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Revision of the genus *Trigonopselaphus* GEMMINGER & HAROLD (Coleoptera: Staphylinidae: Staphylininae)

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Abstract

The Neotropical genus *Trigonopselaphus* GEMMINGER & HAROLD (Coleoptera: Staphylinidae: Staphylininae) is revised. A new species, *T. diplopegus*, is described from Ecuador and Peru. A neotype is designated for *Staphylinus herculeanus* LAPORTE. Lectotypes are designated for *Polyphematiana zikani* BERNHAUER, *Staphylinus columbinus* ERICHSON and *Trigonophorus myrtillinus* (NORDMANN). *Polyphemus melzeri* BIERIG is shown to be a junior synonym of *Polyphemus banghaasi* BERNHAUER and *Polyphematiana zikani* BERNHAUER a junior synonym of *Trigonophorus myrtillinus* (NORDMANN). A key and illustrations of morphological characters are provided for the identification of species.

Key words: Staphyliniformia, Staphylinidae, Staphylinini, Xanthopygina, *Terataki*, *Torobus*, South America, Neotropical Region.

Introduction

The genus *Trigonopselaphus* GEMMINGER & HAROLD is distributed in South America and contains some of the largest species in the subtribe Xanthopygina. Most species are 25–40 mm long, and only few other genera in Staphylinidae (e.g., *Platydracus* THOMSON, *Ocypus* LEACH, *Tasgius* STEPHENS) contain species that are larger.

The type species of *Trigonopselaphus* is *Trigonophorus myrtillinus* (NORDMANN, 1837). The name *Trigonophorus* was preoccupied (STEPHENS 1829, HOPE 1831), and GEMMINGER & HAROLD (1868) proposed *Trigonopselaphus* as a replacement name. Some of the first characters used to identify this species were the securiform labial palpi and the metallic coloration (ERICHSON 1839), and unfortunately many subsequent authors ended up placing taxa in *Trigonopselaphus* just based on these characters. BERNHAUER (1914a) proposed the genus *Polyphemus* to accommodate *Staphylinus herculeanus* LAPORTE and described a new species, *P. banghaasi*, seemingly unaware of *T. myrtillinus*. However, the name *Polyphemus* was preoccupied (MÜLLER 1776) and was replaced by the name *Polyphematiana* by STRAND (1915). BERNHAUER (1921a), unaware of the replacement name, proposed his own replacement name: *Lypophemus*. Eventually, BERNHAUER (1921b) recognized that *Staphylinus columbinus* ERICHSON and *T. myrtillinus* also belonged in the same taxonomic concept as *Polyphematiana* but he failed to realize that the name *Trigonopselaphus* had priority. In the meantime, between 1839 and 1939 dozens of taxa were described as *Trigonopselaphus* that did not correspond to the original taxonomic concept of the genus. Most of these were subsequently moved to the genera *Gastrisus* SHARP, *Nausicotus* SHARP and *Phanolinus* SHARP to name a few (see HERMAN 2001a for details). HERMAN (2001b) created the genus *Torobus* to accommodate the remainder species in *Trigonopselaphus* that did not belong to the original taxonomic concept of the genus.

As it is obvious from the paragraph above, the taxonomic concept of *Trigonopselaphus* (i.e. what species should be in *Trigonopselaphus*) has been problematic for more than 150 years, to say the least. In his description of *Trigonopselaphus mutator*, SHARP (1876) mentioned that the name *Trigonopselaphus* "has already scarcely any definite meaning, owing to the heterogeneous nature of the few species associated under it". Earlier, CHATZIMANOLIS (2013) erected the genus

Terataki CHATZIMANOLIS, 2013 to accommodate several taxa previously in *Torobus*, *Gastrisus* and *Trigonopselaphus*. The purpose of this paper is to review the remainder species in *Trigonopselaphus* and firmly establish the taxonomic concept for the genus.

Materials and methods

Specimens used in this study were examined using an Olympus SZX10 stereomicroscope. Specimens were relaxed in warm soapy water to dissect the male genitalia. Female genitalia were examined but the spermathecae were found to be not sclerotized. Terminology and label data follow the procedure established by ASHE & CHATZIMANOLIS (2003) and used in other Xanthopygina taxonomic works (e.g., CHATZIMANOLIS 2004, 2008, 2012, 2013, 2014, CHATZIMANOLIS & ASHE 2009). Total length is measured from the anterior margins of frons to the posterior margin of abdominal segment VIII. It should be noted though that I did not attempt to fully extend the body for an accurate body length measurement in specimens that were old and fragile. Width:length ratio measurements were made on the widest and longest parts of the structure. The comparison of the length of the medial lobe and the paramere excludes the bulbous basal part of the median lobe. Measurements were made with an ocular micrometer except total body length that was measured with a Peak Glass Scale. Distribution maps do not include specimens for which only the country or collector has been mentioned on the label. Photographs were taken with a Visionary Digital Passport system using a Canon EOS40D camera and a Canon MP-E 65 mm macro lens. Photographs were auto-montaged using Helicon Focus Pro 4.2.9 (http://www.heliconsoft.com/heliconsoft-products/helicon-focus). SEM images were taken using a Neoscope JEOL desktop SEM. Lectotypes were designated in all cases where the original author did not state how many specimens were available. In this paper I use the phylogenetic species concept as proposed by WHEELER & PLATNICK (2000).

Specimens used in this paper were loaned from the following institutions:

AMNH	American Museum of Natural History, New York, USA (L. Herman)
BMNH	The Natural History Museum, London, UK (R. Booth)
CNC	Canadian National Collection, Ottawa, Canada (A. Davies)
FMNH	Field Museum of Natural History, Chicago, USA (A. Newton, M. Thayer)
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, USA (P. Perkins)
NHMB	Naturhistorisches Museum, Basel, Switzerland (E. Sprecher)
NMW	Naturhistorisches Museum Wien, Vienna, Austria (H. Schillhammer)
SDEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany (S. Blank)
ZMHB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (M. Uhlig)
ZMUC	Zoological Museum, University of Copenhagen, Copenhagen, Denmark (A. Solodovnikov)

Trigonopselaphus GEMMINGER & HAROLD

Trigonopselaphus GEMMINGER & HAROLD 1868: 597 (replacement name for *Trigonophorus* NORDMANN).
Trigonophorus NORDMANN 1837: 8 (type species: *Trigonopselaphus myrtillinus* (NORDMANN, 1837)).
Polyphematiana STRAND 1915: 122 (replacement name for *Polyphemus* BERNHAUER).
Polyphemus BERNHAUER 1914a: 397 (type species: *Staphylinus herculeanus* LAPORTE).
Lypophemus BERNHAUER 1921a: 74 (replacement name for *Polyphemus* BERNHAUER).

TYPE SPECIES: *Trigonopselaphus myrtillinus* (NORDMANN, 1837) – fixed with objective synonymy with *Trigonophorus*.

DIAGNOSIS: *Trigonopselaphus* superficially resembles genera in Staphylinina but the formation of the pronotal hypomeron is typical of Xanthopygina. *Trigonopselaphus* is probably closely related to the genera *Darwinilus* CHATZIMANOLIS, *Haematodes* LAPORTE and *Terataki* due to the shared presence of the following shared characteristics (a) hexagonal shape of the head; (b) no nuchal ridge; (c) asymmetrical antennomeres 5–10 [not present in *Haematodes*]; (d)

anteclypeus expanded; (e) punctation pattern on the abdomen and (f) meso- and metatibia with two long apical spurs. However, *Trigonopselaphus* can be distinguished from all Xanthopygina by the combination of the following characters: (a) size over 20 mm and typically 30–40 mm (only few other Xanthopygina taxa are over or near 20 mm, e.g.: *Darwinilus sedarisi* CHATZIMANOLIS, *Gastrisus purpuripennis* (BERNHAUER), *Torobus brasilianus* (BERNHAUER) and *Triacrus dilatus* NORDMANN); (b) interior lateral border of eyes not vertical (as in *Terataki* or *Darwinilus*) but present in oblique angle, thus appearing that eyes are positioned twisted on head (c) anterolateral corners of pronotum bulging and clearly extending beyond anterior margin [character not present in *Darwinilus*, *Haematodes* or *Terataki*]. The only species longer than 20 mm belonging to the hypothesized closely related genera is *Darwinilus sedarisi*, but that taxon does not have porose structures on male abdominal sternite VII (present in *Trigonopselaphus* except *T. banghaasi*).

DESCRIPTION: Size large, 20–40 mm in total length, body robust, habitus as in Figs. 1–6. Coloration of head pronotum and elytra dark metallic blue or purple, with green and golden overtones in some species. Mouthparts light brown except mandibles brown. Coloration of abdomen dark blue, purple or blue-green (in *T. diplopegus*).

Head hexagonal, widest at temples. Eyes medium size, prominent, positioned anteriorly in oblique angle to dorsal surface of head. Anteclypeus expanded. Surface of epicranium slightly to moderately convex, with microsculpture and micropunctures, punctures various; with large prominent macrosetae around posterolateral margins. Postoccipital suture and ventral basal ridge present; postmandibular ridge present but short, ending just before the postocular setae; prominent ridge situated between gular suture and postmandibular ridge (perhaps this is the infraorbital ridge but unclear) extending from posterior to middle of gena; gular sutures converging medially; without neck (no nuchal ridge). Labrum (Fig. 11) with deep emargination medially. Mandibles (Figs. 7–8) curved, elongate, symmetrical except molar region; with deep fold on lateral edge (dorsal view); left mandible with distinct bicuspid molar, but valley between cusps varies among species; right mandible with single molar or weak bicuspid molar; prostheca setose. Maxilla as in Fig. 9; galea and lacinia densely setose; maxillary palpi 4-segmented; P_1 (= palpomere 1) short; P_2–P_4 elongate; P_2 curved, approximately twice as long as P_1, with several rows of macrosetae; P_3 curved, slightly shorter than P_2, widest anteriorly, with rows of macrosetae anteriorly; P_4 straight, rounded apically, shorter than P_3. Hypopharynx as in Fig. 10. Labium as in Figs. 10, 18; labial palpi 3-segmented; P_1 shorter than P_2; P_2 with several long macrosetae around anterior border; P_3 either securiform (Fig. 18) or truncate (Fig. 10) but in both cases longer than P_2. Antenna (Figs. 22–27) 11-segmented; antennomeres 1–3 longer than wide, with several rows of macrosetae; antennomeres 4–11 length to width varies, covered with microtrichiae. Antennomeres 4 and 5 asymmetrical in same species; 6–10 always asymmetrical.

Pronotum (Figs. 12–17) as wide as or slightly wider than head; convex; subquadrate to quadrate; with postcoxal process present (although not always easy to see). Anterolateral corners of pronotum bulging dorsally and clearly extending beyond anterior margin of pronotum. Pronotum hypomeron expanded; superior and inferior marginal lines of the pronotum clearly separated throughout their length (inferior line sometimes difficult to observe near bulging anterolateral corner of pronotum); superior line clearly visible from above and forming slightly explanate carina along the border of pronotum (visible both in Figs. 1–6 and Figs. 12–17). Pronotum with microsculpture and micropunctures that varies among species; density of punctures on lateral and anterolateral sides of pronotum varies. Basisternum (Fig. 18) with diagonal demarcations; with microsculpture and macrosetae; anterior marginal depression present; sternacostal ridge present; furcasternum with small medial carina. Elytra wider and longer than pronotum; with uniform, dense, contiguous small punctation; with large prominent macrosetae around lateral and posterior margins. Elytra trapezoid, becoming wider posteriorly; depressed near mesoscutellum.

Mesoscutellum large, with dense punctation and setation similar to elytra. Hind wings fully developed. Mesoventrite (Fig. 19) without median carina or mesoventral process; mesoventrite disc with a narrow elongate impunctate line. Metaventrite with two small, round, triangular mesoventral processes. Legs with tarsal segmentation 5-5-5; covered with dense setae; meso- and metatibia with two long apical spurs (similar to those in *Terataki* and *Darwinilus*), spurs as long as basitarsus. Protarsus enlarged in both sexes; meso- and metatarsi not enlarged but elongate; two empodial setae present.

Abdomen (Figs. 20–21) with paired prototergal glands present; abdominal termites III–V without curved (arch-like) ridge or accessory basal lines. Abdominal sternites and tergites with dense uniform punctation. Abdominal sternite VII in males with porose structure positioned medio-anteriorly except in T. *banghaasi* absent; posterior border of sternite VII with broad and shallow U-shaped emargination in T. *banghaasi*, unmodified in other species. Abdominal sternite VIII in males with emargination medially that varies among species.

Male and female genitalia (Figs. 28–42) typical of Xanthopygina; spermatheca not sclerotized; aedeagus with long median lobe slightly curved in lateral view; median lobe with dorsal tooth and sclerotized ventral apical "shelf" above endophallus opening. Paramere divided apically to two lobes.

REMARKS: The name *Trigonophorus* ("triangle bearing" in Greek) refers to the securiform shape of labial P_3 present in *T. banghaasi*, *T. coelestis* (BERNHAUER), and *T. myrtillinus*.

Trigonopselaphus banghaasi (BERNHAUER, 1914)
(Figs. 1, 12, 20, 22, 28–30)

Polyphemus banghaasi BERNHAUER 1914b: 52.
Polyphemus melzeri BIERIG 1932: 261 **syn.n.**
Polyphematiana banghaasi (BERNHAUER); SCHEERPELTZ 1933: 1419.
Polyphematiana melzeri (BIERIG); SCHEERPELTZ 1933: 1419.
Trigonopselaphus banghaasi (BERNHAUER); HERMAN 2001b: 28.
Trigonopselaphus melzeri (BIERIG); HERMAN 2001b: 28.

TYPE MATERIAL: **Holotype** of *Polyphemus banghaasi*: ♂: "[Brazil] R. Grande do Sul / *Polyphemus banghaasi* Bern.Typus / Chicago NHMus M. Bernhauer Collection / *Trigonopselaphus banghaasi* (BERNHAUER) det. Chatzimanolis 2014" (FMNH). – **Holotype** of *Polyphemus melzeri*: ♂: "Sao Paulo, 20.xii.1918, Brasilien / Brazil - S. Paulo, Est. S. Paulo 21.xii.1918 [note: this date is different than the one above — in the manuscript BIERIG listed the date as 21.xii.1918], Saude / Typus / Field Mus. Nat. Hist. A. Bierig Colln. Acc. Z-13812/ *Polyphemat*. [*iana*] *melzeri* BIERIG / *Trigonopselaphus banghaasi* (BERNHAUER) det. Chatzimanolis 2014" (FMNH).

ADDITIONAL MATERIAL EXAMINED:
BRAZIL: Minas Gerais: (1 ♂ BMNH); **Rio de Janeiro:** Neu Freiburg [= Nova Friburgo] (1 ♂ ZMHB); Rio [de Janeiro], 7.iii.[19]20 (1 ♂ FMNH); Corcovado, ii.1948, coll. Wygodzinski (1 ♀ NHMB); **São Paulo:** Cubatão (1 ♂ ZMHB); **unknown state:** (1 ♂ NMW).

DIAGNOSIS: Among *Trigonopselaphus* taxa that have sparse punctation on the anterolateral corners and lateral sides of pronotum, *T. banghaasi* has abdominal sternite VII in males without porose structure but with a broad and shallow U-shaped emargination at the posterior border (Fig. 20). Additionally, antennomeres 4–10 are lobed and strongly asymmetrical (Fig. 22; reminiscent of the antennae of *D. sedarisi*, but not quite as serrate as in that species); the paramere is divided into two lobes from apex until middle of paramere, and the total length is 24–28 mm.

DESCRIPTION: Body length 24–28 mm. Coloration of head and pronotum dark metallic blue or purple, sometimes with golden-red or green overtones. Antennomeres brown; antennomeres 4–11 with yellow setation. Elytra dark metallic blue-purple; mesoscutellum brown. Dorsal surface

of abdomen shinning brown. Ventral surface of body brown except posterior margin of sternite VIII orange. Legs brown except protarsi orange.

Head width:length ratio = 1.15; surface of epicranium with many irregularly spaced small punctures; with larger punctures around eyes and near border of temples; epicranium with dense polygon-shaped microsculpture, appearing matt. Clypeus with broad emargination; frons depressed medially, with two large furrows on each side. Length of eye to length of head ratio = 0.38. Middle of epicranium slightly convex. Ventral surface of head with two loosely organized rows of large punctures immediately beneath each mandible. Left mandible with shallow valley between two molar cusps; labial P_3 securiform. Antennomeres 4–11 transverse; 4–10 strongly asymmetrical to serrate; 5–7 similar in shape, larger than 4 and 8–10; 8–10 similar in shape. Pronotum quadrate, width:length ratio = 1, as wide as head; with many irregularly spaced small punctures on disc and few larger ones; with dense polygon-shaped microsculpture; appearing matt. Lateral borders of pronotum slightly convex medially. Anterolateral sides of pronotum without dense punctation, punctures widely spaced. Elytra width:length ratio = 1.07. Posterior margin of abdominal sternite VII in males with broad and shallow U-shaped emargination medially; without porose structure. Posterior margin of abdominal sternite VIII in males with deep V-shaped emargination medially.

Aedeagus (Figs. 28–30) with paramere in dorsal view divided to near middle into two lobes; distance between two lobes wider apically; each lobe converging to rounded apex; paramere shorter and narrower than median lobe; in lateral view paramere straight; with a row of sensory spinules (Fig. 30) on each interior side of the paramere lobe. Median lobe in dorsal view wide, converging to elongate rounded apex; with single wide dorsal tooth; in lateral view becoming much narrower near apex.

DISTRIBUTION: Known from the states of Minas Gerais, Rio de Janeiro, Rio Grande do Sul and São Paulo in Brazil.

Trigonopselaphus coelestis (BERNHAUER, 1921)

(Figs. 2, 13, 18–19, 23, 31–33)

Polyphemus coelestis BERNHAUER 1921b: 19.
Polyphematiana coelestis (BERNHAUER); SCHEERPELTZ 1933: 1419.
Trigonopselaphus coelestis (BERNHAUER); HERMAN 2001b: 28.

TYPE MATERIAL: **Holotype** ♂: "coll. Spermann ded. Bang-Haas / *Polyphemus coelestis* Bernh. Typus unic. / Brasil. coll. Spermann / Chicago NHMus M. Bernhauer Collection / *Trigonopselaphus coelestis* (BERNHAUER) det. Chatzimanolis 2014" (FMNH).

ADDITIONAL MATERIAL EXAMINED:

BRAZIL: Rio de Janeiro: Petrópolis, 2.ii.1868 (1 ♀ BMNH); **Rio Grande do Sul:** Santo Augusto, xi.1968, O. Roppa (1 ♀ BMNH); **São Paulo:** Est. Biol. Boraceia, Salesópolis S.P., 4–11.ii.1962, G.R. Kloss coll. (1 ♀ BMNH).

DIAGNOSIS: Among *Trigonopselaphus* taxa that have sparse punctation on the anterolateral corners and lateral sides of pronotum, *T. coelestis* has abdominal sternite VII in males with porose structure but does not have an emargination at the posterior border (as in Fig. 21) of sternite VII. Additionally, antennomeres 5–10 are weakly asymmetrical (Fig. 23), the paramere is divided into two short lobes only at apex. Total length is between 25–29 mm.

DESCRIPTION: Body length 25–29 mm. Coloration of head and pronotum metallic purple, with blue-green overtones. Antennomeres 1–4 brown, 5–11 reddish brown with dark yellow setation. Elytra dark metallic blue-purple; mesoscutellum brown. Dorsal surface of abdomen shinning dark metallic blue. Ventral surface of body shinning metallic brown with blue overtones. Legs brown except protarsi orange.

Head width:length ratio = 1.15; surface of epicranium with many irregularly spaced small punctures; with few larger punctures scattered, especially around eyes and near border of temples; epicranium with dense polygon-shaped microsculpture, appearing matt. Clypeus with broad emargination; frons depressed medially, but without any furrows. Length of eye to length of head ratio = 0.34. Middle of epicranium slightly convex. Ventral surface of head with two loosely organized rows of large punctures immediately beneath each mandible. Left mandible with shallow valley between two molar cusps; labial P_3 securiform. Antennomere 4 subquadrate, 5–10 transverse; 5–10 asymmetrical; 5–7 similar in shape, longer than 4 and 8–10; 8–10 similar in shape. Pronotum quadrate, width:length ratio = 1, as wide as head; with many irregularly spaced small punctures on disc and few larger ones; with dense polygon-shaped microsculpture; appearing matt. Lateral borders of pronotum slightly convex medially. Anterolateral sides of pronotum without dense punctation, punctures widely spaced. Elytra width:length ratio = 1. Posterior margin of abdominal sternite VII in males without emargination; with porose structure. Posterior margin of abdominal sternite VIII in males with broad and shallow U-shaped emargination medially.

Aedeagus (Figs. 31–33) with paramere in dorsal view having shallow v-shaped emargination apically; slightly wider near apex; paramere shorter and narrower than median lobe; in lateral view paramere convex; with sensory spinules as shown in Fig. 33. Median lobe in dorsal view wide, converging to elongate pointed apex; with single wide dorsal tooth; in lateral view becoming much narrower near apex.

DISTRIBUTION: Known from the states of Rio de Janeiro, Rio Grande do Sul and São Paulo in Brazil.

Trigonopselaphus columbinus (ERICHSON, 1839)
(Figs. 3, 7–11, 14, 24, 34–36)

Staphylinus columbinus ERICHSON 1839: 400.
Trigonopselaphus columbinus (ERICHSON); GEMMINGER & HAROLD 1868: 597.
Polyphemus columbinus (ERICHSON); BERNHAUER 1921b: 19.
Polyphematiana columbinus (ERICHSON); SCHEERPELTZ 1933: 1419.
Trigonopselaphus columbinus (ERICHSON); HERMAN 2001b: 28.

TYPE MATERIAL: **Lectotype** ♀: "5975 / Hist. Coll. (Coleoptera) Nr. 5975 *Staphylinus columbinus* Erichs. Brasil. Virmond. Zool. Mus. Berlin / SYNTYPUS *Staphylinus columbinus* ERICHSON, 1839 labelled by MNHUB 2011 / Lectotype *Staphylinus columbinus* ERICHSON des. Chatzimanolis 2014 / *Trigonopselaphus columbinus* (ERICHSON) det. Chatzimanolis 2014". – **Paralectotype** ♀: "Hist. Coll. (Coleoptera) Nr. 5975 *Staphylinus columbinus* Erichs. Brasil. Virmond. Zool. Mus. Berlin / SYNTYPUS *Staphylinus columbinus* ERICHSON, 1839 labelled by MNHUB 2011 / Paralectotype *Staphylinus columbinus* ERICHSON des. Chatzimanolis 2014 / *Trigonopselaphus columbinus* (ERICHSON) det. Chatzimanolis 2014".

ADDITIONAL MATERIAL EXAMINED:
BRAZIL: unknown state: (1 ♂, 1 ♀ ZMHB).

DIAGNOSIS: Among *Trigonopselaphus* taxa that have dense, almost contiguous punctation on the anterolateral corners and lateral sides of pronotum, *T. columbinus* has shinning metallic dark purple, with blue-green overtones, the surface of head and pronotum appears glossy, antennomere 4 is subquadrate, and the paramere has two rows of 6–8 sensory spinules each. However, it should be noted that sometimes female specimens of *T. herculeanus* appear glossier than the males. Total length of specimens is 31–36 mm. Without dissecting male specimens or comparing types, *T. columbinus* is rather difficult to distinguish from *T. herculeanus*.

DESCRIPTION: Body length 31–36 mm. Coloration of head and pronotum shinning metallic dark purple, with blue-green overtones. Antennomeres 1–4 metallic brown-blue, 5–11 reddish brown with dark yellow setation. Elytra metallic purple; mesoscutellum metallic blue. Dorsal

surface of abdomen dark metallic blue-green. Ventral surface of body shinning metallic brown with blue-green overtones, especially on anterior and posterior margins of segments. Legs metallic brown with blue-green overtones.

Head width:length ratio = 1.04; surface of epicranium with few large punctures scattered, especially around eyes and border of temples but disc of epicranium without punctures; with micropunctures and dense transverse-shaped microsculpture, appearing glossy. Clypeus with deep emargination; frons without depression. Length of eye to length of head ratio = 0.24. Middle of epicranium convex. Ventral surface of head with few large scattered punctures. Left mandible with deep valley between two molar cusps; labial P_3 truncate, not securiform. Antennomeres 4–5 subquadrate; 6–10 transverse, weakly asymmetrical; 6–7 similar in shape, longer than 8–10; 8–10 similar in shape. Pronotum subquadrate, width:length ratio = 1.08; as wide as head; pronotum disc impunctate but with micropunctures and dense transverse-shaped microsculpture; appearing glossy. Lateral borders of pronotum slightly convex medially. Anterolateral sides of pronotum with dense uniform medium-size punctures, punctures almost contiguous; punctures becoming smaller and denser on each side of anterolateral corner. Elytra width:length ratio = 1.01. Posterior margin of abdominal sternite VII in males without emargination; with porose structure. Posterior margin of abdominal sternite VIII in males with broad and shallow U-shaped emargination medially.

Aedeagus (Figs. 34–36) with paramere in dorsal view having deep v-shaped emargination apically; paramere slightly converging from middle to apex; paramere shorter and narrower than median lobe; in lateral view paramere slightly convex; with sensory spinules as shown in Fig. 36. Median lobe in dorsal view wide, converging to elongate pointed apex; with single wide dorsal tooth; in lateral view becoming much narrower near apex.

DISTRIBUTION: Known from Brazil but without specific location details.

Trigonopselaphus diplopegus **sp.n.**
(Figs. 5, 15, 21, 25, 37–39)

TYPE MATERIAL: **Holotype** ♂: "Ecuador / M. Cameron. Bequest. B.M. 1955-147. / Holotype *Trigonopselaphus diplopegus* CHATZIMANOLIS des. Chatzimanolis 2014" (BMNH). – **Paratypes** (6 exs.): 2 ♀♀: "Ecuador / Sharp Coll. 1905-313. / Sarayacu [Sara Yacu] Ecuador /Buckley 1879" (BMNH); 1 ♀: "Sara Yacu 80.14 / *Polyphematiana columbina* Er." (BMNH); 1 ♂: "Sara Yacu 80.14 / *Polyphematiana columbina* Er. / ChicagoNHMus M. Bernhauer Collection" (FMNH); 1 ♂: "Peru: Loreto: Yagua Indian Village headwaters of Loreto-Yacu / iv.24 –26.1970 leg. B. Malkin" (FMNH); 1 ♂: "Rio Tapiche Peru iii.1928 F6154 / H. Bassler Collection Acc. 33591 / *Polyphematiana* sp A. Newton det. 1979" (AMNH). All paratypes with label: "Paratype *Trigonopselaphus diplopegus* CHATZIMANOLIS des. Chatzimanolis 2014".

DIAGNOSIS: Among *Trigonopselaphus* taxa that have dense, almost contiguous punctation on the anterolateral corners and lateral sides of pronotum, *T. diplopegus* has the coloration of abdomen vivid metallic blue-green, and is known from Ecuador and Peru. Additionally, the total length of specimens is 31–39 mm, the surface of the head and pronotum appears glossy and the paramere has sensory spinules in pairs (Fig. 39).

DESCRIPTION: Body length 31–39 mm. Coloration of head and pronotum shinning bright metallic blue, with purple-green overtones. Antennomeres 1–5 metallic brown-green, 6–11 reddish brown with dark yellow setation. Elytra and mesoscutellum metallic blue-purple. Dorsal surface of abdomen shinning bright metallic blue-green. Ventral surface of body shinning metallic brown with blue-green overtones, especially on anterior and posterior margins of segments. Legs metallic brown with blue-green overtones.

Head width:length ratio = 1.16; surface of epicranium with few large punctures scattered, especially around eyes and border of temples but disc of epicranium without punctures; with

micropunctures and dense transverse-shaped microsculpture, appearing glossy. Clypeus with deep emargination; frons with narrow and shallow depression. Length of eye to length of head ratio = 0.3. Middle of epicranium convex. Ventral surface of head with few large scattered punctures. Left mandible with deep valley between two molar cusps; labial P_3 truncate, not securiform. Antennomere 4 longer than wide; 5 subquadrate; 6–10 transverse, weakly asymmetrical; 6–7 similar in shape, longer than 8–10; 8–10 similar in shape. Pronotum subquadrate, width:length ratio = 1.09, slightly wider than head; pronotum disc impunctate but with micropunctures and dense transverse-shaped microsculpture; appearing glossy. Lateral borders of pronotum slightly convex medially. Anterolateral sides of pronotum with dense uniform medium-size punctures, distance between punctures equal width of puncture; punctures becoming smaller and denser on each side of anterolateral corner. Elytra width:length ratio = 0.96. Posterior margin of abdominal sternite VII in males without emargination; with porose structure. Posterior margin of abdominal sternite VIII in males with broad and shallow U-shaped emargination medially.

Aedeagus (Figs. 37–39) with paramere in dorsal view having deep v-shaped emargination apically; paramere parallel-sided from middle to apex; paramere shorter and narrower than median lobe; in lateral view paramere straight; with sensory spinules (Fig. 39) mainly in pairs, typically 3–4 such pairs per side of paramere. Median lobe in dorsal view wide, converging to elongate pointed apex; with single wide dorsal tooth; in lateral view becoming much narrower near apex.

DISTRIBUTION: Known from Sara Yacu in Ecuador and from Loreto department in Peru.

ETYMOLOGY: The specific epithet derives from the words "diplo" (double in Greek) and "peg" (from the peg setae on the paramere) and refers to the particular formation of peg setae on the paramere.

Trigonopselaphus herculeanus (Laporte, 1835)
(Figs. 4, 16, 26, 40–42)

Staphylinus herculeanus Laporte 1835: 114.
Polyphemus herculeanus (Laporte); Bernhauer 1914a: 52.
Polyphematiana herculeanus (Laporte); Scheerpeltz 1933: 1419.
Trigonopselaphus herculeanus (Laporte); Herman 2001b: 28.

TYPE MATERIAL: **Neotype** ♂: "♂ / Hansa Humboldt Sta[tion] Catharina Brasilien Reitter / Emmerich Reitter vend. iii.1940 / ex coll. Scheerpeltz / Neotype *Staphylinus herculeanus* Laporte des. Chatzimanolis 2014 / *Trigonopselaphus herculeanus* (Laporte) det. Chatzimanolis 2014" (NMW).

ADDITIONAL MATERIAL EXAMINED:

ARGENTINA: Misiones: El Soberbio, 27.18S, 54.13W, ii.1985, S. Bolle (1 ♀ FMNH).

BRAZIL: Espírito Santo: unknown location (1 ♀ CNC); **Rio de Janeiro:** Theresopolis [Teresópolis], J. Michaelis (1 ♂, 3 ♀♀ ZMHB); **Rio Grande do Sul:** São Leopoldo (1 ♀ NMW); unknown location (1 ♀ ZMHB); **São Paulo:** São Paulo (1 ♀ FMNH); **Santa Catharina:** Hansa Humboldt Station, viii.1939, E. Reitter (4 ♀♀, 6 ♂♂ NMW); same location, iii.1940, E. Reitter (1 ♀, 2 ♂♂ NMW; 1 ♂ ZMUC); unknown location (1 ♀ SDEI; 1 ♂ ZMHB); **unknown state:** (1 ♀ BMNH; 1 ♀ FMNH; 1 ♀ MCZ; 1 ♀, 1 ♂ NMW; 1 ♀ SDEI; 1 ♂ ZMHB).

PARAGUAY: Guaira: Villarica, xi.1925, F. Schade (1 ♂ NMW); same location and collector, ix.1948, (1 ♀ NMW); same location and collector, xii.1948, (1 ♀ NMW); same location and collector, vi.1949 (2 ♂♂ NMW); 300 m, 11.x.1961, C. Pfannel (1 ♂ FMNH).

DIAGNOSIS: Among *Trigonopselaphus* taxa that have dense, almost contiguous punctation on the anterolateral corners and lateral sides of pronotum, *T. herculeanus* has the surface of head and pronotum appearing matt, antennomere 4 longer than wide, and the paramere with two rows of 2–3 sensory spinules each. However, it should be noted that sometimes female specimens of *T. herculeanus* appear glossier than the males. Total length of specimens is 31–40 mm. Without

dissecting male specimens, *T. herculeanus* could be rather difficult to distinguish from *T. columbinus*.

DESCRIPTION: Body length 31–40 mm. Coloration of head and pronotum dark metallic blue, with purple-green overtones. Antennomeres 1–5 metallic brown-blue, 6–11 brown with dark yellow setation. Elytra and mesoscutellum metallic blue-purple. Dorsal surface of abdomen dark metallic blue-green. Ventral surface of body metallic brown with blue-green overtones, especially on anterior and posterior margins of segments. Legs metallic brown with blue-green overtones.

Head width:length ratio = 0.98; surface of epicranium with few medium-sized punctures scattered, especially around eyes and border of temples but disc of epicranium without punctures; with micropunctures and dense polygon-shaped microsculpture, appearing matt. Clypeus with deep emargination; frons without depression. Length of eye to length of head ratio = 0.26. Middle of epicranium convex. Middle of head demarcated by narrow depression extending from clypeus to posterior margin. Ventral surface of head with few large scattered punctures. Left mandible with deep valley between two molar cusps; labial P_3 truncate, not securiform. Antennomere 4 longer than wide; 5 subquadrate; 6–10 transverse, weakly asymmetrical; 6–7 similar in shape, longer than 8–10; 8–10 similar in shape. Pronotum quadrate, width:length ratio = 1, as wide as head; pronotum disc impunctate but with micropunctures and dense polygon-shaped microsculpture; appearing matt. Lateral borders of pronotum slightly convex medially. Anterolateral sides of pronotum with dense uniform medium-size punctures, distance between punctures equal width of puncture; punctures becoming smaller and denser on each side of anterolateral corner. Elytra width:length ratio = 0.99. Posterior margin of abdominal sternite VII in males without emargination; with porose structure. Posterior margin of abdominal sternite VIII in males with broad and shallow U-shaped emargination medially.

Aedeagus (Figs. 40–42) with paramere in dorsal view having deep v-shaped emargination apically; paramere slightly converging from middle to apex; paramere shorter and narrower than median lobe; in lateral view paramere straight; with two rows of 2–3 sensory spinules. Median lobe in dorsal view wide, converging to elongate pointed apex; with single wide dorsal tooth; in lateral view becoming much narrower near apex.

DISTRIBUTION: Known from the province of Misiones in Argentina, the states of Espírito Santo, Rio de Janeiro, Rio Grande do Sul, Santa Catharina and São Paulo in Brazil and the Guaira department in Paraguay.

REMARKS: The original type material described by LAPORTE (1835) is considered lost (Ken Walker, Museum Victoria, pers. comm.). The type was among the specimens of the first Laporte collection that was destroyed by a fire at the Smithsonian Institution in 1865 (see EVENHUIS 2012 for a detailed account on Laporte and his collections). The second Laporte collection in Museum Victoria, Australia does not contain the type, but only a drawing of the type by Laporte.

Trigonopselaphus myrtillinus (NORDMANN, 1837)
(Figs. 6, 17, 27)

Trigonophorus myrtillinus NORDMANN 1837: 8.
Staphylinus myrtillinus (NORDMANN); ERICHSON 1839: 400.
Trigonopselaphus myrtillinus (NORDMANN); GEMMINGER & HAROLD 1868: 597.
Polyphemus myrtillinus (NORDMANN); BERNHAUER 1921b: 19.
Polyphematiana zikani BERNHAUER 1927: 165. **syn.n.**
Polyphematiana myrtillinus (NORDMANN); SCHEERPELTZ 1933: 1419.
Trigonopselaphus myrtillinus (NORDMANN); MOORE & LEGNER 1975: 45.
Trigonopselaphus zikani (BERNHAUER); HERMAN 2001b: 28.

TYPE MATERIAL: **Lectotype** of *Trigonophorus myrtillinus* (here designated): ♀: "5973 / Type / Hist. Coll. (Coleoptera) Nr. 5973 *Staphylinus myrtillinus* Nordm. [label mistake, the species was described as *Trigonophorus myrtillinus*] Brasil., v. Olfers, Zool. Mus. Berlin / SYNTYPUS *Trigonopselaphus myrtillinus* NORDMANN [NORDMANN should have been in parentheses], 1837 labelled by MNHUB 2011 / Lectotype *Trigonophorus myrtillinus* NORDMANN des. Chatzimanolis 2014 / *Trigonopselaphus myrtillinus* (NORDMANN) det. Chatzimanolis 2014" (ZMHB). – **Lectotype** of *Polyphematiana zikani* (here designated): ♀: "Mar de Hespanha, E. Minas [= Minas Gerais], Brasilien, 31 Oktober [October] 1910, J. F. Zikan / *Polyphematiana zikani* Bernh. Typus / Chicago NHMus M. Bernhauer Collection / Lectotype *Polyphematiana zikani* Bernhauer des. Chatzimanolis 2014 / *Trigonopselaphus myrtillinus* (NORDMANN) det. Chatzimanolis 2014" (FMNH).

ADDITIONAL MATERIAL EXAMINED:

BRAZIL: Rio de Janeiro: Itatiaya, 700 m, 28.x.1933, No. 34 J.F. Zikan (1 ♀ FMNH); **Unknown state:** (1 ♀ SDEI).

DIAGNOSIS: Among *Trigonopselaphus* taxa that have sparse punctation on the anterolateral corners and lateral sides of pronotum, *T. myrtillinus* has antennomeres 5–10 weakly asymmetrical (Fig. 27). The total body length is 20–22 mm, which is much smaller than in all other species of *Trigonopselaphus* known.

DESCRIPTION: Body length 20–22 mm. Coloration of head and pronotum metallic purple, with golden, green or red overtones. Antennomeres 1–3 brown, 4–11 brown with dark yellow setation. Elytra dark metallic blue-purple; mesoscutellum brown. Dorsal surface of abdomen dark metallic blue-purple. Ventral surface of body shinning metallic brown with blue-purple overtones. Legs brown.

Head width:length ratio = 1.03; surface of epicranium with many irregularly spaced small punctures; with few larger punctures scattered, especially around eyes and near border of temples; epicranium with dense polygon-shaped microsculpture, appearing matt. Clypeus with broad emargination; frons depressed medially, but without any furrows. Length of eye to length of head ratio = 0.28. Middle of epicranium slightly convex. Ventral surface of head with few scattered small to medium size punctures. Left mandible with shallow valley between two molar cusps; labial P_3 securiform. Antennomere 4 subquadrate, 5–10 transverse, asymmetrical; 5–7 similar in shape, longer than 4 and 8–10; 8–10 similar in shape. Pronotum quadrate, width:length ratio = 1, as wide as head; with many irregularly spaced small punctures on disc and few larger ones; with dense polygon-shaped microsculpture; appearing matt. Lateral borders of pronotum almost parallel to each other. Anterolateral sides of pronotum without dense punctation, punctures widely spaced. Elytra width:length ratio = 1.09. Structure of abdominal sternites VII–VIII in males and aedeagus unknown.

DISTRIBUTION: Known from the states of Minas Gerais and Rio de Janeiro in Brazil.

Key to species of *Trigonopselaphus*

There are two other keys in the literature regarding *Trigonopselaphus.* The first was written by BERNHAUER (1921b) for the four species of *Polyphemus* described until then. However that key is missing several taxa and some of the characters are difficult to interpret. The second key was provided by SCHEERPELTZ (1972) for taxa of *Trigonopselaphus* but the taxa included here in *Trigonopselaphus* match the taxonomic concept of *Torobus* sensu HERMAN (2001b) (i.e., before the removal of several taxa from *Torobus* to erect the genus *Terataki*). The key provided below can distinguish male specimens of *Trigonopselaphus*, and unfortunately, most female specimens can only be identified in association with male specimens.

1 Anterolateral corners and lateral sides of pronotum with dense punctation (punctures contiguous or almost contiguous) (Figs. 14–16); labial P_3 apically truncate (Fig. 10); left mandible with deep valley between two molar cusps; (Fig. 7); antennomeres 5–10 symmetrical or weakly asymmetrical (Figs. 24–26)..... 2

– Anterolateral corners and lateral sides of pronotum with sparse punctation (Figs. 12–13, 17); labial P_3 securiform (Fig. 18); left mandible with shallow depression between molar cusps; antennomeres 5–10 strongly asymmetrical (Figs. 22–23, 27) 4

2 Formation of sensory spinules (peg setae) mainly in pairs (Fig. 39), typically 3–4 such pairs per side of paramere; coloration of abdomen shinning bright metallic blue-green (Fig. 5), known from Ecuador and Peru ..... . *diplopegus* sp.n

– Formation of sensory spinules (peg setae) not in pairs; coloration of abdomen darker metallic blue-green, known from Brazil, Argentina and Paraguay 3

3 Surface of head and pronotum appearing glossy; antennomere 4 subquadrate; paramere with two rows of 6–8 sensory spinules (Fig. 36)..... *columbinus*

– Surface of head and pronotum appearing matt (however some female specimens also appear glossy); antennomere 4 longer than wide; paramere with two rows of 2–3 sensory spinules (Fig. 42) ..... *herculeanus*

4 Size 20–22 mm, (Fig. 6; only female specimens known)..... *myrtillinus*

– Size >24 mm..... 5

5 Abdominal sternite VII in males without porose structure but with broad and shallow U-shaped emargination at posterior border (Fig. 20); antennomeres 4–10 lobed and strongly asymmetrical (Fig. 22); paramere divided into two lobes from apex until middle (Figs. 29–30) ..... *banghaasi*

6 Abdominal sternite VII in males with porose structure but without U-shaped emargination at posterior border (Fig. 21); antennomeres 5–10 asymmetrical but not as strongly as in *T. banghaasi* (Fig. 23); paramere divided only at apex (Figs. 32–33)..... *coelestis*

Discussion

No data are available for the natural history and habitat of these large rove beetles. Perhaps the presence of asymmetrical antennae is an indication that they live in nests of wasps or other social insects as it has been hypothesized or documented for other rove beetles (e.g. *Taxiplagus* BERNHAUER in SCHILLHAMMER 2013; *Terataki* in CHATZIMANOLIS 2013; *Triacrus dilatus* NORDMANN in WASMANN 1902). The mandibles of these beetles often had signs of wear and tear which might be an indication of active predatory life style. Additionally, the meso- and metatarsi are elongate perhaps indicative of support for running. Another intriguing morphological feature in these beetles is the presence of a porose structure (Fig. 21) in males (except *T. banghaasi*). The purpose of this structure is unknown, although it is found in many other rove beetles both within Xanthopygina (e.g., *Glenus* KRAATZ, *Haematodes* LAPORTE, *Plociopterus* KRAATZ, *Terataki*) and other related taxa (e.g., *Philothalpus* KRAATZ, Anisolinina). The morphology of the porose structure is not similar in all these taxa, which probably indicates that this structure is not homologous and has evolved multiple times.

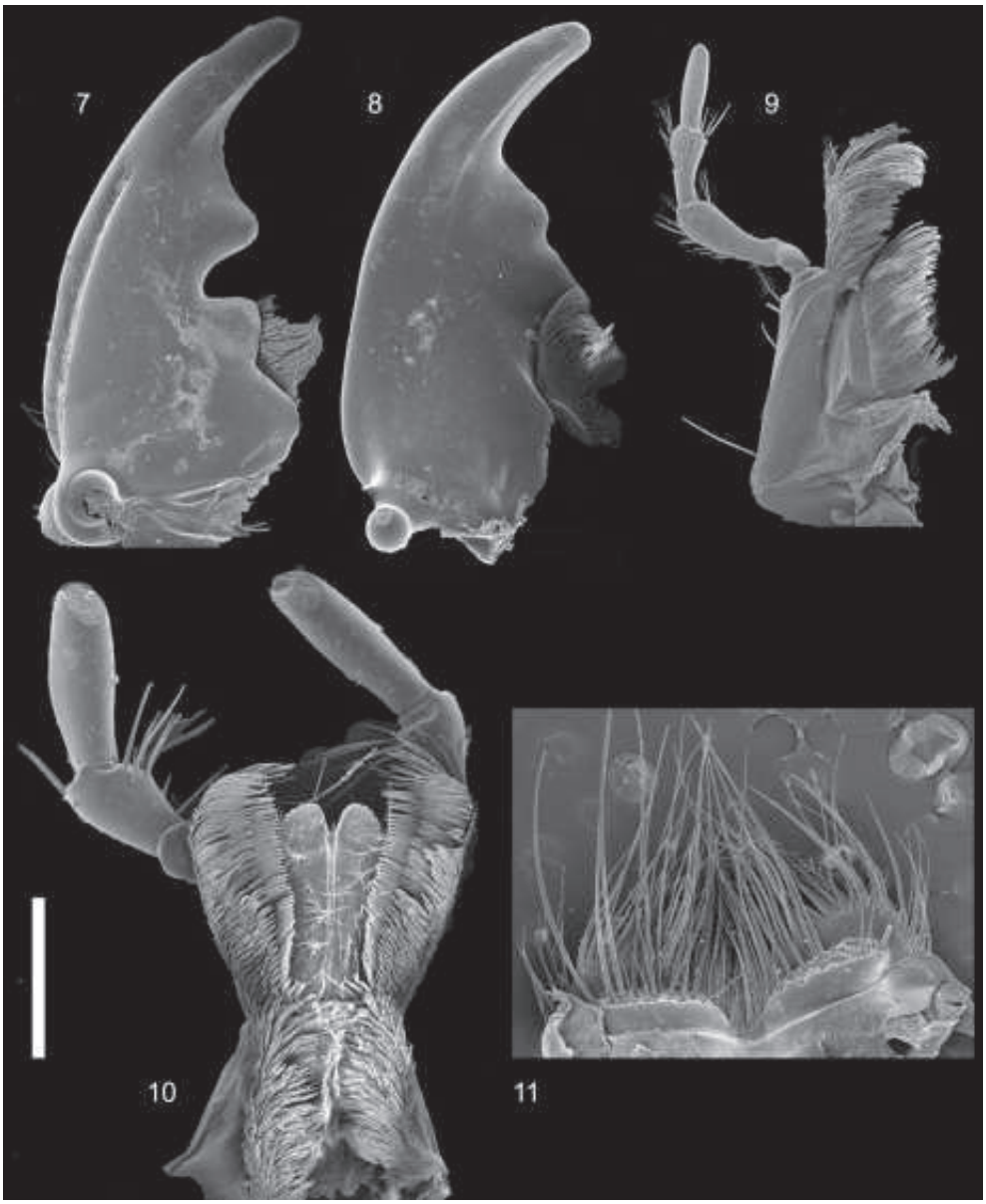
It appears that *Trigonopselaphus* is relatively rare in collections, despite its large size, which may have to do with the hypothesized cryptic habitat (i.e., in nests of other insects). The map on Fig. 43 reveals a huge gap in the distribution of the species between the coastal Brazil and Ecuador, Peru. This gap is most likely due to incomplete sampling rather than reflecting the actual distribution of the genus. It is conceivable that the taxa discussed in this revision represent just the tip of the iceberg regarding the diversity of this genus.

Most of the specimens from Brazil that were available for this revision were collected in the first half of the 20th century by German collectors. It is unfortunate that more recent specimens from that region were not available from Brazilian collections despite my repeated requests using both email and social media.

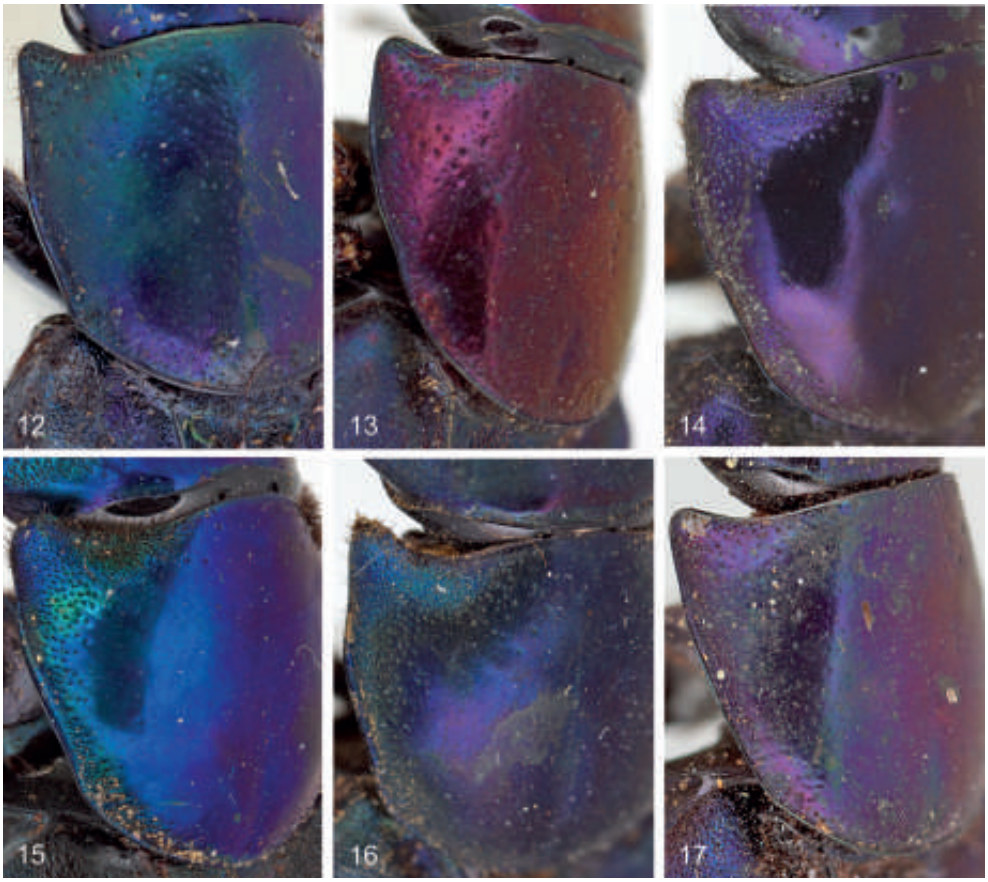
Figs. 1–2: Habitus photographs of *Trigonopselaphus*, 1) *T. banghaasi*, total length = 28 mm, 2) *T. coelestis*, total length = 29 mm.

Figs. 3–4: Habitus photographs of *Trigonopselaphus*, 3) *T. columbinus*, total length = 36 mm, 4) *T. herculeanus*, total length = 40 mm.

Figs. 5–6: Habitus photographs of *Trigonopselaphus*, 5) *T. diplopegus*, total length = 37 mm, 6) *T. myrtillinus*, total length = 20 mm.



Figs. 7–11: Mouthparts of *Trigonopselaphus columbinus*, 7) dorsal view of left mandible, scale bar = 1 mm, 8) ventral view of right mandible, scale bar = 1 mm, 9) dorsal view of left maxilla, scale bar = 1 mm, 10) hypopharynx and labial palpi, scale bar = 0.5 mm, 11) labrum , scale bar = 0.75 mm.



Figs. 12–17: Oblique view of pronotum, highlighting the punctation patterns on anterolateral and lateral sides, 12) *Trigonopselaphus banghaasi*, 13) *T. coelestis*, 14) *T. columbinus*, 15) *T. diplopegus*, 16) *T. herculeanus*, 17) *T. myrtillinus*. Not to scale.

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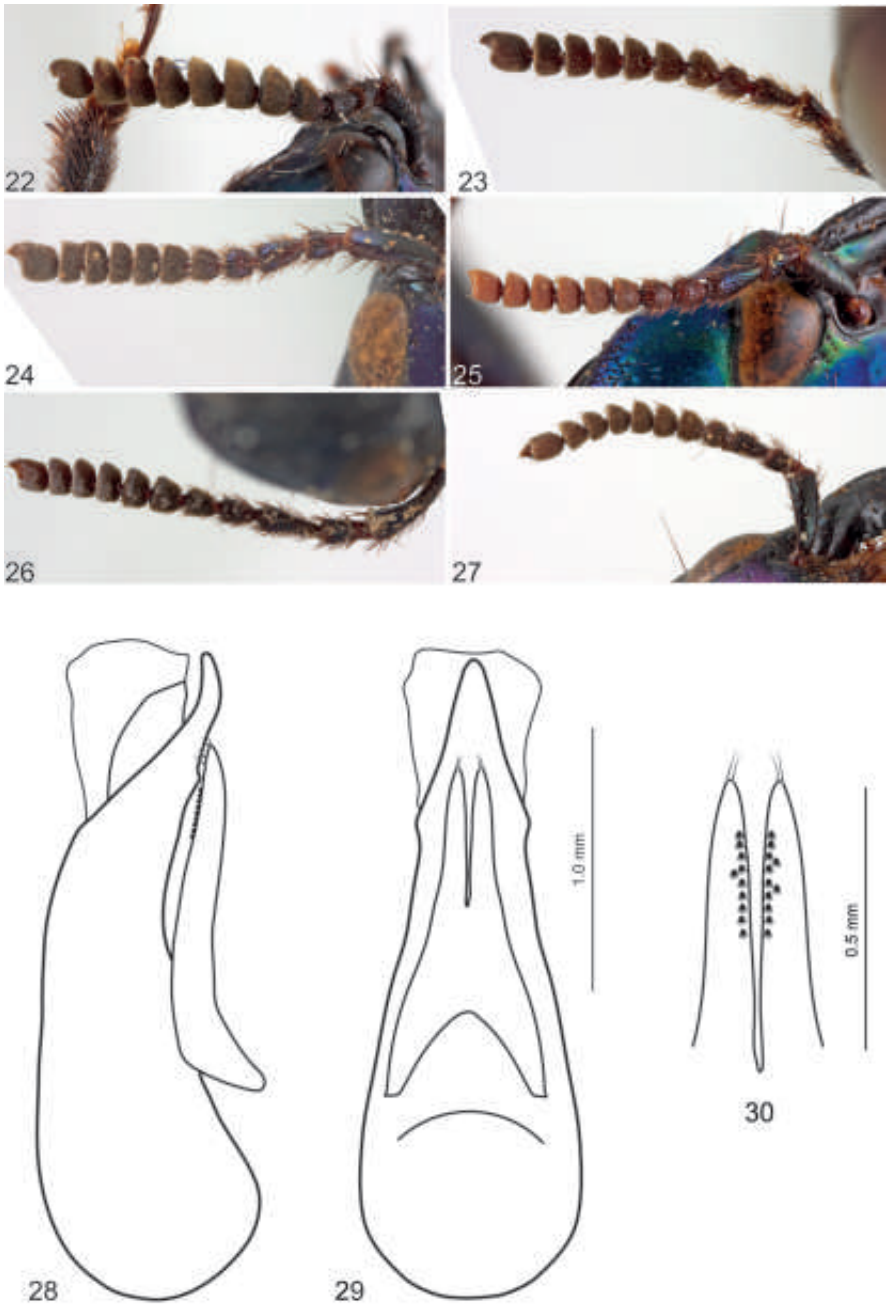
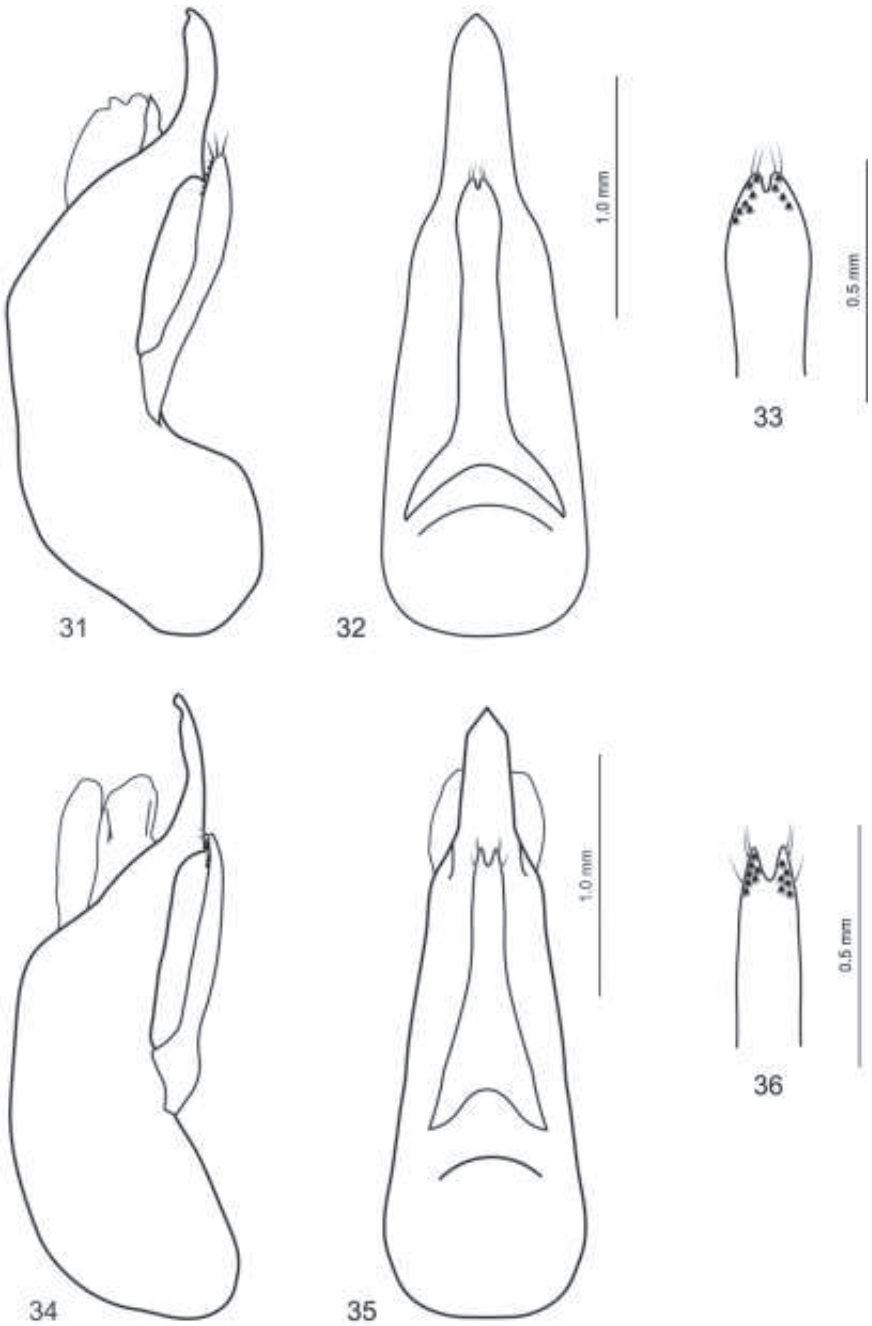
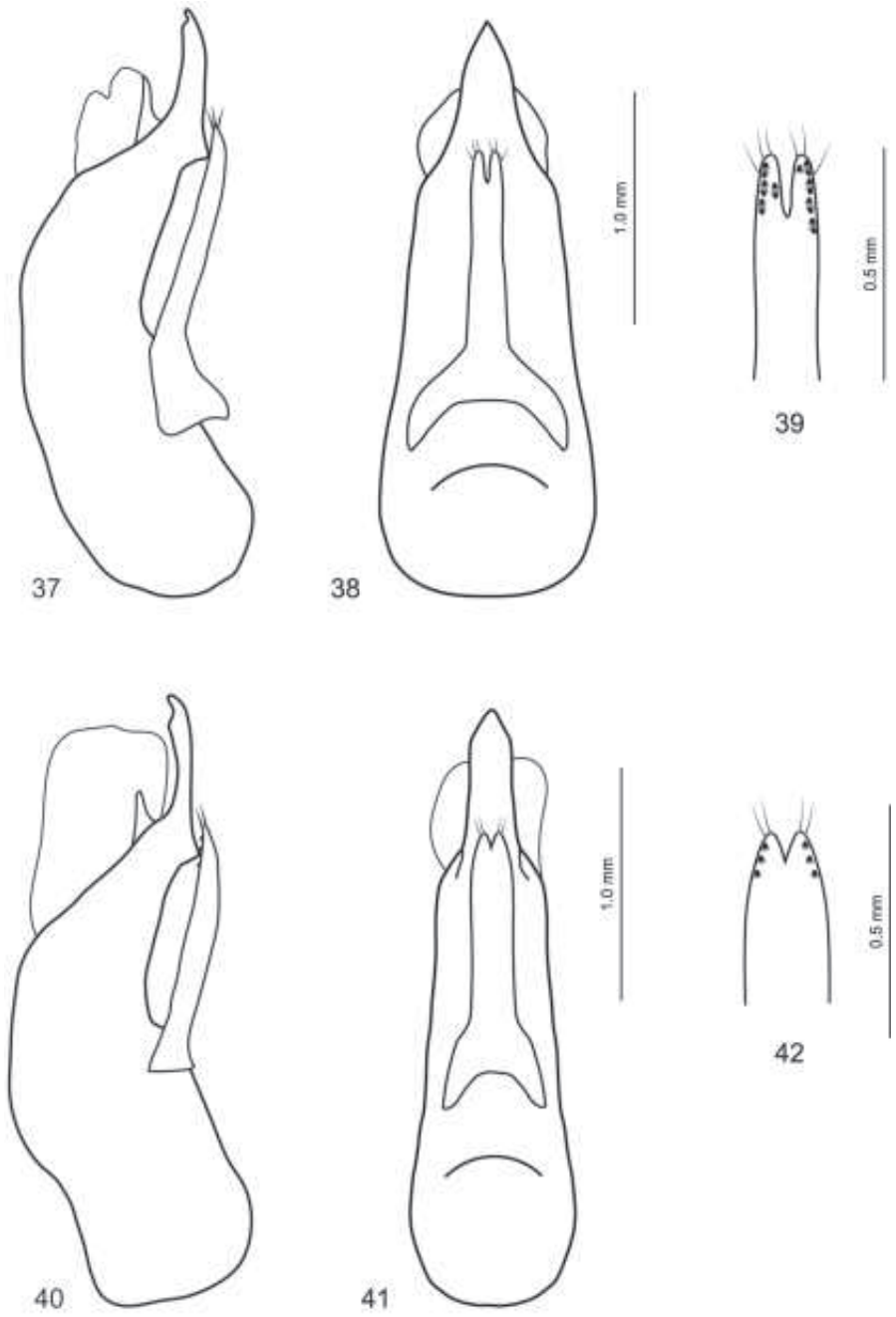
Figs. 18–19: *Trigonopselaphus coelestis*, 18) ventral view of head and prosternum, scale bar = 0.5 mm, 19) ventral view of meso- and metaventrite, scale bar = 0.4 mm.
Figs. 20–21: Abdominal sternites VI–VIII, 20) *Trigonopselaphus banghaasi*, scale bar = 2.5 mm, 21) *T. diplopegus*, scale bar = 3 mm.



Figs. 22–27: Antennae, 22) *Trigonopselaphus banghaasi*, 23) *T. coelestis*, 24) *T. columbinus*, 25) *T. diplopegus*, 26) *T. herculeanus*, 27) *T. myrtillinus*. Not to scale.
Figs. 28–30: Aedeagus of *Trigonopselaphus banghaasi*, 28) lateral view, 29) dorsal view, 30) detail of paramere, ventral view.



Figs. 31–33: Aedeagus of *Trigonopselaphus coelestis*, 31) lateral view, 32) dorsal view, 33) detail of paramere, ventral view.
Figs. 34–36: Aedeagus of *Trigonopselaphus columbinus*, 34) lateral view, 35) dorsal view, 36) detail of paramere, ventral view.



Figs. 37–39: Aedeagus of *Trigonopselaphus diplopegus*, 37) lateral view, 38) dorsal view, 39) detail of paramere, ventral view.
Figs. 40–42: Aedeagus of *Trigonopselaphus herculeanus*, 40) lateral view, 41) dorsal view, 42) detail of paramere, ventral view.

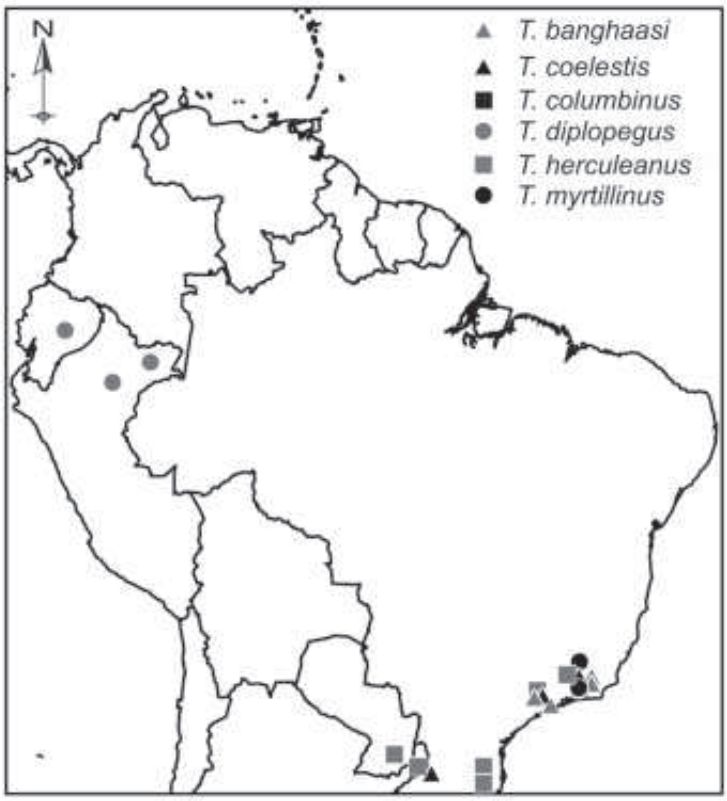


Fig. 43: Distribution map of species of *Trigonopselaphus*.

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