan. 23/4–5/5/30.", "Psammodes peezi K.".

Diagnosis. The species is most similar to *T. herero* Gearner, 2021 by having prominent punctures on the pronotal disc and a golden setation of the elytral disc (Kaminski *et al.* 2021). Both species can be distinguished by different body size (*T. zofiae*: 18.5 mm, *T. herero*: 23.0–25.0 mm), basal margination of pronotal disc (*T. zofiae*: complete, *T. herero*: interrupted in the middle) (Fig. 6D), structure of prosternal process (*T. zofiae*: rounded in lateral view, *T. herero*: angular in lateral view) (Fig. 6H, E), and tuberculation of elytral disc (*T. zofiae*: microtubercles present, *T. herero*: microtubercles absent) (Fig. 6A, G).

Description (based on holotype). Length 18.5 mm, width of pronotum 7.0 mm, and elytra 11.0 mm.

Head: Hypognathous. Frons finely and irregularly punctate; frontoclypeal suture coarse, with deep groove in middle; apical clypeal margin broadly shallowly emarginate; clypeus projected toward front of body. Eye comma-shaped, with reduced ventral part, strongly emarginate around epistomal base; with deep groove on temporal side. Mentum and submentum missing due to dermestid damage. Antennae broken off at level of 4th segments; slender, moderately covered in recumbent acuminate goldish setae; antennomere 2 short, equal to 0.2 of antennomere 3 length; antennomere 4 about half of antennomere 3 length.

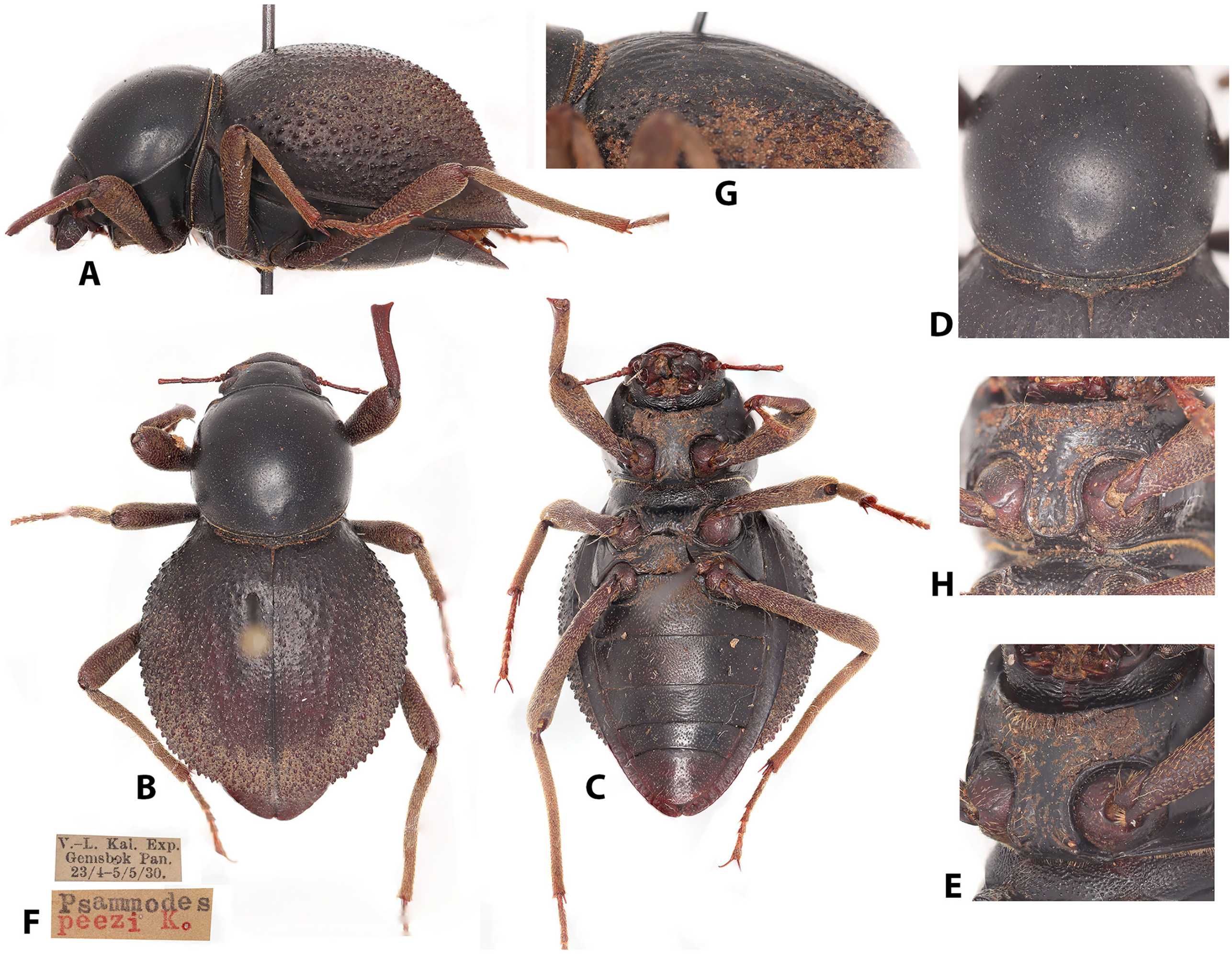


FIGURE 6. Morphology of *Toktokkus zofiae* **sp. nov.** (holotype) (A–F) and *T. herero* (G, H). Lateral (A), dorsal (B), and ventral (C) views of the body; pronotal disc (D), prosternal process (E, H); label (F); and elytral disc (G).

Prothorax: Pronotal lateral margin rounded, well visible. Pronotum widest above middle. Disc dull, finely punctate (4–5 diameters apart); anterior and basal margins complete, anterior apices slightly produced. Hypomeron convex, without submarginal groove, impunctate. Prosternal process rounded in lateral view, longitudinally depressed in middle (ventral view). Anterior margin of prosternum straight, with gold setae.

Pterothorax: Scutellum densely covered with microtubercles. Elytra widest in half, slightly rounded, covered in scattered gold setae; covered with dense tubercles (1–3 diameters apart) and microtubercles (2–4 diameters apart). Laterally situated tubercles very pronounced. Elytral slope relatively steep, elytral apex flattened. Epipleura impunctate, not tuberculated, clearly distinguishable from neighbouring portion of elytra, widely enfolding fifth ventrite. Mesoventrite with deep median groove and elevated sides. Metaventrite impunctate, densely setose. Lateral regions of metaventrite (between coxae) extremely short. Metaepisternal suture abbreviated posteriorly.

Legs: Covered with dense gold setae. Procoxa exposed basally. Apex of protibia with denticle on outer margin, lateral carina terminating in basal third. Spurs on meso- and metatibiae of equal length. Tarsi narrowed laterally.

Abdomen: Ventrites 1–3 medially covered with goldish setae, moderately punctate (2–3 diameters apart) and weakly rugulose; ventrites 4–5 finely punctate (1–3 diameters apart); ventrite 5 without submarginal sulcus.

Terminalia: Due to scarcity of materials, terminalia were not dissected. Nevertheless, the tip of the ovipositor was visible on the analyzed specimen. The morphology of coxites is consistent with the bauplan reported for the genus (Kamiński *et al.* 2021).

Etymology. This species is named in honor of my daughter, Zofia Irena Kamińska, born on November 3, 2018 (Flagstaff, USA).

Distribution. South Africa—only known from the type locality (Gemsbok Pan).

Discussion

While introducing the classification of the tribe Sepidiini, Koch (1955) designed an informal grouping of genera among the subtribe Molurina, which he referred to as 'Phrynocoloid Molurina'. According to his definition, the members of this lineage were united by a specific structure of the prosternum (collar-like covering postgenal to mental portions of the head) and elytra (primary costae sharp to dentate). Although taxonomically limited, the recent studies of Kamiński *et al.* (2021) and Gearner *et al.* (2022) provided molecular support for the existence of this phylogenetic lineage within Molurina. The authors revised Koch's morphological definition by noticing that all of the members of the grouping share a unique structure of scutellum (apex with deep transverse grooves—Fig. 3A–C). On the other hand, the presence of sharp/dentate costae has been excluded from diagnostic features as it was proven to be variable among the genera. The lineage has been renamed and referred to as the '*Dichtha* clade'. According to Kamiński *et al.* (2021), the following genera constitute this grouping: *Amiantus*, *Arturium*, *Brachyphrynus*, *Dichtha*, *Distretus*, *Euphrynus*, *Glyptophrynus*, *Melanolophus*, *Phrynocolus*, *Phrynophanes*, and *Physophrynus*. The total diversity is estimated to exceed 125 species and subspecies (Kamiński *et al.* 2019).

Contrary to the morphological definition of the '*Dichtha* clade' itself, the diagnostic features of many of the genera representing this grouping remain blurry (Wilke 1921, Koch 1951, 1955, 1956, 1962, Mal 2005), potentially indicating the non-monophyletic nature of some of them. Such assumptions were also preliminarily supported by the already published molecular data. Namely, the analysis conducted by Kamiński *et al.* (2021) revealed the polyphyly of the genus *Dichtha*. In particular, *Amiantus octocostatus* Péringuey, 1896 and *Dichtha inflata* (Gerstaecker, 1854) (type species of the genus) were clustered together, while the morphologically distinct *Dichtha cubica* was recovered as a separate lineage. Up to now, *Dichtha* was defined by having parallel sides of elytra (Fig. 3B, E, G), flat elytral disc (not covered with costae), and smooth scutellum of a particular shape (Fig. 3A–C) (Haag-Ruthenberg 1871, Robiche 2013). Nevertheless, previous authors noticed the morphological distinctiveness of *Dichtha cubica*, which was the only species of the genus having the subquadrate shape of elytra (Robiche 2013) (Fig. 3E).

The discovery of two new species (i.e., *B. mariae* **sp. nov.**, *B. chillygonzalesi* **sp. nov.**), which in many aspects closely resemble *Dichtha cubica*, revealed that some of the previously observed apomorphies (subquadrate body shape—Figs 1–2, laterally punctured pronotal disc—Fig. 2A, 3F) for this species are present in a wider group of taxa. Taking into consideration the molecular (Kamiński *et al.* 2021) and morphological distinctiveness of this grouping, it is hereby designated as a new genus *Bouchardium*. Although this taxonomic decision clarifies only a small portion of the total species diversity of '*Dichtha* clade', it constitutes the first step towards larger revisionary work. The generic affiliation of the remaining species of *Dichtha* (*D. inflata* (Gerstaecker, 1854), *D. modesta* Robiche, 2013, *D. transvalica* Brancsik, 1914, and *D. quedenfeldti* Kolbe, 1886) is temporarily sustained. However, it is possible that such grouping remains paraphyletic in regards to *Amiantus* and/or *Distretus*.

The discovery of the new species of the genus *Toktokkus* (i.e., *T. zofiae* **sp. nov.**) within the Frey Beetle Collection, might indicate that, regardless of the recent revisionary efforts, the taxonomy of this genus is still insufficiently studied (Kamiński *et al.* 2021, Gearner *et al.* 2022, Kamiński 2022). The newly described species represents a well-diagnosable entity that, together with *T. herero,* represents a previously unrecognized lineage of the genus.

Acknowledgments

This research was funded by the OPUS 19 Project (number 2020/37/B/NZ8/02496) from the National Science Centre, Poland. I am grateful to Simona Ruffener for her hospitality during my visit to the Naturhistorisches Museum Basel; to Dr. Ryan Lumen (MIZ PAN) for his comments on the previous versions of the manuscript; and to Dr. Martin Lillig for providing specimens used in this study.

References

GBIF.org (2023) GBIF Occurrence Download. Available from: https://doi.org/10.15468/dl.wjwz7b (accessed 26 March 2024)

Gearner, O.M., Kamiński, M.J., Kanda, K., Swichtenberg, K. & Smith, A.D. (2021) Discovery of New Genera Challenges the Subtribal Classification of Tok-Tok Beetles (Coleoptera: Tenebrionidae: Sepidiini). *Insect Systematics and Diversity*, 5, 1–10.

https://doi.org/10.1093/isd/ixab006

Gearner, O.M., Lumen, R. & Kamiński, M.J. (2022) New species of *Toktokkus* from Mozambique (Tenebrionidae: Sepidiini: Molurina). *Annales Zoologici*, 72, 123–127. https://doi.org/10.3161/00034541ANZ2022.72.1.010

Haag-Rutenberg, G. (1871) Beiträge zur Familie der Tenebrioniden (II. Stück). *Coleopterologische Hefte*, VII, 21–111.

Iwan, D. (2002) Catalogue of the World Platynotini (Coleoptera: Tenebrionidae). *Genus*, 13, 219–323.

Kamiński, M.J. (2011) Catalogue of the World Melambiina Mulsant et Rey, 1854 (Coleoptera, Tenebrionidae, Pedinini). *Annales Zoologici*, 61, 281–333. https://doi.org/10.3161/000345411X584780

Kamiński, M.J. (2022) A new species and distributional notes on the genus *Toktokkus* Kamiński & Gearner, 2021 (Coleoptera: Tenebrionidae: Sepidiini). *Zootaxa*, 5155 (2), 297–300. https://doi.org/10.11646/zootaxa.5155.2.8

Kamiński, M.J., Kanda, K., Lumen, R., Ulmer, J.M., Wirth, C.C., Bouchard, P., Aalbu, R., Mal, N. & Smith, A.D. (2019) A catalogue of the tribe Sepidiini Eschscholtz, 1829 (Tenebrionidae: Pimeliinae) of the world. *Zookeys*, 844, 1–121. https://doi.org/10.3897/zookeys.844.34241

Kamiński, M.J., Gearner, O.M., Kanda, K.., Swichtenberg, K., Purchart, L. & Smith, A.D. (2021) First insights into the phylogeny of tok-tokkie beetles (Tenebrionidae: Molurina, Phanerotomeina), and examination of the status of the *Psammodes vialis* species-group. *Zoological Journal of the Linnean Society*, 191, 883–901. https://doi.org/10.1093/zoolinnean/zlaa052

Kamiński, M.J., Gearner, O.M., Raś, M., Hunsinger, E.T., Smith, A.L., Mas-Peinado, P, Girón, J.C., Bilska, A.G., Strümpher, W.P., Wirth, C.C., Kanda, K., Swichtenberg, K., Iwan, D. & Smith, A.D. (2022) Female terminalia morphology and cladistic relations among Tok-Tok beetles (Tenebrionidae: Sepidiini). *Cladistics*, 38, 623–648. https://doi.org/10.1111/cla.12510

Koch, C. (1951) Die Tenebrioniden des südlichen Afikas VII—*Arturium* nov. gen. Molurinorum ex aff. *Phrynocolus* Lac. *Atti della Società Italiana di Scienze Naturali*, 90, 89–96.

Koch, C. (1955) Monograph of the Tenebrionidae of southern Africa. Vol. I. Tentyriinae, Molurini Trachynotina: Somaticus Hope. *Transvaal Museum Memoir*, 7, 1–242.

Koch, C. (1956) *Exploration du Parc National de l'Upemba. Mission G.F. de Witte. Fascicule 40. II. Tenebrionidae (Coleoptera, Polyphaga), Opatrinae, First part: Platynotini, Litoborini and Loensini.* M. Hayez, Bruxelles, 472 pp.

Koch, C. (1962) Analysis of the Madagascan components of the subfamily Tentyriinae (Tenebrionidae, Coleoptera) with revisions of the generic systematics of the Asidini from Africa south of the Sahara and the African, Asiatic and Palaearctic Epitragina of Tentyriini. *Mémoires de l'institut de la scientifique de Madagascar*, 13, 1–146.

Mal, N. (2005) Description d'une espèce nouvelle du genre *Physophrynus* Fairmaire, 1882 (Coleoptera: Tenebrionidae: Molurini). *Annales Zoologici*, 55, 9–10.

Robiche, G. (2013) Note sur le genre *Psammodes* Kirby, 1818 au Mozambique et descriptions de nouvelles espèces appartenant aux genres *Psammophanes* Lesne, 1922 et *Dichtha* Haag-Rutenberg, 1871 (Coleoptera, Tenebrionidae). *Lambillionea*, 113, 155–166.

Schawaller, W. (2018) The coleopterologist and specialist on Tenebrionidae Carl Koch (1904–1970): list of publications. *Annals of the Ditsong National Museum of Natural History*, 8, 156–160.

Schawaller, W. (2020) The coleopterologist and specialist on Tenebrionidae (Insecta: Coleoptera) Hans Gebien (1874–1947), with a list of his publications. *Annals of the Ditsong National Museum of Natural History*, 9, 54–60.

Sprecher-Uebersax, E., Geiser, M. & Hicklin, M. (2013) Die Käfersammlung Frey: eine Kostbarkeit für die Wissenschaft. *Mitteilungen der Naturforschenden Gesellschaften beider Basel*, 14, 3–19.

Wilke, S. (1921) Die Molurinen-Gattung *Phrynocolus* Lac. (Col., Tenebr.). *Archiv für Naturgeschichte*, 87, 161–174.