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Neotrichaphodioides, new genus of Neotropical Aphodiini, with description of a new species from Peru (Scarabaeoidea: Scarabaeidae: Aphodiinae)

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Abstract. The **new genus** *Neotrichaphodioides* and the **new species** *N. woytkowskii* from Peru are described. *Aphodius caracanus* Balthasar, *A. ecuadoriensis* Petrovitz, *A. forsterianus* Balthasar, and *A. volxemi* Harold are redescribed and figured, and transferred into *Neotrichaphodioides*, all becoming **new combinations**. **New synonymies** of *Aphodius martinsi* Petrovitz with *N. caracanus* (Balthasar) and *Aphodius squamifer* Petrovitz with *N. volxemi* (Harold) are presented. The **lectotype** of *A. volxemi* is here designated.

Key words. Systematics, new genus, new species, new combinations, new synonymies, lectotype designation, *Neotrichaphodioides*, *N. woytkowskii*, Neotropical, Aphodiinae.

Introduction

The main taxonomical characteristics of the new genus *Neotrichaphodioides* are: a) scutellum small, triangular; b) hind tibiae apically fimbriate with spinulae irregularly elongate; c) basal margin of pronotum not bordered; d) head and pronotum glabrous; e) pronotum coarsely punctured on disc; f) aedeagus with parameres short, with a preapical tuft of more or less elongate hairs, sometimes extremely elongate; g) epipharynx with corypha not reaching the anterior margin and with two apical strong spiculae; h) male with the first segment of labial palpi strongly shortened and widened, the second cylindrical more elongate and widened, the third normally shaped; i) segments of mesotarsi always normally shaped; j) head large, clypeus nearly semicircular, genae acutely or rightly angulate; and k) protibiae with punctate dorsal surface.

The new taxon is similar to the Afrotropical genus *Trichaphodioides* Paulian, 1942, in general morphology and having sexually dimorphic labial palpi. *Neotrichaphodioides* can be easily distinguished by the peculiar shape of males labial palps (Fig. 1-2), usually by the normal shape of the mesotarsal segments (Fig. 3-4), and by the Neotropical distribution.

The terminology used in this work to describe the morpho-anatomical features follows that of Dellacasa et al. (2001).

Materials

Materials studied are in the following collections:

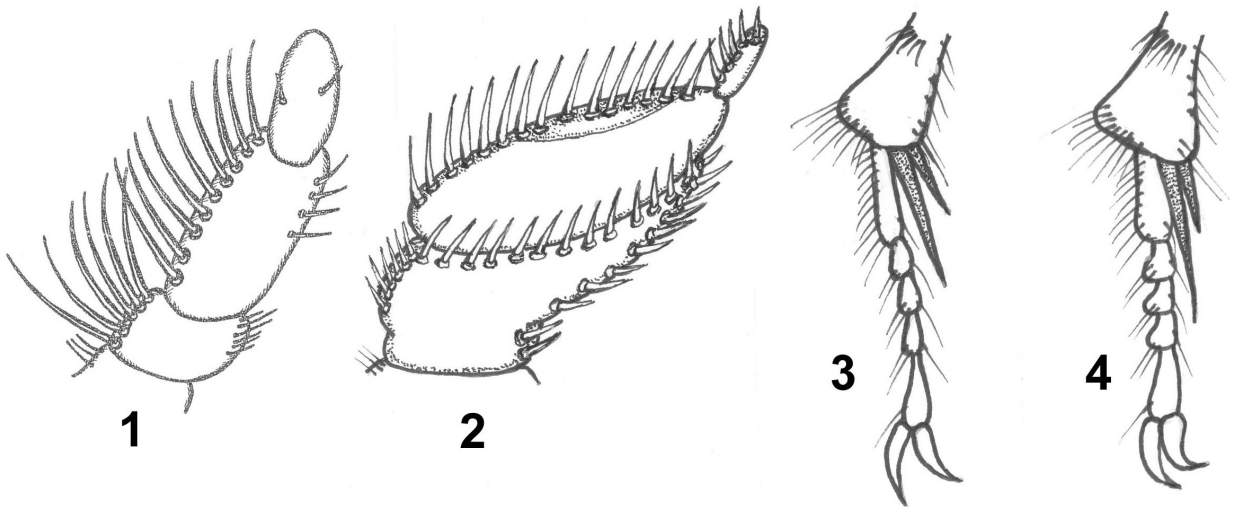

Figure 1-4. Male labial left palps (ventral view) of **1)** *Neotrichaphodioides volxemi* (Harold, 1876). **2)** *Trichaphodioides calcaratus* (Boheman, 1857). Male left mesotarsus of **3)** *Neotrichaphodioides volxemi* (Harold, 1876). **4)** *Trichaphodioides calcaratus* (Boheman, 1857).

BCMN – Balthasar collection, Narodni Muzeum Prirodovedecke Muzeum, Praha, Czech Republic.
BCSC – Bordat collection, Saint-Cirq, France.
DCGI – Dellacasa collection, Genoa, Italy.
ISEA – Institute of Systematics and Evolution of Animals PAS, Kraków, Poland.
SEMC – Snow Entomological Museum, Kansas University Natural History Museum and Biodiversity, Lawrence KS, USA.
MHNG – Muséum d'Histoire Naturelle, Geneva, Switzerland.
MNHN – Muséum National d'Histoire Naturelle, Paris, France.
SMFM – Senckenberg Museum, Frankfurt am Main, Germany.

***Neotrichaphodioides* new genus**

Type species. *Aphodius volxemi* Harold, 1876, by present designation.

Diagnosis. Small or medium size species (length 3.5-8.0 mm), oblong, moderately convex, few specimens are glossy, glabrous; rarely apical half of male elytra with short, dense pubescence. Piceous, brownish-red or brownish-yellow, sometimes elytra cloudy darkened on disc. Head with epistome almost flat, sparsely punctulate; clypeus almost semicircular or subtruncate anteriorly, widely rounded at sides, glabrous; genae acutely angulate or obtusely rounded, not to very shortly bristled, more or less strongly protruding; frontal suture finely impressed, mutic. Pronotum transverse, feebly convex, evenly or dually punctured; hind angles subtruncate; base not bordered. Scutellum small, triangularly elongate. Elytra oval, denticulate or not at shoulder, deeply finely striate; intervals flat or more or less strongly convex, microreticulate, sparsely punctured. Fore tibiae distally tridentate, proximally serrulate at outer margin; upper side sparsely distinctly punctured. Hind tibiae with feeble transverse carinae on outer face; apically fimbriate with spinules elongate and irregularly strongly unequal. Pygidium sparsely roughly punctured; each puncture with a short recumbent hair; apical margin with few, sparse and elongate straight setae. Sexual dimorphism shown in males mostly by wider head and pronotum, the short and widened segments of the labial palpi, elytral intervals sometimes with short dense pubescence, fore tibiae apical spur short, stout and abruptly bent downward, and metasternal plate deeply excavate, densely punctured and pubescent. Aedeagus with parameres short, with a preapical tuft of more or less elongate, sometimes exceptionally elongate hairs. Epipharynx with anterior margin deeply sinuate at middle, widely rounded at sides; epitorma shortly conical; corypha with two apical strong and elongate spiculae protruding beyond front

margin; pedia densely pubescent, with few elongate, stout, antero-lateral spines subserially arranged; chaetopariae slender, moderately elongate and densely arranged.

Distribution. Neotropical Region.

Etymology. The generic name (gender masculine) is based on the first three letters of "Neotropical" followed by the generic name *Trichaphodioides*.

Key to species of *Neotrichaphodioides*

1. Elytra denticulate at shoulder; pronotum evenly, moderately closely punctured. Body brownish-red. Length 5.0-6.0 mm. Bolivia, Costa Rica ..... ***N. forsterianus* (Balthasar)**
— Elytra not denticulate at shoulder; pronotum dually punctured. Body color, length and distribution variable **2**

2(1). Clypeus almost semicircular; genae obtusely rounded, slightly protruding beyond eyes. Body dark reddish brown. Length 5.0-5.5 mm. Ecuador ..... ***N. ecuadoriensis* (Petrovitz)**
— Clypeus subtruncate anteriorly; genae distinctly protruding beyond eyes. Body color, length and distribution variable **3**

3(2). Posterior half of elytra with short, dense pubescence in males. Body piceous. Length 7.0-8.0 mm. Peru ..... ***N. woytkowskii*, new species**
— Elytra glabrous in both sexes, at most with short, sparse pubescence before apex in males. Body yellowish to reddish brown. Length less than 6.0 mm. Widespread in South America **4**

4(3). Elytral intervals distinctly convex, with short, sparsely pubescence preapically in males; superior apical spur of hind tibiae almost as long as first tarsal segment. Body reddish brown. Length 5.0-6.0 mm. Brazil ..... ***N. volxemi* (Harold)**
— Elytral intervals almost flat, glabrous in both sexes, superior apical spur of hind tibiae distinctly shorter than first tarsal segment. Body yellowish brown. Length 3.5-4.5 mm. Argentina, Bolivia, Brazil, Colombia, Venezuela ..... ***N. caracanus* (Balthasar)**

***Neotrichaphodioides caracanus* (Balthasar, 1970), new combination**
(Fig. 5-9)

Aphodius (*Gonaphodiellus*) *caracanus* Balthasar, 1970: 250; Dellacasa 1988: 239.
Aphodius (*Gonaphodiellus*) *martinsi* Petrovitz, 1970: 227; Dellacasa 1988: 240 (**new synonymy**).

Type locality. Serra Caraça, 1380 m, [Mato Grosso], Brazil.

Type repository. For *A. caracanus*: National Museum (Balthasar collection), Prague (holotype examined). For *A. martinsi*: Muséum d'Histoire Naturelle, Geneva, Switzerland (examined).

Redescription. Length 3.5-4.5 mm, oblong, moderately convex, subshiny, glabrous. Brown-yellowish; head posteriorly and pronotal disc shadowy brownish; elytra with juxtasutural interval and a small preapical shadow spot brown; legs pale brownish; antennal club testaceous. Head with epistome nearly flat, finely, sparsely and regularly punctured throughout; clypeus anteriorly subtruncate, widely rounded at sides; thickly bordered, edge somewhat thickened anteriorly; genae small, angulose, near imperceptibly bristled, protruding beyond eyes; frontal suture finely impressed; front relatively more coarsely punctured. Pronotum moderately transverse and feebly convex, dually punctured; large punctures three to four times larger than small, lacking on disc and somewhat denser on sides, mixed small distinct punctures throughout subregularly scattered; lateral margins nearly subparallel, distinctly bordered; hind angles obliquely truncate, feebly inwardly sinuate; base slightly bisinuate. Scutellum apically acumi-

nate, finely and sparsely punctured. Elytra oblong, moderately convex, not denticulate at shoulder; striae fine, superficially punctured, not crenulate; intervals feebly convex on disc, flat preapically, finely and sparsely punctured. Hind tibiae superior apical spur distinctly shorter than first tarsal segment; latter longer than following three combined. Male: head and pronotum relatively more transverse, less convex and less densely punctured; metasternal plate with spoon-shaped depression, fine median longitudinal groove, coarsely and sparsely punctured; aedeagus Fig. 6-7. Female: head and pronotum relatively less transverse, more convex and more densely punctured; metasternal plate with deep median longitudinal groove, nearly flat and smooth at sides.

Material examined. ARGENTINA, Puán, F. Sola, B[ueno]s Aires, XI.1962, A. Martinez leg. (1 paratype of *Aphodius martinsi* Petrovitz, MHNG); **BOLIVIA**, Mururata, Cusilluni, XII.1984, m 1200-1600, L. E. Peña leg. (2 DCGI); Songo (5 DCGI); **BRAZIL**, Caraça, 2e Semestre 1894, P. Germain (31 MNHN); Horama, Serra de Moça, Iavrado, VII.1997, F. Z. Vaz de Mello leg. (3 ISEA); M[inas] G[erais], Serra Caraça, m 1380, Klass, Lenka, Martins & Silva leg. (holotype and 6 paratypes, BCMN); **COLOMBIA**, San Martin, Meta D., IX.1977, L. E. Peña leg. (1 DCGI); **VENEZUELA**, Mérida, Mariño, m 1700, 01.XII.1984, C. Bordon leg. (1 DCGI).

Distribution. Argentina, Bolivia, Brazil (Minas Gerais), Colombia, Venezuela.

***Neotrichaphodioides ecuadoriensis* (Petrovitz, 1961), new combination**
(Fig. 10-14)

Aphodius (*Trichaphodius*) *ecuadoriensis* Petrovitz, 1961: 444; Dellacasa 1988: 274.
Aphodius (*Gonaphodiellus*) *ecuadoriensis*; Petrovitz 1970: 226.

Type locality. Curay [Curaray], Ecuador.

Type repository. Senkenberg Museum, Frankfurt am Main, Germany (holotype examined).

Redescription. Length 5.0-5.5 mm; oblong, moderately convex, subshiny, glabrous. Reddish brown, clypeal margin and pronotal sides paler; legs reddish brown, antennal club yellowish. Head with epistoma convex, near imperceptibly microreticulate, evenly sparsely finely punctured; clypeus almost semicircular, entirely bordered, edge glabrous, anteriorly slightly reflexed; genae obtusely rounded, not ciliate, feebly protruding beyond eyes; later noticeably large; frontal suture finely impressed, mutic; front evenly sparsely punctured. Pronotum transverse, few convex, finely microreticulate, dually punctured; large, moderately coarse punctures, four to five times larger than small, irregularly, not closely sparse on sides, lacking on disc; small, fine punctures evenly sparsely scattered throughout, somewhat finer on disc; lateral margins feebly arcuate, rather thinly bordered, edge glabrous; hind angles subtruncate; base distinctly bisinuate, not bordered. Scutellum flat, with few fine sparse punctures near base. Elytra oval elongate, moderately convex, feebly broadened posteriorly, finely striate; striae moderately impressed, finely punctured, subcrenulate; intervals superficially alutaceous, slightly convex, sparsely finely punctured. Hind tibiae superior apical spur shorter than first tarsal segment; latter somewhat longer than following three combined. Male: head with epistoma regularly convex; pronotum relatively more transverse, less convex, more sparsely punctured; metasternal plate concave, densely punctured, pubescent; aedeagus Fig. 11-12. Female: head with epistome distinctly gibbous on disc; pronotum relatively more convex, less transverse, more densely punctured; metasternal plate nearly flat, sparsely punctured, almost glabrous.

Material examined. ECUADOR, Curaray, 4.I.1906, F. Ohaus S. (holotype male SMFM); Canelos, 22.X.1905, F. Ohaus S. (allotype MHNG).

Distribution. Ecuador.

***Neotrichaphodioides forsterianus* (Balthasar, 1960), new combination**
(Fig. 15-19)

Aphodius (*Gonaphodiellus*) *forsterianus* Balthasar, 1960: 2; Dellacasa 1988: 239.

Type locality. Yungas de Arepucho, Sihuencas, 2200-2500 m, Bolivia.

Type repository. Bayerischen Staatssammlung, München, Germany.

Redescription. Length 5.0-6.0 mm, oblong, moderately convex, shiny, glabrous. Brown-reddish; head anteriorly, sides of pronotum and elytra reddish-testaceous; latter, on preapical declivity, with a rounded paler spot vaguely surrounded by a piceous border; legs pale brown-reddish; antennal club brownish. Head with epistome feebly convex, finely, regularly and sparsely punctured throughout; clypeus faintly truncate anteriorly, widely rounded at sides, thickly bordered, border somewhat thickened anteriorly; genal sutures distinct; genae small, somewhat depressed; obtusely angulate, almost not ciliate, protruding beyond eyes; frontal suture obsolete; front finely, sparsely and regularly punctured. Pronotum transverse, feebly convex, finely microreticulate so subshiny on disc, dually punctured; large punctures, two to three times larger than small, densely scattered on sides only, mixed small punctures somewhat coarser and denser anteriorly and laterally; lateral margins subparallel, thinly bordered; hind angles obtusely truncate, faintly inwardly sinuate; base distinctly bisinuate. Scutellum narrow, apically acuminate, finely microreticulate, impunctate. Elytra oval-elongate, subparallel-sided, faintly denticulate at shoulder; striae fine, superficially punctured, subcrenulate; intervals almost convex, shiny, finely and sparsely punctured on disc, preapically flat, impunctate and strongly microreticulate so dull. Hind tibiae superior apical spur a quarter shorter than first tarsal segment; latter longer than following three combined. Male: head and pronotum relatively more transverse, less convex and more sparsely punctured; fore tibiae slender and more elongate; their apical spur short, stout and downward bent; metasternal plate excavate at middle, finely and sparsely punctured, median longitudinal groove moderately impressed; aedeagus Fig. 16-17. Female: head and pronotum relatively somewhat narrowed frontwardly; more convex and more densely punctured; fore tibiae shorter and stouter, their apical spur slender and nearly straight; metasternal plate almost flat.

Material examined. BOLIVIA, Yungas de Corani, m 2500, 30.09.1953, W. Forster leg. (allotype male BCMN); **COSTA RICA**, Tierra Blanca, m 2300, 04.05.1945, A. Bierig leg. (2 DCGI).

Distribution. Bolivia, Costa Rica.

***Neotrichaphodioides volxemi* (Harold, 1876), new combination**
(Fig. 1, 20-24)

Aphodius Van Volxemi Harold, 1876: 93.
Aphodius volxemi; Blackwelder 1944: 213.
Aphodius (*Trichaphodius*) *volxemi;* Schmidt 1913: 136; Schmdt 1922: 134; Dellacasa 1988: 215, 317.
Aphodius (*Gonaphodiellus*) *squamifer* Petrovitz, 1970: 225, Dellacasa 1988: 240 (**new synonymy**).

Type locality. Barbacena [Minas Gerais, Brazil].

Type repository. For *A. volxemi*: Muséum National d'Histoire Naturelle, Paris (lectotype examined, designated below). For *A. squamifer* : Muséum d'Histoire Naturelle, Geneva, Switzerland (examined).

Redescription. Length 5.0-6.0 mm, oblong, moderately convex, subshiny; glabrous, at most elytra with short, sparse pubescence near apex in males. Reddish-testaceous, sometimes brown-yellowish (ab. *squamifer* Petrovitz, 1970), front, pronotal disc and elytral suture somewhat darkened; legs brownish; antennal club yellowish. Head with epistome nearly flat, superficially microreticulate, finely and sparsely punctured;

clypeus subtruncate anteriorly, widely rounded at sides, thickly bordered, border somewhat more thickened anteriorly; genae acutely angulate, almost not ciliate, strongly protruding beyond eyes; frontal suture finely impressed, backward curved at middle; front relatively more shiny and more distinctly punctured. Pronotum somewhat transverse, feebly convex, dually punctured; large punctures, four to five times larger than small, lacking on disc and moderately denser on sides, mixed fine and sparse punctures regularly scattered throughout; lateral margins feebly rounded, thickly bordered; hind angles obtusely truncate, faintly inwardly sinuate; base feebly bisinuate. Scutellum narrow, apically acuminate, finely microreticulate, sparsely and nearly imperceptibly punctured. Elytra oval elongate, moderately convex; striae fine nearly indistinctly punctured; intervals distinctly convex on disc, nearly flat on preapical declivity, finely and sparsely punctured. Hind tibiae superior apical spur almost as long as first tarsal segment; latter longer than following three combined. Male: head and pronotum relatively more transverse, less convex and more sparsely punctured; clypeus faintly truncate anteriorly; fore tibiae more slender and more elongate; metasternal plate with spoon-shaped depression, feeble median longitudinal groove, coarsely punctured; aedeagus Fig. 21-22. Female: head and pronotum relatively less transverse, more convex and more densely punctured: clypeus more distinctly truncate anteriorly; fore tibiae stouter and shorter; metasternal plate with deep median longitudinal groove, flat and nearly smooth.

Material examined. "**BRAZIL**, Barbacena, Coll. Camille/ Van Volxem, Ex Musaeo/ E. Harold" (male **lectotype here designated** MNHN); Brasilia, 1100 m, (dist. Fédéral) Bresil; XI.1997; N. Degallier leg. (2 BCSC); Goia, Alto Paraiso, 26/31.X.1997, N. Degallier leg. (1 DCGI); Minas Gerais, Ingai-Lavras, prox. Poço Bonito, XI.2002, F. Z. Vaz-de-Mello leg. (5 DCGI); Unaí (Faz. Bolivia), M[inas] G[erais], 22.X.1964, Exp. Dep. Zoologia (1 paratype of *Aphodius squamifer* Petrovitz, MHNG).

Distribution. Brazil.

Remarks. Although Harold (1876) originally spelled the specific epithet "*Van Volxemi*", it was later emended to "*volxemi*" by Schmidt (1913, 1922), and all subsequent authors have used that spelling. Following Article 33.2.3.1 of the Code (ICZN 1999), "when an unjustified emendation is in prevailing usage and is attributed to the original author and date it is deemed to be a justified emendation." Therefore, the correct name for the species is *N. volxemi*.

***Neotrichaphodioides woytkowskii*, new species**
(Fig. 25-29)

Type locality. San Idelfonso Hills, Dept. Amazonas, Peru.

Type repository. Snow Entomological Museum, University of Kansas, Lawrence, Kansas.

Description. Length 7.0-8.0 mm; oblong elongate, moderately convex, shiny. Piceous brown; clypeal margins and pronotal sides paler, legs dark brown, antennal club piceous. Head with epistome almost flat, evenly finely sparsely punctured; clypeus subtruncate anteriorly, widely rounded at sides, thickly bordered, edge glabrous, anteriorly slightly reflexed; genae subacutely angulate, near imperceptibly bristled, protruding beyond eyes; frontal suture finely impressed, mutic; front evenly, finely sparsely punctured. Pronotum transverse, moderately convex, dually punctured; large, coarse punctures, five to six times larger than small, irregularly sparse on sides, lacking on disc; small, fine punctures evenly scattered throughout, somewhat more superficial and sparser on disc; lateral margins nearly straight, thickly bordered, edge glabrous; hind angles subtruncate, almost imperceptibly bristled; base feebly bisinuate, not bordered. Scutellum flat, impunctate. Elytra oval elongate, moderately convex, deeply striate; striae fine, superficially punctured, subcrenulate; intervals feebly convex, sparsely irregularly finely punctured on basal half; more densely and deeply punctured in posterior half. Hind tibiae superior apical spur shorter than first tarsal segment; latter as long as following three combined. Male: pronotum relatively more transverse, less convex and more sparsely punctured; posterior half of elytra with short, dense pubescence; aedeagus Fig. 26-27. Female: pronotum relatively less transverse, more convex and more densely punctured; elytra glabrous.

Type material. Holotype male (SEMC) label data "/ San Idelfonso Hills, 1900-4000 masl, Dept. Amazonas / Peru, S. A., July 26, 1936, F. Woytkowski, No. 3755/". Allotype female (SEMC) label data "/ Dept. Amazonas, Collected on way to Chachapoyas as from San Idelfonso / Peru, S. A., July 30, 1936, F. Woytkowski, No. 3755/".

Additional paratypes (17): **PERU**: Dept. Amazonas**:** San Idelfonso Hills, 1900-4000 m asl, July 26, 1936, F. Woytkowski, No. 3755 (2 SEMC); same data except, July 3, 1936 (2 DCGI); same data except, July 27, 1936 (3 SEMC); same data except, July 30, 1936 (2 SEMC); same data except, July 31, 1936 (2 SEMC); Collected on way to Chachapoyas from San Idelfonso, Aug. 1, 1936, F. Woytkowski, No. 3756 (2 SEMC); same data except, Aug. 2, 1936 (1 FSCA); San Idelfonso Hills, 1900-4000 m asl, Aug. 3, 1936, F. Woytkowski, No.3756 (1 FSCA); Vicinity of Chachapoyas, Aug. 4, 1936, F. Woytkowski, No. 3756 (1 SEMC). Dept. San Martin: Vicinity of Rioja, Nov. 23, 1936, F. Woytkowski, No. 3759 (1 SEMC). Many of the paratypes have broken legs or tarsi.

Distribution. Known from Peru, Departments of Amazonas and San Martin.

Etymology. Named in honor of F. Woytkowski, a naturalist active in Peru from the 1930s until the early 1960s who collected all the specimens of typical series.

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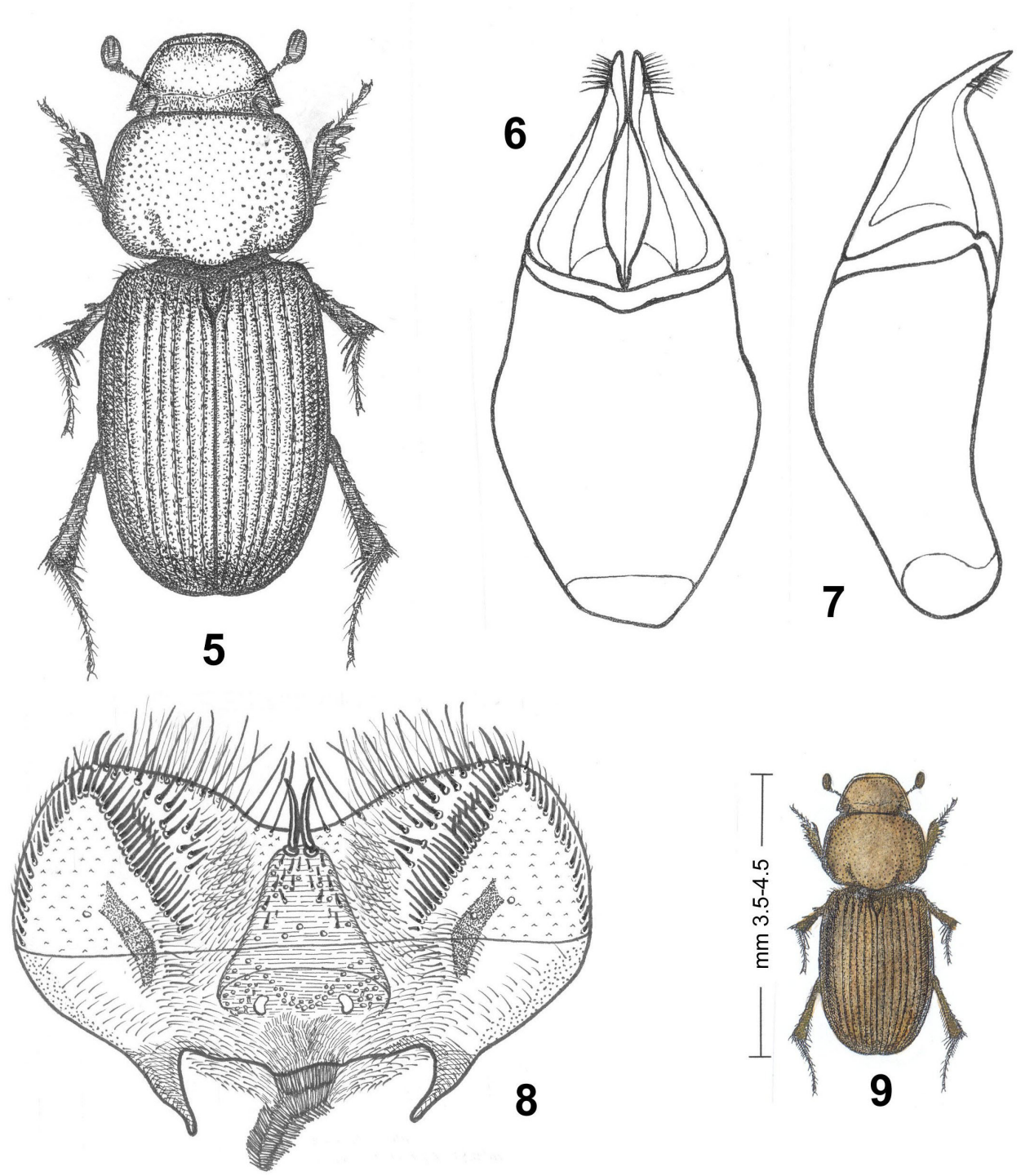

Figure 5-9. *Neotrichaphodioides caracanus* (Balthasar, 1970) (holotype male). **5)** Morphological details of habitus. **6-7)** Aedeagus (dorsal and lateral view). **8)** Epipharynx. **9)** Habitus.

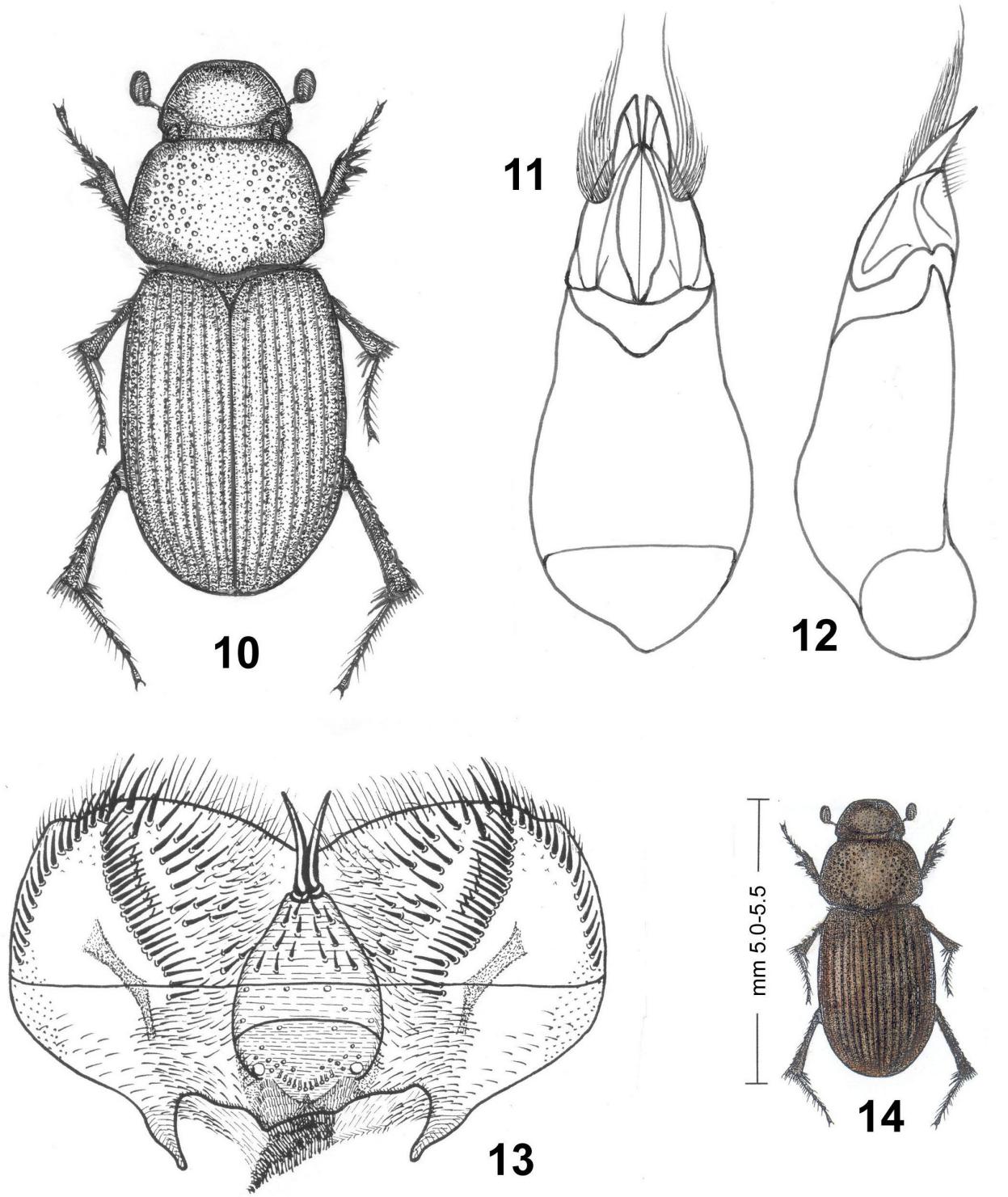

Figure 10-14. *Neotrichaphodioides ecuadoriensis* (Petrovitz, 1961) (holotype male). **10)** Morphological details of habitus. **11-12)** Aedeagus (dorsal and lateral view). **13)** Epipharynx. **14)** Habitus.

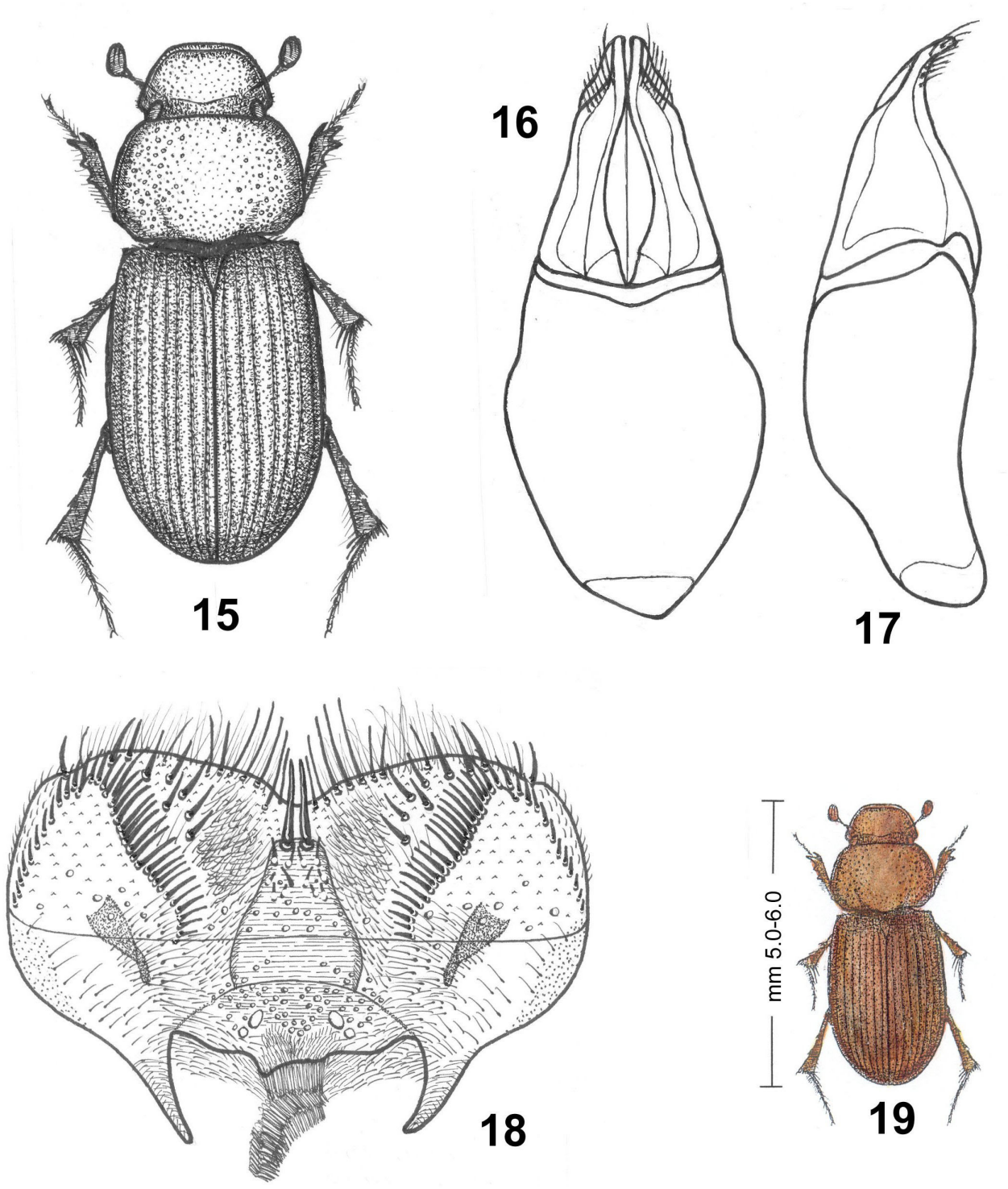

Figure 15-19. *Neotrichaphodioides forsterianus* (Balthasar, 1960) (allotype male). **15)** Morphological details of habitus. **16-17)** Aedeagus (dorsal and lateral view). **18)** Epipharynx. **19)** Habitus.

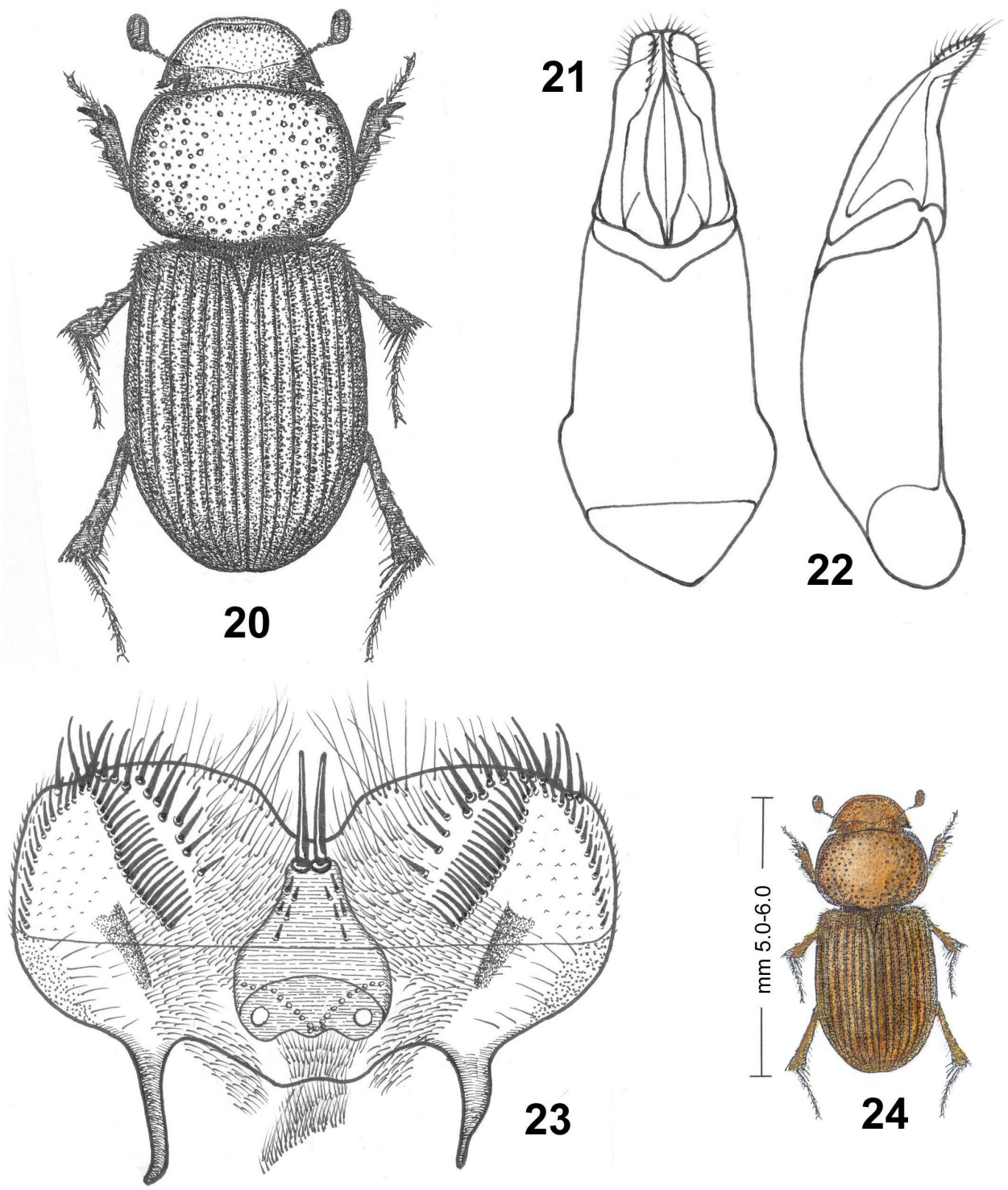

Figure 20-24. *Neotrichaphodioides volxemi* (Harold, 1876) (lectotype male). **20)** Morphological details of habitus. **21-22)** Aedeagus (dorsal and lateral view). **23)** Epipharynx. **24)** Habitus.

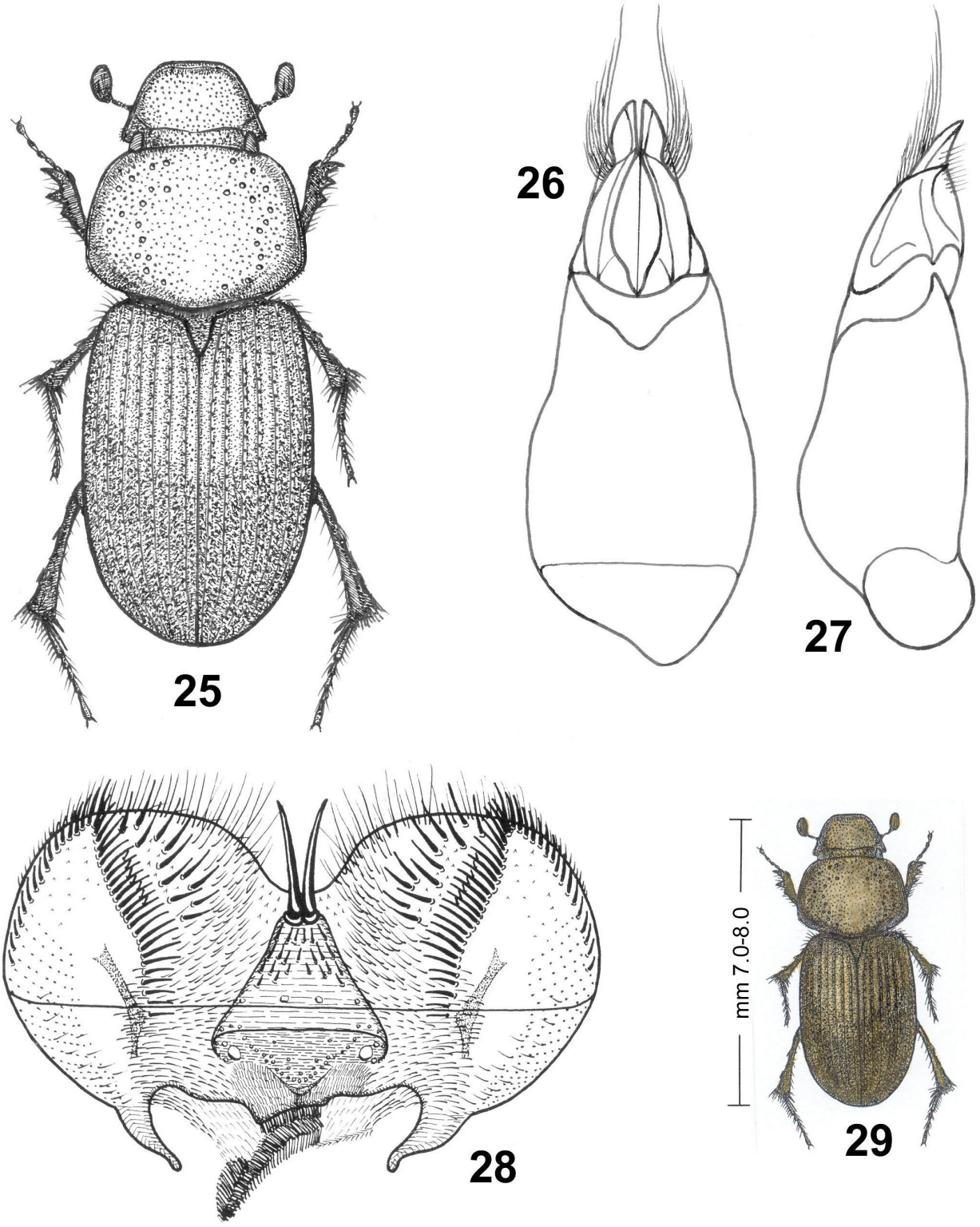

Figure 25-29. *Neotrichaphodioides woytkowskii*, new species (holotype male). **25)** Morphological details of habitus. **26-27)** Aedeagus (dorsal and lateral view). **28)** Epipharynx. **29)** Habitus.