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A revision of *Aphodius* Illiger, 1798 subgenus *Amidorus* Mulsant et Rey, 1870 with description of the new subgenus *Chittius* (Coleoptera: Scarabaeidae)

Ревизия подрода *Amidorus* Mulsant et Rey, 1870 рода *Aphodius* Illiger, 1798 с описанием нового подрода *Chittius* (Coleoptera: Scarabaeidae)

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KEY WORDS: Scarabaeidae, *Aphodius*, *Amidorus*, *Chittius*, new subgenus, new synonymies, distribution.

КЛЮЧЕВЫЕ СЛОВА: Scarabaeidae, *Aphodius*, *Amidorus*, *Chittius*, новый подрод, новые синонимы, распространение.

ABSTRACT. Study of the female vaginal sac along with external morphology indicates that new systematic limits of subgenus *Amidorus* Mulsant et Rey, 1870 genus *Aphodius* Illiger, 1798, must be established. The new monotypic subgenus *Chittius* Tarasov, **subgen.n.** (type species *Aphodius anatolicus* Petrovitz, 1963) is described. Representatives of *Amidorus* worldwide are reviewed and a key to species presented. Five new synonymies are established: *Aphodius obscurus* (Fabricius, 1792) = *A. kluchoris* Roubal, 1918, **syn. n.**; *A. cribrarius* Brullé, 1832 = *A. tarsensis* Petrovitz, 1967, **syn. n.**; *A. alagoezi* Olsoufiev, 1918 = *A. monticustos* Balthasar, 1946, **syn.n.** = *A. rollandi* Kalashian et Lumaret, 2000, **syn. n.**; *A. cribricollis* Lucas, 1846 = *A. oranicus* Balthasar, 1961, **syn.n.** The American species, *Aphodius lutulentus* Haldeman, 1843, is placed in the subgenus *Pseudacrossus* Reitter, 1892. A lectotype of *A. monticustos* Balthasar, 1946 is designated.

РЕЗЮМЕ. Основываясь на строении вагинального мешка самки в совокупности с признаками внешней морфологии, пересмотрен объём и установлены новые систематические границы подрода *Amidorus* Mulsant et Rey, 1870 рода *Aphodius* Illiger, 1798. Выделен новый монотипический подрод *Chittius* Tarasov, **subgen.n.** (типовой вид *Aphodius anatolicus* Petrovitz, 1963). Дан обзор и определительная таблица видов подрода *Amidorus* мировой фауны. Установлено пять новых синонимов: *Aphodius obscurus* (Fabricius, 1792) = *A. kluchoris* Roubal, 1918, **syn.n.**; *A. cribrarius* Brullé, 1832 = *A. tarsensis* Petrovitz, 1967, **syn.n.**; *A. alagoezi* Olsoufiev, 1918 = *A. monticustos* Balthasar, 1946, **syn.n.** = *A. rollandi* Kalashian et Lumaret, 2000, **syn.n.**; *A. cribricollis* Lucas, 1846 = *A. oranicus* Balthasar, 1961, **syn.n.** Североамериканнский вид *A. lutulentus* Haldeman, 1843 перенесён в подрод *Pseudacrossus* Reitter, 1792. Обозначен лектотип *A. monticustos* Balthasar, 1946.

Introduction

In the world catalogue of Aphodiidae [Dellacasa, 1988] subgenus *Amidorus* Mulsant et Rey, 1870 contained 24 species from the Palearctic, Nearctic, Afrotropical, and Neotropical regions. A prime diagnostic criterion of *Amidorus* was the presence of a shagreened, punctured elytral sculpture. But this character is subjected to parallelism in the genus *Aphodius* Illiger, 1798. Subsequent study of adult characters of some species resulted in removal to other subgenera. Two American species, *Aphodius glyptus* Bates, 1887, and *A. latecrenatus* Bates, 1887, were placed in the subgenus *Trichonotuloides* Balthasar, 1945 [Dellacasa, et al., 2002]. *Aphodius subsericeus* Ballion, 1878, was moved to *Pseudacrosssus* Reitter, 1892 [Král, 1997]. The systematic limits between subgnera *Amidorus* and *Pseudacrossus* were not well defined. Many species were often moved between subgenus *Pseudacrossus* and *Amidorus*. G. Dellacasa [1983] difined systematic limits between these subgenera based on the presence of tuberculated frontal suture in the representatives of *Pseudacrossus* and moved to this subgenus two species *A. thermicola* Sturm, 1800 and *A. cribricollis* Lucas, 1846, originally placed in *Amidorus*. Afterwards some Palearctic species was also placed in *Pseudacrossus* [Dellacasa M., 1988]. Then G. Dellacasa with coauthors [2001] considered that the most significant difference between *Amidorus* and *Pseudacrossus* was the presence of male inferior apical spur of middle tibia shortened and apically truncate in *Pseudacrossus* species.

Thus *A. thermicola* [Dellacasa & Kirgiz, 2002] and *A. cribricollis* [Dellacasa & Dellacasa, 2006] was moved back in *Amidorus*. Kabakov [1996] has another opinion and noted in the description of *A.* (*Agrilinus*) *isajevi* Kabakov, 1996 "Formally the new species [i.e. *A. isajevi*, author's comment] (especially in the structure of hind tibia apical setae and shortened male inferior apical spur of middle tibia) can be moved to *Pseudacrossus* Kosh. But it is necessary to notice that the status of this subgenus is doubtful. In my opinion *A. grombczewskyi* D. Koshantscikov the type species of this subgenus and related *A. przewalskyi* Rtt. belong to *Amidorus* Muls., *A. edgardi* Solsky belongs to *Melaphodius* Rtt., *A. brevithorax* Sumakov belongs to *Parammoecius* Seid., and the group of species closely related to *A. nasutus* Rtt. is closer to *Agrilinus* Muls. et Rey. The new species belongs to this group".

All taxomomic changes of the subgenera did not solve the main problem of not adequately defined systematic limits of *Amidorus*. The absence of distinct diagnostic character (or the group of characters) usually utilized in *Aphodius* taxonomy (external morphology, epipharynx, and aedeagal shape) remained open the question of systematic limits and relation of *Amidorus*. Moreover the true identity of many species has been in doubt because many distinctive features were missed in the original descriptions, or were results of individual variation. Thus the necessity of a subgeneric revision became obvious.

This research based on utilization of a previously unrecognized character in *Aphodius* taxonomy, the female vaginal sac structure in addition to the traditional chatacters. A review of the reproductive system of some *Aphodius* species and related groups is given in the work of Martínez et al. [2001]. The vaginal sac along with the bursa copulatrix forms the genital chamber. The genital chamber joins on base with common oviduct and terminates in the vulva. The vaginal sac is a dorsal part of genital chamber and the bursa copulatrix is a ventral part. The vaginal sac often has various sclerotized structures which are rather diverse with varying degree of sclerotization and membranes. Sometimes, because of poor chitinization, the shape can very somewhat (shrink or widen). Closely related species usually have the same vaginal structure but sometimes it is clearly distinguished between close species. The combination of this character with the complex of traditional characters gives a more accurate picture of the taxonomical limits of *Amidorus,* and allows to recognizing the hiatuses with similar subgenera.

Materials and methods

This study is based on material deposited in the collection of Zoological Museum of Moscow State University — ZMUM (Moscow, Russia); Zoological Institute, Russian Academy of Sciences — ZISP (St. Petersburg, Russia); Muséum d'Histoire Naturelle — MHNG (Geneva, Switzerland); MNHN — Muséum National d'Histoire Naturelle, (Paris, France); NMPC — National Museum of Natural History, (Prague, Czech Republic); UZIL — Universitets zoologiska Institut, (Lund, Sweden); author's collection and materials kindly offered by Giovanni & Marco Dellacasa (Italy, Genova & Pisa).

The male genitalia were drawn in 10% solution of KOH for 24 hours, then they were washed in distilled water and then stored in glycerin.

Additional information and comments on label data are given in brackets.

Comparative remarks

A. obscurus (Fabricius, 1792) the type species of the subgenus *Amidorus*, possessses the large membranous lobes on the parameral apex (Fig. 10) and the vaginal sac with membrane structure sclerotized on the border, apico-lateral portions distinctly bent inward (Fig. 12). Thus I include in the subgenus *Amidorus* the species which instead of the similar external morphological characters (described below) possess also similar shape of aedeagus or vaginal sac structure. But the hiatus in the structure of the male and female genitals between some species can be rather different.

The species *A. immaturus* (Mulsant, 1842) and *A. cribrarius* Brúlle, 1832 possess uniform aedeagus shape (apex of paramera with large, membranous lobes) (Figs 15–16) and the same structure of vaginal sac (Fig. 12) with *A. obscurus*.

The aedeagus shape of *A. moraguesi* Baraud, 1978 with similar membranous lobes (Fig. 17) and external morphology also indicate its relation to the type species of the subgenus. Unfortunately I did not have an opportunity to study the vaginal sac of this species.

The species *A. alagoezi* Olsoufiev, 1918 has also similar shape of aedeagus with large membranous lobes on the parameral apex (Fig. 11) and close similiarity in the external morphology with *A. obscurus* (Frolov [2000] considered *A. monticustos* Balthasar*,* 1946, the junior synonym of *A. alagoezi*, as synonym of *A. obscurus*). But the vaginal sac structure of this species distinctly differs from the structures of all other species of *Amidorus*. The vaginal sac structure of *A. alagoezi* is presented with with the membranous ovaloid sclerotized on the border and closely located to the vulva (Fig. 18). Thus *A. alagoezi* is included in *Amidorus* based on the characters of external morphology and aedeagal shape.

The species *A. thermicola*, *A. cribricollis* and *A. koshantschikovi* Jacobson, 1911 differ in the shape of aedeagus from the *A. obscurus* and species listed above. But these species possess uniform structure of vaginal sac (Figs 20, 22, 52) and external morphology with the type species. Variability may be observed at the specific level in the degree of apico-lateral bend among representatives of the subgenus from one extreme form to another (from Fig. 12 to Figs 20, 22, 52, sequentially), with the exception of *A. alagoezi*.

Thus eight species are included in the subgenus *Amidorus*: *A. obscurus*, *A. alagoezi*, *A. immaturus*, *A. cribrarius*, *A. moraguesi*, *A. thermicola*, *A. cribricollis*, and *A. koshantschikovi*. Other species from the Palearctic, Nearctic, and especially from the Neotropical and

Afrotropical Regions, previously included in *Amidorus* [Dellacasa M., 1988], must be assigned to other subgenera. The correct placement of these species awaits further taxonomic research.

The American species, *A. lutulentus* Haldeman, 1843 previously involved in *Amidorus*, is transferred to *Pseudacrossus* because the structure of the vaginal sac, with an ovaloid sclerotized on the border (Fig. 14), and the main diagnostic features of external morphology do not distinguish it from typical representatives of *Pseudacrossus*. The differences in external morphology and vaginal sac structure between *Amidoris* and *Pseudacrossus* are distinct (see key to subgenera below) with the exception of *A. alagoezi*. The vaginal sac structure of this species is similar to the structures of *Pseudacrossus* species. The similarity in the shape of vaginal structure between *A. alagoezi* and *Pseudacrossus* species may indicate close relationship between *Amidorus* and *Pseudacrossus*. The *Pseudacrossus* have perhaps to include only species which Král [1997] includes to this subgenus. Although some Palearctic and Nearctic species (previously belonged to *Amidorus*, I had not opportunity to study) also may be placed to *Pseudacrossus*.

Aphodius tomentosus (Miller, 1776), placed in the monotypic subgenus *Pubinus* Mulsant et Rey, 1870, has often been moved to *Amidorus*. This transfer was obviosly incorrect because combination of external characters and the vaginal sac structure (Fig. 13) indicate the subgeneric separation of this species.

A new subgenus, *Chittius*, is established for *A. anatolicus* Petrovitz, 1963, originally placed in *Amidorus*. The vaginal structure of this species has two ovaloids, sclerotized on the borders (Fig. 55) and differs from the structures of all *Amidorus* representatives. The aedeagal shape also has no common features with *Amidorus* species. There are no distinct chatacters of external morphology which separate *A. anatolicus* from *Amidorus* but also there is no any unique character which may indicate that this species belongs to *Amidorus* or to any other subgenus of *Aphodius*. Based on these facts I place *A. anatolicus* to the new separate subgenus.

Following is a key to those subgenera whose taxonomical limits often overlap those of *Amidorus*.

KEY TO *APHODIUS* SUBGENERA MOST SIMILAR TO *AMIDORUS* MULSANT ET REY, 1870

1(2). Inferior apical spur of male middle tibia shortened, apically truncate; male front tibial apical spur usually thickened and elongate (with different degrees in different species); vaginal sac with membranous sclerotized on border ovaloid (Fig. 14) ..... ***Pseudacrossus*** Rtt.

2(1). Inferior apical spur of male middle tibia acuminate toward apex in both sexes; vaginal sac structure usually differently shaped or with membranous sclerotized on border ovaloid closely located to vulva (Fig. 18).

3(4). Vaginal sac with small, flat, sclerotized plat, lying upright across sac and rouded on dorsal side (Fig. 13); genae not more protruding than eyes; pronotum and elytral interstices in females with long, dense pubescence; male pronotum nearly glabrous, often with sides and hind angles with short pubescence, elytral interstices with short pubescence ..... ***Pubinus*** Muls. & Rey

4(3). Vaginal sac structure differently shaped; genae distinctly more protruding than eyes

5(6). Vaginal sac with two ovaloids sclerotized on borders (Fig. 55) ..... ***Chittius*** Tarasov, **subgen.n.**

6(5). Vaginal sac with membrane sclerotized on border, apical lateral portions more or less bent inward (Figs 12, 20, 22, 52) or vaginal sac with sclerotized on border ovaloid closely located to vulva (Fig. 18) .... ***Amidorus*** Muls. & Rey

Subgenus *Amidorus* Mulsant et Rey, 1870

Type species: *Scarabaeus obscurus* (Fabricius, 1792)

DESCRIPTION. Length 5–10 mm, oval, rather convex. Black; elytra black, reddish, yellowish, or yellowish-brown; always distinctly punctured and/or shagreened.

Head with three tubercles or with trace of tubercles; epistome feebly swollen anteriorly or with trace of transverse carina. Clypeus feebly sinuate at middle, rounded at sides; width of eye in ventral view approximately equal to minimum interval between eye and gula.

Pronotum dark; in males more convex and wider; in females narrower and densely punctured; sides and base bordered. Hind angles rounded. Scutellum triangular, small, approximately as long as 1/9 length of sutural margin of elytra.

Elytra glabrous, or with extremely short lateral and preapical pubescence (*A. thermicola* Sturm, 1800, with elytra distinctively pubescent).

Male protibia with apical spur usually larger than in females (in *A. moraguesi*, it is hooked-shaped and bent inward, and in *A. alagoezi*, it is slightly rounded at apex). Middle tibial spurs not modified in either sex; apical setae of hind tibia unequal.

Vaginal sac with membrane sclerotized on borders, and the apico-lateral portions are more or less bent inward (from Figs 12, 20, 22, 52). In *A. alagoezi* vaginal sac with an ovaloid sclerotized on the border and closely located to the vulva (Fig. 18).

DISTRIBUTION. Species of this subgenus are distributed in the Palearctic Region mostly in mountain systems of the Mediterranean region (the Pyrenees, Cantabrian Mts, Apennines, Balkan Mts, Levant), Asia Minor, Armenian highlands, Caucasus, Alps, Carphatian Mts, mountains of Middle Europe and North Africa.

SPECIES COMPOSITION. Based on the structure of vaginal sac and aedeagal shape, *Amidorus* can be divided into three groups. Each group is characterized by the unique, permanent, or slightly varying structure of vaginal sac (with the exception of *A. alagoezi*), and also by the similar aedeagal shape.

1. ***obscurus***-group. *A. obscurus*, *A. alagoezi*, *A. immaturus*, and *A. cribrarius*. This group of closely related species is difficult to identify. The species involved possesss large membranous lobes on the parameral apex (Figs 10–11, 15–16). The vaginal sac structure with membrane sclerotized on border, apico-lateral portions distinctly bent inward (Fig. 12), or in *A. alagoezi* is presented with a membranous ovaloid sclerotized on the border closely located to the vulva (Fig. 18).

2. ***moraguesi***-group. This group contains one species, *A. moraguesi*, which is known only from the Atlas Mountain type series. I did not have an opportunity to study the vaginal sac of this species. The aedeagal shape, particularly the parameras with the membranous lobes (Fig. 17), and the habitus are close to those of the ***obscurus***-group. However, the aedeagal shape differs in several ways from all ***obscurus***-group species, therefore this species is placed its own group.

3. ***thermicola***-group. *A. thermicola*, *A. cribricollis* and *A. koshantchikovi*. These species differ from those of other groups by the aedeagal shape with downward bent parameras (Figs 19, 21, 50), and by the structure of vaginal sac which has the dorsal portion reduced from the apex and the apical and lateral portions less bent inward. The structure of vaginal sac varies somewhat within the species group (Figs 20, 22, 52).

KEY TO *AMIDORUS* SPECIES

1(2). Apical spur of male front tibia apically hook-shaped, bent inward; clypeal border raised; black, elytra black to brownish black, coarsely, distinctly, irregularly punctured, punctures often confluent, surface between punctures polished, shiny; aedeagus (Fig. 17); length 7–8 mm; Atlas Mountains ..... 5. ***A. moraguesi*** Baraud

2(1). Apical spur of male front tibia not apically hook-shaped, not bent inward in both sexes; clypeal border not raised.

3(10). Apex of paramera with large, membranous lobes (Figs 10–11, 15–16)

4(5). Black, elytra red to dark red; distinctly and densely punctured (Figs 35–38), surface between punctures polished, shiny; aedeagus (Fig. 16); vaginal sac structure (Fig. 12); length 6–9 mm; south of Balkan Peninsula, and south Turkey ..... 4. ***A. cribrarius*** Brullé

5(4). Elytra shagreened, more or less dull, sometimes slightly shiny, but surface between punctures not polished, shiny.

6(7). Vaginal sac with sclerotized on border ovaloid, closely located to vulva (Fig. 18); membranous lobes of paramera long (Fig. 11); male front tibial spur somewhat rounded at apex (Fig. 9); black, elytra black to black-reddish; elytral sculpture feebly shiny, somewhat shagreened, weakly punctured (Figs 31–33); punctures on sides of clypeus not confluent in wrinkles (Fig. 5); length 6–8 mm; Caucasus: Aragats, Elbrus ..... 2. ***A. algoezi*** Ols.

7(6). Vaginal sac structure differently shaped, with apicolateral portions distinctly bent inward (Fig. 12); punctures on sides of clypeus confluent in wrinkles (Fig. 1); male front tibial spur acute at apex (Fig. 8)

8(9). Membranous lobes of paramera shorter (Fig. 10); black, elytra black to red, sometimes yellowish; elytral sculpture variable with different degrees of shagreening and punctation, usually dull, less shagreened, sometimes slightly shiny (Figs 23–28); length 6–9 mm; some mountain systems of Europe, Asia minor, Caucasus .... 1. ***A. obscurus*** (F.)

9(8). Membranous lobes of paramera longer (Fig. 15); black, elytra black to black brown; elytral sculpture shinier, more shagreened (Figs 29–30); length 6–8 mm; southwestern Alps ..... 3. ***A. immaturus*** (Muls.)

10(3). Apex of paramera without large membranous lobes, bent downward (Figs 19, 21, 50)

11(12). Body short, length 5–6 mm (Fig. 49); genae rounded, slightly protruding beyond eyes (Fig. 51); black; elytra black to blackish brown, shagreened, indistinctly punctured, usually dull but usually slightly shiny (Figs 46–48), surface between punctures not polished, shiny; aedeagus (Fig. 50); vaginal sac structure (Fig. 52); Levant, southern Turkey, and Cyprus ..... 8. ***A. koshantsikovi*** Jacob.

12(11). Body long, length 6–10 mm; genae angulate, distinctly protruding beyond eyes (as in ***obscurus***-group species — see Figs 1, 5); elytra differently sculptured, surface between punctures, polished, shiny

13(14). Black, elytra yellowish-brown to dark yellowish-brown; more sparsely punctured (Figs 43–44); nearly glabrous, often with very short apical pubescence; head in males distinctly tuberculate; aedeagus (Fig. 21); vaginal sac structure (Fig. 22); length 6–8 mm; Morocco, Algeria, Tunisia ..... 7. ***A. cribricollis*** Lucas

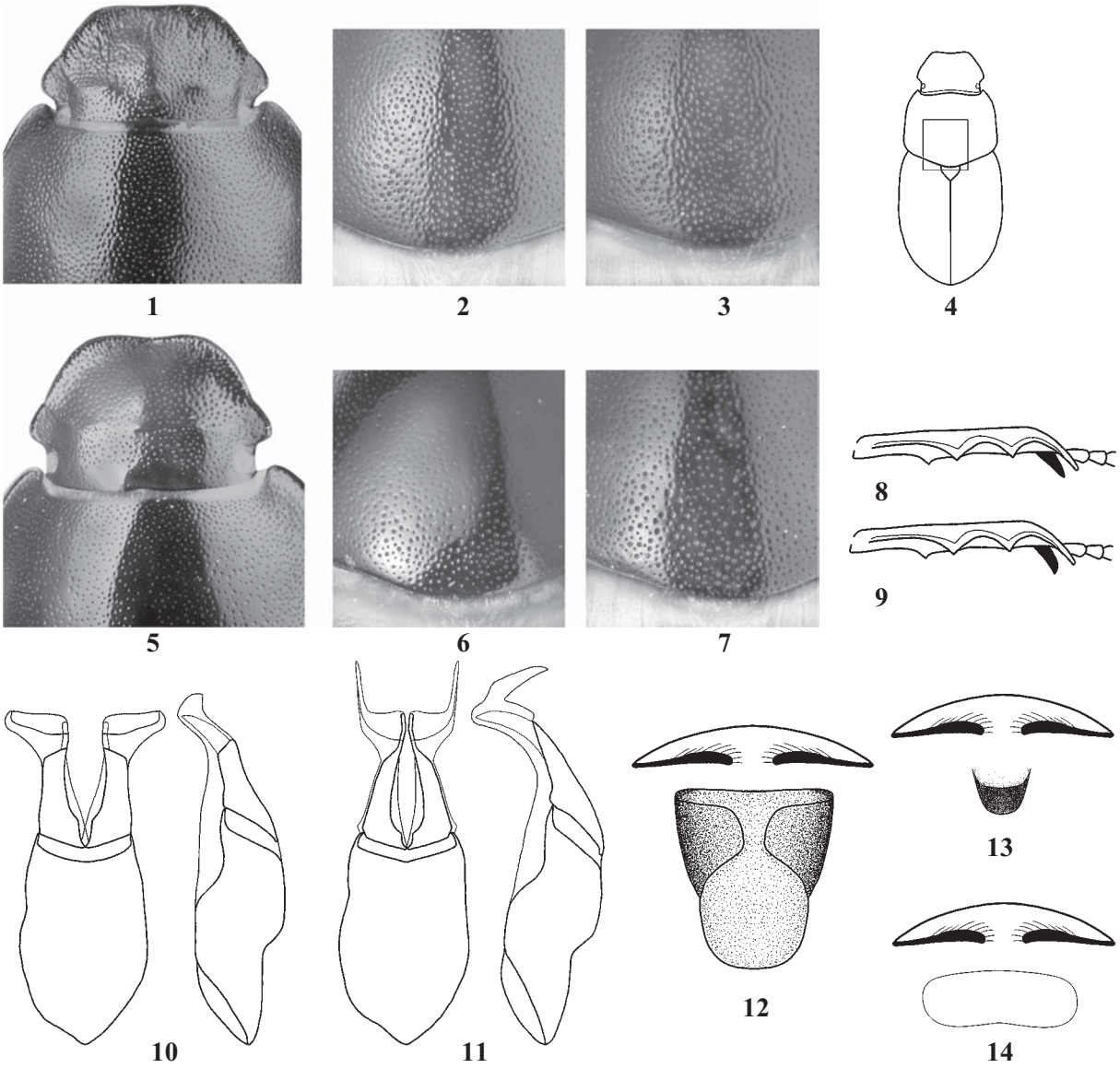
14(13). Black, elytra red to dark red; more densely punctured (Figs 39–42); elytra distinctly pubescent (hairs often abraided)); male head weakly tuberculate; aedeagus (Fig. 19); vaginal sac structure (Fig. 20); length 7–10 mm; Europe, Asia Minor, Caucasus ..... 6. ***A. thermicola*** Sturm

1. *Aphodius* (*Amidorus*) *obscurus* (Fabricius, 1792)
Figs 1–3, 8, 10, 12, 23–28

Scarabaeus obscurus Fabricius, 1792: 25
Type locality: Germania [Germany].
Aphodius flavipennis Miller L., 1883: 265
Type locality: Parnass bei Arachova [Greece]
Aphodius (*Amidorus*) *kluchoris* Roubal, 1918: 7, **syn. n.**
Aphodius (*Amidorus*) *obscurus*; Olsoufiev, 1918: 64; Balthasar, 1964: 289; Iablokov-Khnzorian, 1967: 107; Dzambazishvili, 1979: 98; Dellacasa G., 1983: 162; Dellacasa M., 1988: 368; Piau et al., 1999: 117
Aphodius (*Amidorus*) *flavipennis*; Balthasar, 1964: 290
Aphodius (*Amidorus*) *obscurus latinus* Dellacasa G., 1983: 164
Type locality: Forca d'Acero [Italy]
Amidorus obscurus; Dellacasa G. et al., 2001: 82

MATERIAL. **Type material examined**: Paratypes of *A. obscurus latinus*: 1♂and 1♀ bearing follow geographical label: "[Italy] Maiella (Abruzzo) Fondo di Femmina Morta [0]2.VII.1977 m.2600 R. Poggi".

Other material. **CAUCASUS, ASIA MINOR AND ARMENIAN HIGHLAND**: 18 ex. — Caucasus; 49 ex. — Georgia: 75 km W of Tbilisi, Avranlo, Kizil-kilisa, 18.VI.1909, Berg; 22 ex. — Akhalkalaki, N bank of Paravani lake, Tambovka, 26.VI.1909, Berg; 3 ex. — 14 km NE of Bakuriami, Tabazkuri lake, 18.VI.1909, Schmidt; 7 ex. — 38 km NE of Tsnori, Lagodekhi, Khochal-dag, 20.VII.1896, L. Mlokosevich; 1 ex. — 38 km NE of Tsnori, Lagodekhi, Khochal-dag; 1 ex. — Gori, 01.VI.1913, L. Mlokosevich; 9 ex. — Akhalkalaki, Samsarsky Mt.R., Levan-Gel lake, 25–26.VI.1909, Berg; 1 ex. — Akhalkalaki, Samsarsky Mt.R., Levan-Gel lake; 1 ex. — Akhalkalaki, Samsarsky Mt.R., Levan-Gel lake, 25.VI.1909, Schmidt; 13 ex. — 23 km NE of Akhalkalaki, Gorelovka, 28.VI.1909, Berg; 4 ex. — valley of Alazani R. Tsnori, 12.VI.1986; 21 ex. — 25 km NW of Gori, Kareli, 10.IX.1928, J. Kirschenblatt; 6 ex. — Bakuriani, 05.VIII.1909 Berg; 2 ex. — 18 km SE of Akhalkalaki, Bogdanovka, 21.VI.1909, Berg; 1 ex. — NW Abkhazia, Ritsa lake, Avadkhara, 1600 m, 07.VI.1980, Zaguliaev; 1 ex. — Akhalkalaki, Paravani lake; 1 ex. — Akhalkalaki, Paravani lake, 26.VI.1909, Schmidt; 2 ex. — Bakuriani, 19.VII.1928, D. Romanov; 1 ex. — Bakuriani, VI.1910, 6000 ft., Mlokos[evich]; 2 ex. — Tbilisi, 10.VII.1934; 19 ex. — Bakuriani, 19.VII.1928, D. Romanov; 1 ex. — Bakuriani, 14.VI.1928, D. Romanov; 2 ex. — Bakuriani;. **Azebaijan:** 3 ex. — Talysh Mts, Veri, 04.VI.1983, Shatrovskiy; 1 ex. — Talysh Mts, Nugis Qalasi Mt, 1900 m, 22.VI.1909, Znoiko; 1 ex. — N Azerbaijan, Kutkashen Mt., up cour Damir-Aparanchai R., 1400–1800 m, 15.VII.1994, V. Savitsky; 3 ex. — Lenkoran, Zuvant, Revarut; 1 ex. — Talysh Mts, Zuvant, Kizil-jurdy Mt., 08.VII.1932, Znoiko. **Armenia:** 2 ex. — SE Armenia, Zangezursky Mt.R., Tativ, Ochèi, 18.VII.1911; 2 ex. — NW slope of Aragats, Kipchah, 27.VII.1936; 11 ex. — Yerevan, Gokcha, Elenovka, 06.VI.1902, Elachich Klemat; 5 ex. — Yerevan, Gokcha, Chubukhly, 10.VI.1902, Elachich Klemat; 92 ex. — N bank of Sevan lake, Semenovka, 03.VI.1902, Elachich Klemat; 2 ex. — Yerevan, XI.1911–I.1912; 1 ex. — Armen[ien]. Geb[irgskamm], Leder, Reitter; 1 ex. — Aragats, 2000 m, 05.VII.1984, V. Grachev; 1 ex. — Yerevan, VII.1913; 1 ex. — S slope of Mt. Aragats, 3000–3300m, 30.VI.2003, Koval A.G.; 1 ex. — Yerevan. **Russia:** 5 ex. — W Caucasus, Fisht Mt, 22.VI.1903, Filipchenko; 2 ex. — NW Caucasus, Teberda, O.L. Kryzhanovskij; 4 ex. — Kubanskaya oblast [NW Caucasus]; 1 ex. — N Ossetia, Kazbek; 7 ex. — N Ossetia, Dzamarashkom, 2300 m, 04.VI.1987, S.K. Alexeev; 151 ex. — N Ossetia, mouth of Bagulta-don R. 2000 m, 04.VI.1987, S.K. Alexeev; 1 ex. — N Ossetia, Zaramag, Tsmiakom, 15.IV.1990, S.K. Alexeev; 2 ex. — N Ossetia, Zaramag, Tsmiakom, 19.VII.1986, S.K. Alexeev; 3 ex. — N Ossetia, basin of Ardon R., Mamison ravine, Kalaki Pass, 2870 m, 16.IX.1986, S.K. Alexeev; 2 ex. — N Ossetia, Tsei, 3000 m,



Figs 1–14. 1–3, 10 — *A. obscurus*; 4 — *Amidorus*; 5–7, 9, 11 — *A. alagoezi*; 8,12 — *A. obscurus, A. immaturus, A. cribrarius*; 13 — *Pubinus*; 14 — *Pseudacrossus*; 1, 5 — head and pronotum; 2–3, 6–7 — pronotum; 4 — habitus; 8–9 — male fore tibia apical spur (lateral view); 10, 11 — aedeagus in dorsal and lateral view; 12 — vaginal sac structure; 13–14 — vaginal sac structure (stipites are presented only for scale, vaginal sac structure in transversal view).

Рис. 1–14. 1–3, 10 — *A. obscurus*; 4 — *Amidorus*: 5–7, 9, 11 — *A. alagoezi*; 8, 12 — *A. obscurus, A. immaturus, A. cribrarius*; 13 — *Pubinus*; 14 — *Pseudacrossus*; 1, 5 — голова и переднеспиека; 2–3, 6–7 — переднеспинка; 4 — габитус; 8–9 — вершинная шпора передних голеней самца (вид сбоку); 10–11 — эдеагус сверху и сбоку; 12 — структура вагинального мешка; 13–14 — структура вагинального мешка (стипесы представлены только для масштаба, вагинальная структура в поперечном виде).

30.VII.1981, S.K. Alexeev; 7 ex. — W Caucasus, the Upper of M. Laba R., Chelipsi Mt.R., 2500 m, 14–15.VII.2004, S.I. Tarasov; 2 ex. — W Caucasus, Krasnaya Poliana, Aishho Pass, 2000 m, 11.VII.2004, S.I. Tarasov; 2 ex. — Karachaevo-Cherkesiya, Teberdinsky reserve, Kashkadzher ravine, 2300 m, 12.VI.1996, A.A. Gusakov; 4 ex. — Adygeya, S of Maikop, Lagonaki (kamennoe more), 22.VI.1995, A.A. Gusakov; 2 ex. — Karachaevo-Cherkesiya, Kiryngabash Mt.R., 2500–2700 m, 25.VI.1993, V. Savitsky; 1 ex. — Karachaevo-Cherkesiya, Teberdinsky reserve, SE slope of Khatipara, 2800 m, 05.VIII.1994, A.A. Gusakov; 1 ex. — Karachaevo-Cherkesiya, Teberdinsky reserve, SE slope of Khatipara, 2700 m, 07.VIII.1994, A.A. Gusakov; 1 ex. — Karachaevo-Cherkesiya, Teberdinsky reserve, SE slope of Khatipara, 2800 m, 13.VIII.1994, A.A. Gusakov. **Turkey:** 1 ex. — NE Turkey, 57 km SW of Kars, Sarikamish, 1914; 2 ex. — NE Turkey, 57 km SW of Kars, Sarikamish, 19.V.1912; 9 ex. — Asia Minor, Taurus cillic. or. **Iran:** 1 ex. — NW Iran, Karadag Mt.R., Saroga-daria, 09.VI.1914, von Wik; 1 ex. — NW Iran, Karadag, Gassan-beglu-saroga-daria, 08.VI.1914, von Wik. **CARPATHIAN MTS:** 1 ex. — Ukraine, Svidovets Mt.R., Dogiaska Mt., 1600 m, 21.VII.1996, A.V. Frolov. **PYRENEES AND CANTABRIAN MTS.:** 24 ex. — Lushon, 1901; 2 ex. — Pyrenäen [Pyrenees]; 6 ex. — Spain, Cantabria, Picos de Europa, La Libana, A. Kricheldorf. **ALPS:** 1 ex. — Alpes; 4 ex. — Styria, 5036; 1 ex. — Gallia, 5096; 2 ex. — Alpen-Breit, Nord-Tirol; 2 ex. — Alpen, Tyrol; 2 ex. — Germ. m.; 1 ex. — Tyrolis; 2 ex. — Italy, Piemonte, M.te Saccarello, 2000m, 04.VII.1999, Dellacasa G. **APENNINES:** 2 ex. — Italy, Forco d'Acero, 21.VI.1977, Carpaneto G. **BALKAN MTS:** 2 ex. — Greece, Korinthia, M.ti Killini, 20.V.1989, Zola S. **UNCERTAIN:** 3 ex. — Italy.

DESCRIPTION. Male. Oval, convex, slightly elongate. Black; elytra black to red, yellowish in subspecies *flavipennis*; nearly glabrous, often with very short apical pubesence; legs slightly reddish.

Head black, rather wide, shiny; surface densely punctured, punctures near lateral border sometimes conflent in wrinkles (Fig. 1); epistome slightly swollen in anterior portion, clypeus feebly sinuate at middle, rounded at sides; frontal suture with trace of three tubercles; genae angulate, protruding beyond eyes (Fig. 1).

Pronotum black, wide, rather shiny; disc of pronotum densely punctured, punctures unequal, separated by less then diameter of a puncture, becoming denser laterally (Figs 2–3), see also Fig. 1.

Elytral sculpture extremely variable, surface usually dull (Figs 23–24, 26–27), sometimes slightly shiny (Figs 25, 28); elytral interstices with distinct (Figs 23–25) to nearly obsolete punctures (Figs 26–27); surface between punctures shagreened.

Apical spur of front tibia acute at apex (Fig. 8), extended about to second tarsal segment; first hind tarsal segment nearly as long as upper apical tibial spur, slightly shorter than three following segments combined.

Aedeagus as in Fig. 10.

Metasternal plate shiny, densely punctured apically, with long, golden yellowish pubescent.

Female distinguished from male by narrower pronotum, and denser punctation; apical anterior tibial spur smaller.

Vaginal sac structure as in Fig. 12.

Length 6–9 mm.

DIFFERENTIAL DIAGNOSIS. An extremely variable species difficult to separate from three other species in the group.

It is distinguished from *A. alagoezi* by the parameral apex differently shaped, with shorter membranous lobes, vaginal sac structure with apico-lateral portions distinctly bent inward, male apical front tibial spur apically acute (Fig. 8), lateral clypeal punctation usually confluent in wrinkles (Fig. 1), pronotal disc more densely punctured (Figs 2–3, see also Fig. 1), elytral interstices usually more densely punctured, duller, with more shagreened surface (Figs 23–28). Rarely some individuals of *A. obscurus* may possesss the last three characters, and are very similar to typical representatives of *A. alagoezi*. To distinguish these two species it is necessary to use all of the characters listed above (compare elytral sculpture of *A. obscurus,* Fig. 28, and *A. alagoezi*, Figs 32–33).

It may be distinguished from *A. immaturus* by the parameral apex differently shaped, with shorter membranous lobes, and elytral interstices less shagreened and less shiny. The elytral sculpture may be very similar in both species (compare elytral sculpture of *A. obscurus*, Fig. 25, and *A. immaturus* (Figs 29–30).

It can be separated from *A. cribrarius* by the elytral interstices dull and more shagreened, by not polished shiny elytral surface between punctures. There are no differences in the shape of aedeagus between these two species.

DISTRIBUTION. This species is distributed in the alpine and subalpine zones of Pyrenees, Cantabrian Mts., the Alps, Apennines, Carpathian Mts, Balkan Mts., the Caucasus, the mountainous systems of Asia Minor and Armenian highland. It is sympatric in different parts of the distributional area with three other species of the group (*A. alagoezi*, *A. immaturus* and *A. cribrarius*).

SYSTEMATIC REMARKS. This species inhabits the alpine zone of the mountains listed above, a habitat that dictates its division into several isolated populations. Some of these may represent different subspecies or even species. It already has two subspecies in addition to the typical form, *A. obscurus flavipennis* Miller L., 1883, characterized by forms with yellowish elytra in addittition to forms with reddish and black elytra, and distributed in the southern Balkan Mts (*A. obscurus flavipennis* was originally described in the rank of species *A. flavipennis*, but here I consider this taxon as only a subspecies). The presence of forms with yellowish elytra only in the southern Balkan Mts, although with other colored forms, in my opinion indicates the validity of this subspecies. Because this form does not occur in other parts of the distribution area of *A. obscurus*.

The other subspecies, *A. obscurus latinus* Dellacasa G, 1983, possesssing a unique, distinctly and coarsely punctured, more shagreened and shinier elytral sculpture (Fig. 25), is distributed in the central part of Apennines (*A. obscurus obscurus* is distributed in the northen and southern Apennines) [Dellacasa G. & Dellacasa M., 2006]..

At present it is difficult to ascertain the subspecific status of *A. obscurus*. First, this requires study of a large amount of material from different populations in different parts of the distributional area. Second, in my opinion such a study probably must be primarily based on biochemical data. The question of subspecific structure of the species remains open and is not considered in detail here.

Jan Roubal described *A. kluchoris* Roubal, 1918, from the Caucasus (Teberda, Kluchor Pass). Unfortunately I was not able to find type of this species. In the original description the author did not point out any valid, distinct features separating this form from *A. obscurus*, which is highly variable and widely distributed in the region. It can be supposed that *A. kluchoris* is a junior synonym of *A. alagoezi* which is also distributed in the Caucasus (Elbrus and Aragats). First, according to the original description [Roubal, 1918] "[…] Flügeldecken sehr schwach glänzend […]. […] die Punkte der Streifen ziemlich grob (gröber als bei dem *obscurus* F.) die Zwischenräume weniger eben als bei dem letzteren, grob, dicht punktiert […]. Von *obscurus* F. durch schwächer Wölbung der Elytren, schmächtigere, engere, längere durchschnittliche Gestalt, viel gröbere, dichtere Punktierung der viel mehr uneben Interstitien der Elytren usw., […]." that indicates that elytral sculpture features of the form *A. kluchoris* are presented in the typical representatives of *A. obscurus* and do not occur in *A. alagoezi*. Second, it appears that the distributional area of *A. alagoezi* is strictly localized, and it is not present in the type locality of *A. kluchoris*. Thus I consider *A. kluchoris* a junior synonym of *A. obscurus*.

2. *Aphodius* (*Amidorus*) *alagoezi* Olsoufiev, 1918
Figs 5–7, 9, 11, 18, 31–33

Aphodius (*Amidorus*) *alagoezi* Olsoufiev, 1918: 63; Iablokov-Khnzorian, 1967:106

Type locality: Prov. d'Erivan mont. Alagoez; Ečmiadzin; prov. Kuban, mont Elbrus (Armenia: Alagoz Mt., Echmiadizin. Russia: Elbrus Mt.)

Aphodius (*Amidorus*) *monticustos* Balthasar, 1946: 58, **syn.n.**; Iablokov-Khnzorian, 1967: 106; Frolov, 2000: 390 (as synonym of *obscurus*)

Aphodius (*Amidorus*) *rollandi* Kalashian et Lumaret, 2000: 497, **syn.n.**

MATERIAL. **Type material examined.** The lectotype of *A. monticustos,* male, herein designated, bearing the following labels: 1) white, printed: "Nord Caucasus Elborus G [North Caucasus, Elbrus] 10000 [ft., approximately 3000 m] E. Koenig"; 2) white: "*a.* (*amidorus*) *montiscustos* n. sp. [handwritten] Dr.V. Balthasar det. [printed]; 3) red, printed: TYPUS"; 4) white: "*Aphodius* [printed] *obscurus* F. [handwritten] A. Frolov det 2000 [printed]"; 5) red, printed: "Lectotypus *Aphodius* (*Amidorus*) *monticustos* Balthasar, 1946 S. Tarasov design. 2006"; 6) white, printed: "*Aphodius* (*Amidorus*) *alagoezi* Olsoufiev, 1918 det. 2006 S. Tarasov" (NMPC).

Also one specimen of a female, herein designated as a paralectotype, from the same locality (NMPC). The lectotype and paralectotype are desgnated in order to preserve the stability of the group nomenclature, according to Article 74.7 [ICZN, 1999], since the type specimens of *A. monticustos* Balthasar, 1946, are the primary out of all other extant type specimens of the species *A. alagoezi* Olsoufiev, 1918.

Paratypes of *A. rollandi*: 4 ex. with geographical label "Араяц, оз. Кари-ли, [Aragats, Kari-Li lake] 14.VII.86" (ZISP).

Other material. 5 ex. — Nord Caucasus, Elborus G [North Caucasus, Elbrus], 8000 [ft., approximately 2400 m], E. Koenig; 1 ex. — Nord Caucasus, Elborus G [North Caucasus, Elbrus], 10000 [ft., approximately 3000 m], E. Koenig; 1 ex. — Armenia, Aragats, 3200 m, 05.VII.1984, V. Grachev; 1 ex. — Armenia, Aragats, 15.VII.19 [next two numbers are illegible], Daniliavenia.

DESCRIPTION. Male. Oval, rather convex, feebly elongate. Black; elytra black, to black-reddish, legs slightly reddish; surface nearly glabrous, sometimes with very short apical pubescence.

Head black, rather wide, shiny; surface densely punctured, punctures near lateral border not confluent in wrinkles (Fig. 5); epistome slightly swollen anteriorly, clypeus feebly sinuate medially, rounded at sides; frontal suture feebly trituberculate; genae angulate, protruding beyond eyes (Fig. 5).

Pronotum black, wide, shiny; pronotal disc densely punctured, punctures unequal, separated by a diameter or less, becoming denser laterally (Figs 6–7, see also Fig. 5).

Elytra somewhat dull or slightly shiny; elytral interstics finely, sparsely punctured, surface between punctures not, or feebly shagreened (Figs 31–33).

Apical front tibial spur somewhat apically rounded (Fig. 9), extended to about second tarsal segment; first hind tarsal segment slightly shorter than upper apical spur of tibia and three following segments combined.

Aedeagus as in Fig. 11.

Metasternal plate shiny, densely punctured apically, with long, golden-yellow pubescence.

Female distinguished from male by narrower pronotum and pronotal surface more densely punctured; apical front tibial spur slightly smaller and apically more acute.

Vaginal sac structure with sclerotized on border ovaloid dorso-ventrally closely located to the vulva (Fig. 18).

Length 6–8 mm.

DIFFERENTIAL DIAGNOSIS. This species is very similar to *A. immaturus* and *A. cribrarius*, and is often intermixed with *A. obscurus*. It can be separated from all species of the group by vaginal sac structure with sclerotized on border ovaloid (Fig. 18).

It also may be separated from *A. obscurus* by the parameral apex differently shaped and having longer membranous lobes (Fig. 11), male front tibial apical spur somewhat apically rounded (Fig. 9), lateral clypeal punctures usually not confluent in wrinkles (Fig. 5), disc of pronotum more sparsely punctured (Figs 6–7, see also Fig. 5), elytral interstices more shiny and less shagreened (Figs 31–33). The last three characters are not completely reliable because they are somewhat variable and in some specimens very similar to individuals of *A. obscurus* and *A. alagoezi*. (compare elytral sculpture of *A. alagoezi,* Figs 32–33 and *A. obscurus*, Fig. 28)

It is distinguished from *A. immaturus* by the differently shaped parameral apex, male front tibial spur somewhat rounded at apex (Fig. 9), elytral surface less shagreened.

It may be separated from *A. cribrarius* by aedeagus with longer membranous lobes, and by parameral form, male front tibial apical spur somewhat rounded at apex (Fig. 9), and elytral surface between punctures not polished, not shiny.

DISTRIBUTION. This species is distributed in the alpine zone of the Caucasus. Known only from Elbrus and Aragats. It is sympatric and coexists with closely related species *A. obscurus*.

SYSTEMATIC REMARKS: I was not able to locate the types of *A. alagoezi*, but I examined 5 specimens labeled "*Aphodius* v. *schamyli*" from Elbrus which were collected by E. Koenig and deposited in the Zoological Institute in St. Petersburg (also one specimen bearing the same geographical label, but not marked "*Aphodius* v. *schamyli*"). It is evident that G.V. Olsoufiev examined some part of the material from those collections because he included two specimens collected by Koenig from Elbrus as part of the type series of *A. alagoezi* (none of the specimens studied were marked as *A. alagoezi*). I quote Olsoufiev's words [Olsoufiev, 1918] from the original description of *A. alagoezi*, "This species (i.e. *A. alagoezi*, author's comment) is present in the collection with 10 ex., one of them without any geographical notes was earlier identified (in the old collection) as *A. cribrarius*, but E.G. Koenig has already payed attention to it and gave to his 2 ex. from Elbrus, the name of *A. schamlyi* i. litt. t." Based on this and on the analysis of the original description of *A. alagoezi*, I can state that the specimens deposited in ZSIP and marked as "*Aphodius* v. *schamyli*" belong to *A. alagoezi*. The name *A. schamyli* is a nomen nudum.

The species *A. monticustos* Balthasar, 1946, from Elbrus, was considered by Frolov [2000] as a synonym of *A. obscurus*. Two type specimens of this species were also collected by Koenig, and bear the identical geographical labels as the specimens with the mark "*Aphodius* v. *schamyli*" (type specimens of *A. monticustos* were collected at 1000 ft, five specimens with the mark "*Aphodius* v. *schamyli*" were collected at 8000 ft, and one specimen with the same mark at 10000 ft. It is possible that the type specimens of *A. monticustos* and those with mark "*Aphodius* v. *schamyli*" may have come from the same collection). They undoubtedly belong to *A. alagoezi*. Iablokov-Khnzorian [1967] pointed out that *A. alagoezi* and *A. monticustos* were probably the same species (but according to the following quotation he considered all three names, *A. obscurus*, *A. alagoezi*, and *A. monticustos* to be synonyms). The quote is "We did not study the Olsoufiev's type but we had examined a numerous material from Aragats where frequently occurred specimens of *A. obscurus* with smoothed elytral sculpture but they, however, could not be considered as separate species. On the other hand the species (*A. monticustos*) that was described by Balthasar [1946] from Elbrus as we can see out of its indistinct original description does not distinguish from the Olsoufiev's species".

In my opinion there are distinct differentiating characters that allow *A. obscurus* and *A. alagoezi* to be recognized, therefore I consider both names to be valid.

The species *Aphodius rollandi* Kalashian et Lumaret , 2000, was described from the Aragats area, this name I consider a junior synonym of *A. alagoezi*.

3. *Aphodius* (*Amidorus*) *immaturus* Mulsant, 1842
Figs 8, 12, 15, 29–30

Aphodius immaturus Mulsant, 1842: 263

Type locality: Mont Ventoux [south-east France].

Aphodius (*Amidorus*) *immaturus*; Paulian, 1959: 148; Balthasar, 1964: 295 (as synonym of *cribrarius*); Dellacasa G., 1983: 160; Piau et al., 1999: 117; Tagliaferri, 2000: 239

MATERIAL. France, Brianзon, Lac Neal, 2400m, 28.VII.1987, 5 ex. (Fery H.)

DESCRIPTION. Male. Oval, rather convex, feebly elongate. Black; elytra black to black-brown, nearly glabrous, some-

times with very short apical pubesence; legs slightly reddish.

Head black, rather wide, shiny; surface densely punctured, punctures near lateral margin usually confluent in wrinkles (as in *A. obscurus*, see Fig. 1); epistome slightly swollen anteriorly, clypeus feebly sinuate at middle, rounded at sides; frontal suture feebly trituberculate; genae angulate, protruding beyond eyes.

Pronotum black, wide, rather shiny; pronotal disc densely punctured, punctures unequal, separated by less than a diameter, becoming denser laterally.

Elytral interstices rather shiny, distinctly shagreened, indistinctly punctured (Figs 29–30).

Apical front tibial spur acute at apex (as in *A. obscurus*, see Fig. 8), extended to approximately second tarsal segment; first segment of hind tarsus nearly as long as upper apical tibial spur, and slightly shorter than following three segments combined.

Aedagus as in Fig. 15.

Metasternal plate shiny, densely punctured apically, with long, golden-yellow pubescence.

Female distinguished from male by narrower pronotum and denser pronotal punctation, apical spur of front tibia slightly smaller.

Vaginal sac structure as in Fig. 12.

Length 6–8 mm.

DIFFERENTIAL DIAGNOSIS. This species is very similar to *A. obscurus* (and is often mixed with it in collections), *A. alagoezi*, and *A. cribrarius*.

It may be separated from *A. obscurus* by the parameral apex differently shaped and having longer membranous lobes, and elytral sculpture shinier and more shagreened. Sometimes the differences in elytral sculpture are not useful (compare the elytral sculpture of *A. immaturus* (Figs 29–30) and *A. obscurus* (Fig. 25).

It is distinguished from *A. alagoezi* by the form of parameral apex and membranous parameral lobes, vaginal sac structure with apico-lateral portions distinctly bent inward, male apical front tibial spur apically acute, and the more shagreened elytral sculpture.

It may be separated from *A. cribrarius* by longer membranous parameral lobes and differently shaped apex of paramera, and elytral surface between punctures not polished, not shiny.

DISTRIBUTION. This species is distributed in the alpine zone of south-west Alps (south-east France, north-west Italy: Lombardia, Piemonte, Valle d'Aosta) and Austria [Dellacasa & Dellacasa, 2006]. It is sympatric and coexists with close related species *A. obscurus*.

SYSTEMATIC REMARKS. Some differences exist in the first subunit of the mitochondrial gene cytochrome-c-oxidase (COI) between *A. immaturus* and *A. obscurus* [Piau et al., 1999]. Although these data cannot be considered really definitive because they were obtained through RFLP-analysis, but they reinforce the position that *A. immaturus* and *A. obscurus* are valid species in spite of minimal differences in external morphology and aedeagal shape.

4. *Aphodius* (*Amidorus*) *cribrarius* Brullé, 1832
Figs 8, 12, 16, 35–38

Aphodius cribrarius Brullé, 1832: 171

Type locality: Morée [Greece].

Aphodius (*Amidorus*) *cribrarius*; Olsoufiev, 1918: 64; Balthasar, 1964: 295; Iablokov-Khnzorian, 1967: 107;Dellacasa G., 1983: 157; Dzambazishvili, 1979: 101; Dellacasa M., 1988: 368

Aphodius (*Amidorus*) *tarsensis* Petrovitz, 1967: 329, **syn. n.**

MATERIAL. **Type material examined.** 1 ex. of *A. tarsensis*, ♂ with capsule for genitalia and following labels:

1) white, printed: "Namrum b. Tarsus Asia Minor leg.Petrovitz-Ressl"; 2) red, printed: "TYPUS"; 3) red, printed: "*Aph.* (*Amidorus*) *tarsensis* m. Petrovitz 1966"; 4) white, printed: "Coll. R. Petrovitz". 5) white, printed: "*Aphodius* (*Amidorus*) *cribrarius* Brúlle det. 2006 S. Tarasov".

And also 1 ex. female with the same labels instead of the second bearing an inscription "PARATYPUS" from the same locality (MHNG).

Other material. 18 ex. — Greece, Attica, Reitter; 2 ex. — Greece Salonichi; 2 ex. — Greece, Kalamata, Polani, 27.IX.1988, Dellacasa G. & E.; 2 ex. — Turkey, Vil. Mersin, Çamliyayla, 1100m, 05.X.1988, Dellacasa G. & E.);

DESCRIPTION. Male. Oval, rather convex, feebly elongated. Black; elytra red to dark red, nearly glabrous, sometimes with very short apical pubescence; legs slightly reddish.

Head black, rather wide, shiny; surface densely punctured, punctures somewhat confluent in wrinkles near lateral borders; epistome slightly swollen anteriorly, clypeus feebly sinuate at middle, rounded at sides; frontal suture indistinctly trituberculate; genae angulate, protruding beyond eyes.

Pronotum black, wide, rather shiny; pronotal disc with dense, unequal punctures.

Elytral sculpture variable, with differing degrees of punctation, sometimes punctures confluent in wrinkles, surface between punctures polished, shiny (Figs 35–38).

Apical front tibial spur acute at apex, extended approximately to second tarsal segment; first segment of hind tarsus slightly longer than apical tibial spur, nearly as long as following three segments combined.

Aedeagus as in Fig. 16.

Metasternal plate shiny, apically densely punctured, with long, golden-yellow pubescence.

Female distinguished from male by narrower pronotum, and pronotal punctures denser; apical front tibial spur slightly smaller.

Vaginal sac structure as in Fig. 12.

Length 6–8 mm.

DIFFERENTIAL DIAGNOSIS. This species is most similar to *A obscurus*, *A. alagoezi*, and *A. immaturus*. It is often mixed with *A. thermicola*.

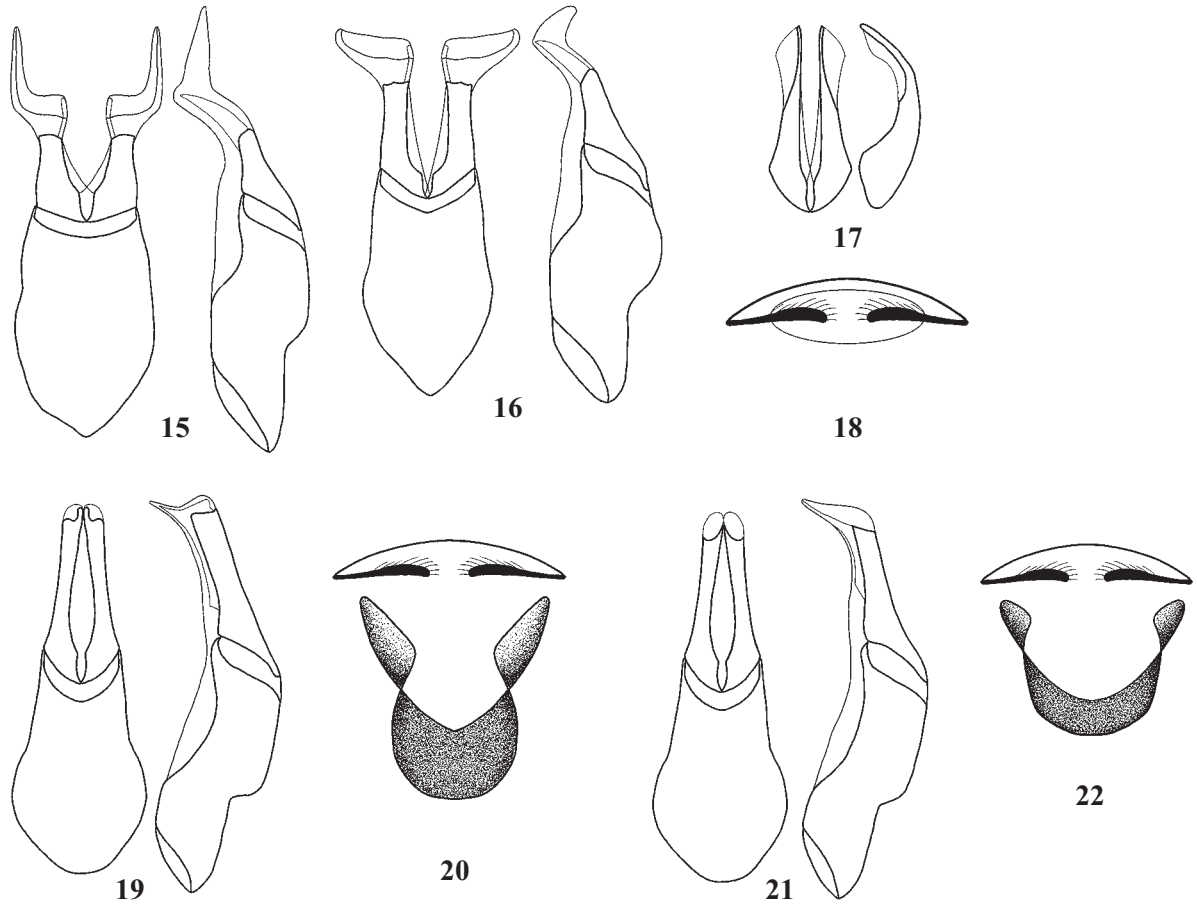
It can be definitely separated from *A. obscurus* by the elytra, red to dark red coloured and by the polished shiny elytral surface between punctures. There is no difference between these species in aedeagal shape.

It may be distinguished from *A. alagoezi* by the shorter membranous parameral lobes, by the differently shaped apex of paramera, vaginal sac structure with apico-lateral portions distinctly bent inward, and elytral interstices between punctures polished, shiny.

It can be distinguished from *A. immaturus* by shorter membranous parameral lobes, by the differently shaped parameral apex, and elytral interstices less shagreened, surface between punctures polished, shiny.

It can be definitely distinguished from *A. thermicola* by vaginal sac structure and aedeagus, pronotum less convex and more densely punctured, elytra nearly glabrous (occasional specimens of *A. thermicola* with abraded elytral hairs), and frontal suture with indistinct trace of three tubercles.

DISTRIBUTION. I have examined the specimens of this species only from Greece and south Turkey. In the large collection of ZISP I have found no specimens of this species from the Caucasus. All the specimens identified as *A. cribrarius* from this area belonged to another species. The records of the species for the Caucasus [Olsoufiev, 1918; Iablokov-Khnzorian, 1967; Dzambazishvili, 1979] must be considered as mistaken. It is difficult to discuss the distribution of the species due to its often mistaken identify. Presumably it is distributed in the south part of Balkan Peninsula and



Figs 15–22. 15 — *A. immaturus*; 16 — *A. cribrarius*; 17 — *A. moraguesi*; 18 — *A. alagoezi*; 19–20 — *A. thermicola*; 21–22 — *A. cribricollis*; 15, 16, 17, 19, 21 — aedeagus in dorsal and lateral view; 18, 20, 22 — vaginal sac structure.

Рис. 15–22. 15 — *A. immaturus*; 16 — *A. cribrarius*; 17 — *A. moraguesi*; 18 — *A. alagoezi*; 19–20 — *A. thermicola*; 21–22 — *A. cribricollis*; 15, 16, 17, 19, 21 — эдеагус сверху и сбоку; 18, 20, 22 — структура вагинального мешка.

south Turkey. Recorded in Italy [Luigioni 1929] but this record needs confirmation [M. & G. Dellacasa, personal communication].

A. cribrarius is probably sympatric with *A. obscurus* but has other biotopic preferences. *A. cribrarius* is diffused in the altitudes 500–1500 m and it is not presented in the alpine zone [M. & G. Dellacasa, personal communication].

SYSTEMATIC REMARKS. I consider the species *A. tarsensis* Petrovitz, 1967 that was described from the south Turkey as a junior synonym of *A. cribrarius* because I do not find any difference between these two taxa.

5. *Aphodius* (*Amidorus*) *moraguesi* Baraud, 1978
Fig. 17

Aphodius (*Amidorus*) *moraguesi* Baraud, 1978: 53

Type locality: Maroc, Moyen-Atlas, Aïn Arbi [Morocco]

Aphodius (*Amidorus*) *moraguesi*; Baraud, 1985: 159; Hollande et al., 1998: 171

MATERIAL. **Type material examined.** Holotype of *A. moraguesi*, male, bearing the following labels: 1) red, handwritten: "*Aphodius* (*Amidorus*) *moraguesi* Baraud HOLOTYPUS ♂"; 2) white, handwritten: "Maroc Moyen-Atlas (2000 m)"; 3) white, handwritten: "Aïn Arbi 2000m. Maroc 27.IX.77"; 4) white, handwritten: "Aïn Arbi (Timhalit) 27.IX.77 L. Bigot"; 5)white, printed: "Muséum Paris Coll J. Baraud" (MNHN).

And also one female paratype from the same locality (MNHN).

DESCRIPTION. Male. Oval, rather convex, feebly elongated. Black; elytra black to dark reddish-brown, nearly glabrous, sometimes with very short apical pubescence; legs sometimes reddish.

Head black, rather wide, shiny; densely punctured, somewhat wrinkled; epistome slightly swollen anteriorly; clypeus feebly sinuate at middle, rounded at sides; border distinctly elevated; frontal suture distinct, without tubercles; genae angulate, protruding beyond eyes.

Pronotum black, wide, rather shiny; disc of pronotum densely punctured, punctures becoming denser laterally.

Elytra coarsely, distinctly, irregularly punctured, punctures often confluent; surface between punctures polished, shiny.

Apical front tibial spur apically hook-shaped, bent inward; first segment of hind tarsus slightly shorter than upper apical tibial spur, and as long as three following segments combined.

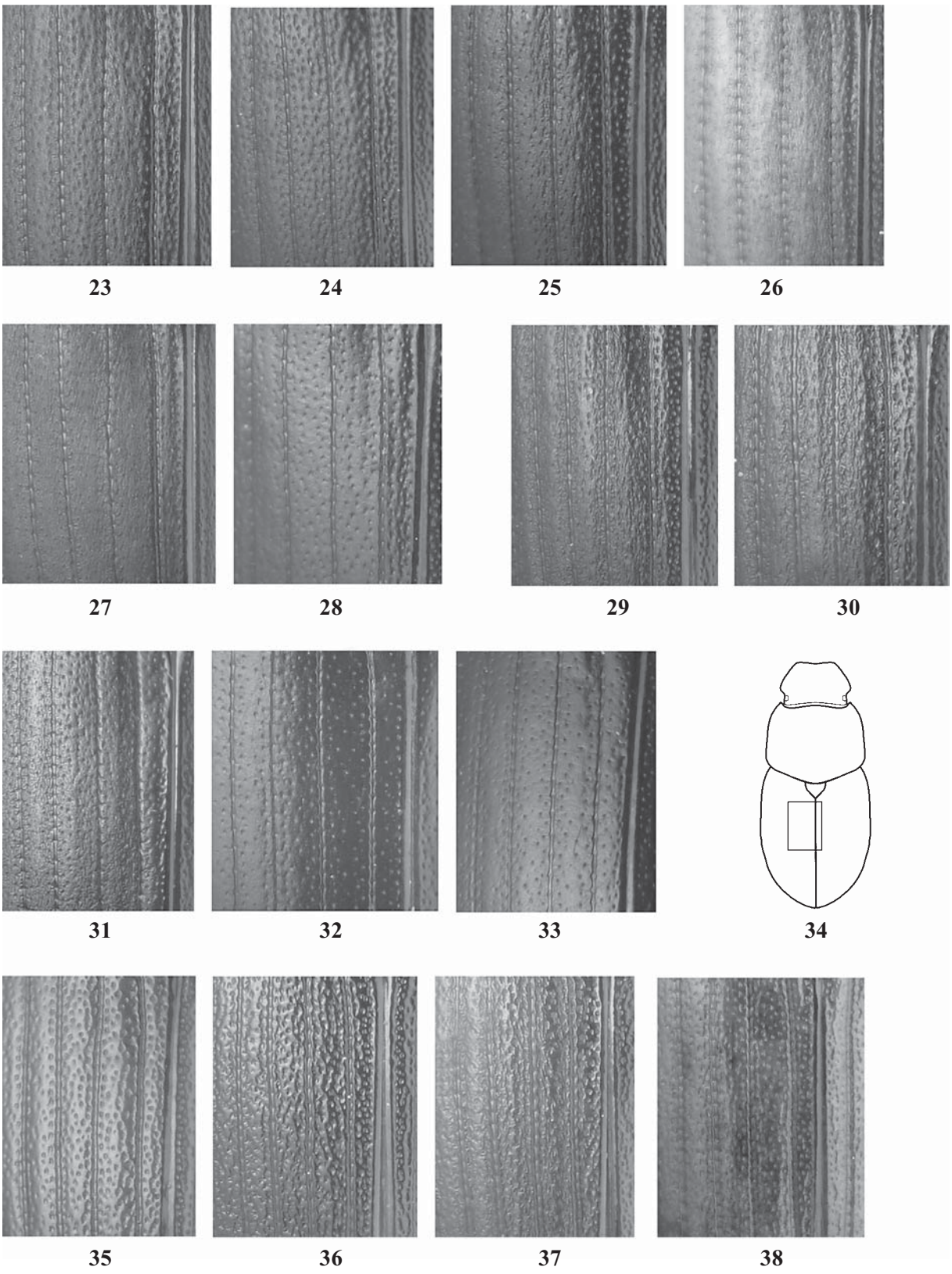
Aedeagus as in Fig. 17.

Female distinguished from male by narrower pronotum and denser pronotal punctation; front tibial spur unmodified.

Length 7–8 mm.

DIAGNOSIS. Habitus of this species is similar to the black form of *A. obscurus*. It can be separated from all other members of the subgenus by the unique aedeagal shape, apical front tibial spur hook-shaped and bent inward, clypeal border distinctly elevated.

DISTRIBUTION. Known only from the type locality.



Figs 23–38. 23–28 — *A. obscurus* (25 — ssp. *latinus* (paratype), 26 — ssp. *flavipennis*); 29–30 — *A. immaturus*; 31–33 — *A. alagoezi*; 34 — *Amidorus*; 35–38 — *A. cribrarius* (38 — holotype of *A. tarsensis*); 23–33, 35–38 — elytral sculpture; 34 — habitus.

Рис. 23–38. 23–28 — *A. obscurus* (25 — ssp. *latinus* (паратип), 26 — ssp. *flavipennis*); 29–30 — *A. immaturus*; 31–33 — *A. alagoezi*; 34 — *Amidorus*; 35–38 — *A. cribrarius* (38 — голотип *A. tarsensis*); 23–33, 35–38 — скульптура надкрылий; 34 — габитус.

6. *Aphodius* (*Amidorus*) *thermicola* Sturm, 1800
Figs 19–20, 39–42

Aphodius thermicola Sturm, 1800: 44
Type locality: Baden [Germany]
Aphodius (*Amidorus*) *thermicola*; Olsoufiev, 1918: 64; Balthasar, 1964: 293; Iablokov-Khnzorian, 1967: 106; Dzambazishvili, 1979: 99
Aphodius (*Pseudacrossus*) *thermicola*; Dellacasa G., 1983: 402

MATERIAL. **RUSSIA:** 1 ex. — Dagestan; 7 ex. — N Ossetia, basin of Ardon R., Unal, mountainous steppe, 1200 m, 09.XI.1985, S.K. Alexeev; 6 ex. — N Ossetia, basin of Ardon R., Unal, mountainous steppe, 1200 m, 10.X.1984, S.K. Alexeev; 1 ex. — N Ossetia, basin of Ardon R., Unal, mountainous steppe, 1200 m, 19.XII.1986, S.K. Alexeev; 1 ex. — N Ossetia, basin of Ardon R., Unal, mountainous steppe, 1200 m, 15.X.1985, S.K. Alexeev; 7 ex. — N Ossetia, basin of Ardon R., Unal, mountainous steppe, 1200 m, 09.XI.1985, S.K. Alexeev; 1 ex. — N Ossetia, Tsei, 6.IV.1985, S.K. Alexeev; 5 ex. — NW Caucasus, Gelendzik, N. Vorob'ev. **UKRAINE:** 1 ex. — Crimea, Feodosia, 24.XII.1901; 1 ex. — Crimea, Feodosia, 25.XII.1901; 1 ex. — Crimea, Feodosia, 09.IV.1898; 1 ex. — Crimea, Sevastopol', 1929, V. Kizerizkiy; 2 ex. — Crimea, Lesni, 08.IV.1907; 1 ex. — Crimea, Sevastopol', 14.IX.1911. **GEORGIA:** 3 ex. — Tbilisi, E. Koenig; 5 ex. — Tbilisi, botanical garden, 13.IX.1916, Olsoufiev; 5 ex. — 15 km N of Tbilisi, Mtsheta, 24.10.1965, Kryzhanovskiy. **AZERBAIJAN:** 1 ex. — Lenkoran, Zuvant, V.1929. **ARMENIA:** 1 ex. — Yerevan, 10−25.XI.1912; 4 ex. — Yerevan, VII.1911−I.1912; 12 ex. — Yerevan, XI.1911; 2 ex. — Yerevan, 24.XII.1911−12.I.1912; 15 ex. — Yerevan, 17.III.1936, Ter-Minasian and Richter; 1 ex. — Yerevan, Garni, 28.III.1998, Smirnov; 1 ex. — Yerevan, 06.V.1939, Richter; 21 ex. — Yerevan, XI.1911. **FRANCE:** 4 ex. — Avignon. **ITALY:** 4 ex. — Abruzzen; 1 ex. — Italia, Reitter; 2 ex. — Lazio, M. Tanzia (Sabini), 1000 m, 13.IX.1990, G. Carpaneto; 1 ex. — Italy, 1890, Reitter; 2 ex. — Abruzzen, Reitter. **GERMANY:** 1 ex. — Germ. m.; 1 ex. — Germany. **UNCERTAIN:** 2 ex. — Gallia; 1 ex. — Pyrenäen [Pyrenees]; 1 ex. — Alpes.

DESCRIPTION. Male. Oval, rather convex, elongate; Black, reddish to dark red; elytra distinctly pubescent (sometimes hairs abraided); legs slightly reddish.

Head wide; surface rugosely punctured; epistome with trace of transverse carina anteriorly, slightly swollen behind; clypeus feebly sinuate at middle, rounded at sides; frontal suture feebly tuberculate; genae angulate, protruding beyond eyes.

Pronotum wide, rather shiny, distinctly convex; disc of pronotum with fine, nearly uniform punctures, punctures separated by a diameter or less, becoming denser laterally.

Elytra densely, coarsely punctured, surface between punctures polished, shiny (Figs 39–42).

Apical front tibial spur extended approximately to second tarsal segment; first hind tarsal segment somewhat longer than apical tibial spur, as long as three following segments combined.

Aedeagus as in Fig. 19.

Metasternal plate shiny, slightly concave, coarsely punctured, laterally with long, golden-yellow pubescence.

Female distinguished from male by narrower, less convex pronotum, pronotal punctation denser, apical front tibial spur slightly smaller, head with tubercles less distinct, metasternal plate without longitudinal groove.

Vaginal sac structure as in Fig. 20.

Length 7–10 mm.

DIFFERENTIAL DIAGNOSIS. This species is most similar to *A. cribricollis*, and *A. koshantschikovi*, and often mixed with *A. cribrarius* in collections.

It can be separated from *A. cribricollis* by the shape of aedeagus and vaginal sac structure, elytra red or dark red colored, more densely punctured (Figs 39–42) and pubescent, head tubercles less distinct.

It is distinguished from *A. koshantschikovi* by the shape of aedeagus and vaginal sac structure, body relatively longer, genae protruding beyond eyes (as in *A. obscurus* and *A. alagoezi* (Figs 1, 5), elytral interstices more shiny, not shagreened, distinctly pubescent.

It is distinct from *A. cribrarius* by the shape of aedeagus and vaginal sac structure, pronotum in males more convex and more sparsely punctured, elytra distinctly pubescent (hairs often abraided), head distinctly tuberculate.

DISTRIBUTION. This is a xerophytic, primarily middle altitude species distributed in several European mountain systems (Pyrenees, Alps, Apennines, and Balkan Mts), Asia Minor, the Caucasus and the Crimea. In North Ossetia it was recorded at an altitude of 1200 m in the mountain steppe [S.K. Alexeev, Kaluga, personal communication].

7. *Aphodius* (*Amidorus*) *cribricollis* Lucas, 1846
Figs 21–22, 43–44

Aphodius cribricollis Lucas, 1846: 260
Type locality: Boudjaréa, aux environs d'Alger [Algeria]
Aphodius (*Amidorus*) *oranicus* Balthasar, 1961: 360, **syn.n.**; Baraud, 1985: 160; Hollande et al., 1998: 174
Aphodius (*Amidorus*) *cribricollis*; Balthasar, 1964: 292; Baraud, 1985: 159; Hollande et al., 1998: 173;
Aphodius (*Pseudacrossus*) *cribricollis*; Dellacasa, 1983: 393

MATERIAL. **Type material examined.** Holotype of *A. oranicus* female bearing following labels: 1) white, printed: "Oran Sidi-bel-Abbès M. Rotron XII.1914."; 2) white, printed on underside: "Slg. R. Oberthür Eing. Nr. 4, 1956"; 3) white: "*a.* (*amidorus*) *oranicus* m. sp. Balth. [handwritten] Holotypus [printed]"; 4) white, printed: "*Aphodius* (*Amidorus*) *cribricollis* Lucas, 1846 det. 2006 S. Tarasov" (NMPC).

Other material. 1 ex. — Algeria, Teniet el Haad, de Vauleger; 1 ex. — Tunisia, Bizerte, 1891, de Vauleger; 12 ex. — Tunisia, El Kef; 3 ex. — Algeria, Sidi bel Abbès; 2 ex. — Algeria, A. Bonneire; 1 ex. — Tunisia; 1 ex. — Tunisia, Reitter; 1 ex. — Tunisia, 90 km. SW from Tunis, Teboursouk; 1 ex. — Tunisia, Collection Le Moult, 2 ex.; Algeria, Aldsannaise, Barte; 1 ex. — Algeria, Sidi bel Abbès, Collection Le Moult; 2 ex. — Morocco, Foret de Mamora, 18.04.1986, Boucher J.F.

DESCRIPTION. Male. Oval, rather convex, feeby elongate. Black; elytra yellowish-brown to dark yellowish-brown; nearly glabrous, sometimes with very short, apical pubescence; legs reddish-brown.

Head black, wide; surface rugosely punctured; epistome anteriorly with trace of transverse carina; clypeus feebly sinuate at middle, rounded or sometimes subdenticulate at sides; frontal suture trituberculate, middle tubercle more distinct; genae angulate, protruding beyond eyes.

Pronotum black, wide, rather shiny, convex; pronotal disc densely punctured, punctures separated by less than a diameter, becoming denser laterally.

Elytra sparsely, coarsely punctured, surface between punctures polished, shiny (Figs 43–44).

Apical front tibial spur extended to basal third of third tarsal segment; first hind tarsal segment nearly as long as superior apical spur of tibia and three following segments combined.

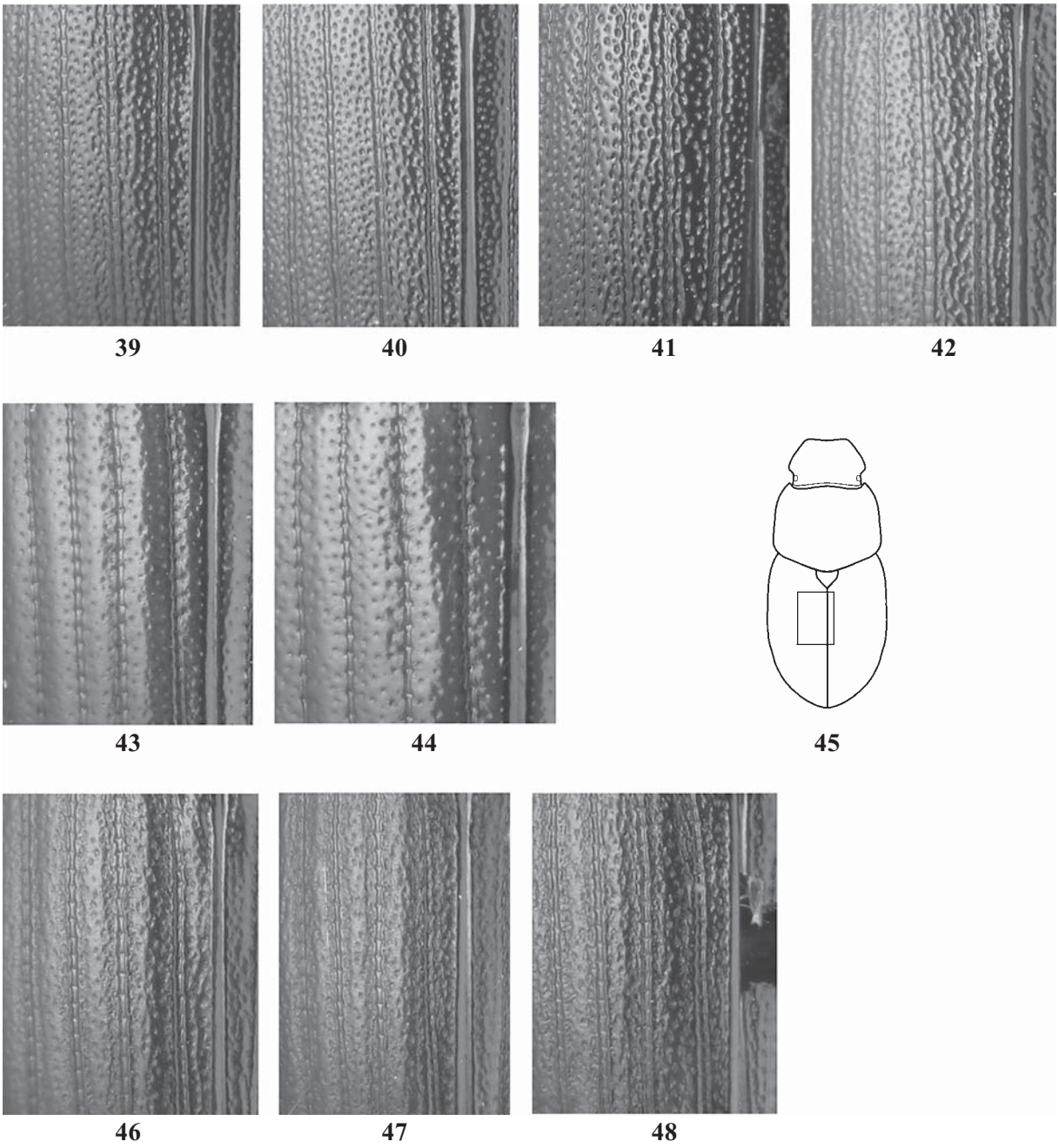
Aedeagus as in Fig. 21.

Metasternal plate shiny, slightly concave, densely, coarsely punctured apically, laterally with long, golden-yellowish pubescence.

Female distinguished from male by narrower, less convex pronotum, pronotum more densely punctured, apical front tibial spur slightly smaller, head with relatively less distinct tubercles, metasternal plate without longitudinal groove.

Vaginal sac structure as in Fig. 22.

Length 6–8 mm.



Figs 39–48. 39–42 — *A. thermicola*; 43–44 — *A. cribricollis*; 45 — *Amidorus*; 46–48 — *A. koshantschikovi*; 39–44, 46–48 — elytral sculpture; 45 — habitus.

Рис. 39–48. 39–42 — *A. thermicola*; 43–44 — *A. cribricollis*; 45 — *Amidorus*; 46–48 — *A. koshantschikovi*; 39–44, 46–48 — скульптура надкрылий; 45 — габитус.

DIFFERENTIAL DIAGNOSIS. This species is most similar to *A. thermicola* and *A. koshantschikovi*.

It may be separated from *A. thermicola* by the shape of aedeagus and vaginal sac structure, color yellowish-brown to dark yellowish-brown, elytra more sparsely punctured (Figs 43–44), nearly glabrous, and male head more distinctly tuberculate.

It is distinguished from *A. koshantschikovi* by the shape of aedeagus and vaginal sac structure, body relatively longer, genae protruding beyond eyes (as in *A. obscurus* and *A. alagoezi*, Figs 1, 5), elytral interstices more shiny, not shagreened.

DISTRIBUTION. This specie is widely distributed in North Africa: Marocco, Algeria and Tunisia (mainly the north parts). The records for Sicily [Romano, 1849; Luigioni, 1929] need confirmation [Dellacasa & Dellacasa, 2006].

SYSTEMATIC REMARKS. I do not find any differences between *A. cribricollis* and *A. oranicus* Balthasar, 1961, described from Oran Province (Sidi bel Abbes), therefore I consider the latter a junior synonym of *A. cribricollis*.

8. *Aphodius* (*Amidorus*) *koshantschikovi* Jacobson, 1911
Figs 46–52

Aphodius fimicola Reiche et Saulcy, 1856: 402 (nec *fimicola* Gebler, 1833)

Type locality: Naplouse [Palestine]

Aphodius koshantschikovi Jacobson, 1911: 145 (as nomen novum)

Aphodius (*Amidorus*) *koshantschikovi*; Olsoufiev, 1918: 64; Iablokov-Khnzorian, 1967: 107; Dzambazishvili, 1979: 99

Aphodius (*Amidorus*) *atratellus* A. Schmidt, 1922: 45 (as nomen novum innecesum)

Aphodius (*Amidorus*) *atratellus*; Balthasar, 1964: 291

Aphodius (*Pseudacrossus*) *koshantschikovi*; Dellacasa M., 1988: 395

MATERIAL. 5 ex. — Cypern. [Cyprus] Kyrenia, 22.II-14.III.1962, Th. Palm (UZIL); 1 ex. — Asia Minor, Littor. cillic, holt 2, 1895 ZISP); 3 ex. — Asia Minor, Mersina, Kricheldorf (ZISP); 2 ex. — Asia Minor, Taurus cillic., Kricheldorf (ZISP);

DESCRIPTION. Male (Fig. 49). Oval, rather convex. Black; elytra black to brownish-black, nearly glabrous, sometimes with very short apical pubescence; legs sometimes slightly reddish.

Head black, wide, somewhat shiny; surface rugosely punctured; epistome anteriorly with trace of transverse carina; clypeus feebly sinuate at middle, rounded or sometimes feebly subdenticulate laterally; frontal suture trituberculate, middle tubercle more distinct; genae rounded, slightly protruding beyond eyes (Fig. 51).

Pronotum black, wide, rather shiny, convex; disc of pronotum densely punctured, punctures separated by less than a diameter.

Elytra shagreened, somewhat punctured, surface usually dull, sometimes feebly shiny (figs. 46–48).

Apical front tibial spur extended about to second tarsal segment; first segment of hind tarsus nearly as long as apical spur and three following segments combined.

Aedeagus as in Fig. 50.

Metasternal plate shiny, densely punctured apically, glabrous.

Female distinguished from male by narrower pronotum and more densely punctured surface, apical front tibial spur slightly smaller, tubercles on head slightly less distinct.

Vaginal sac structure as in Fig. 52. The structure of vaginal sac sometimes varies because of its weak sclerotization, sometimes the apico-lateral portions not bent inward.

Length 5–6 mm.

DIAGNOSIS. The habitus of this species is similar to the black form of *A. obscurus*, but is much shorter. It can be separated from all other species of the subgenus by the unique structure of vaginal sac and aedeagal shape, elytral sculpture, and genae rounded, slightly protruding beyond eyes (Fig. 51).

DISTRIBUTION. This species is known primarily from southern Turkey and Cyprus, also from Palestine (probably widespread in Levant). The Caucasus records [Olsoufiev, 1918; Iablokov-Khnzorian, 1976; Dzambazishvili, 1979] are erroneus.

SYSTEMATIC REMARKS. I was not able to locate the type of *A. fimicola* Reiche et Saulcy, 1856 because it is probably lost [Deuve Th., personal coommunication]. However, based on analysis of the original description, and that the type locality of *A. fimicola* and the localities of material examined herein are geographically very close, I consider that specimens of examined material belong to *A. koshantschikovi*.

Subgenus *Chittius* Tarasov **subgen.n.**

Type species: *Aphodius anatolicus* Petrovitz, 1963

DESCRIPTION. Length 5–6 mm, oval, rather convex. Head with trace of three tubercles; width of eye in ventral view about equal to minimal interval between eye and gula.

Pronotum dark; male pronotum more convex, wider, female pronotum narrower, sides and base bordered, hind angles rounded; scutellum triangular, small, about as long as 1/9 length of sutural elytral margin.

Male apical front tibial spur somewhat large than in females; middle tibial spurs not modified in either sex; apical setae of hind tibia unequal.

Vaginal sac structure with two ovaloid on borders (Fig. 55).

ETYMOLOGY. The new subgenus is named after the nation of Chitties who populated the south area of Asia Minor in 18–12 century B.C.

DISCUSSION. The new subgenus differs from other subgenera of *Aphodius* by a complex of traditional characters, coupled with the structure of vaginal sac. The species *A. anatolicus* was originally described in *Amidorus*, but the vaginal sac structure differs strongly from all other representatives of *Amidorus*. Moreover there is no any significant character of external morphology, between *A. anatolicus* and other subgenera of *Aphodius*, including *Amidorus* that may indicate their relation. Thus, I place this species in a new subgenus.

Aphodius (*Chittius*) *anatolicus* Petrovitz, 1963 **comb.n.**
Figs 53–55

Aphodius (*Amidorus*) *anatolicus* Petrovitz, 1963: 241

Type locality: Asia Minor, Buçak, Burdur [S. Turkey]

MATERIAL. **Type material examined.** Holotype of *A. anatolicus*, male with the capsule for genitalia bearing following labels: 1) white, printed: "Buçak S.v. Burdur"; 2) white, printed: "Asia Minor leg.Petrovitz"; 3) white, printed. "♂"; 4) white, printed: "*Aph.* (*Amidorus*) *anatolicus* m. Petrovitz"; 5) red, printed: "HOLOTYPUS"; 6) white, printed: "Coll. R. Petrovitz", 7) white, printed: "*Aphodius* (*Chittius*) *anatolicus* det. 2006 S. Tarasov" (MHNG). Three paratypes from the same locality (MHNG).

Other material. 2 ex. — Turkey, V. Adana, Cakir, 29.IV.1982, Dellacasa G. & M.

DESCRIPTION. Male (Fig. 53). Oval, rather convex. Black; elytra black, apically reddish; nearly glabrous, sometimes with very short apical pubescence; tibae and tarsi reddish.

Head black, wide, rather shiny, rugosely punctured; epistome slightly swollen anteriorly, clypeus feebly sinuate at middle, angulately rounded at sides; frontal suture feebly trituberculate; genae angulate, protruding beyond eyes.

Pronotum black, wide, rather shiny; pronotal disc densely punctured, punctures unequal, separated by a diameter or less, punctures becoming denser laterally, sides and base bordered. Scutellum small, triangular.

Elytra coarsely, densely punctured, surface between punctures polished, shiny.

Apical front tibial spur extended about to second tarsal segment; first hind tarsal segment nearly as long as upper apical tibial spur, and slightly shorter than succeeding three segments combined.

Aedeagus as in Fig. 54.

Metasternal plate shiny, with shallow longitudinal groove, base and sides densely punctured, with sparse, golden-yellow pubescence.

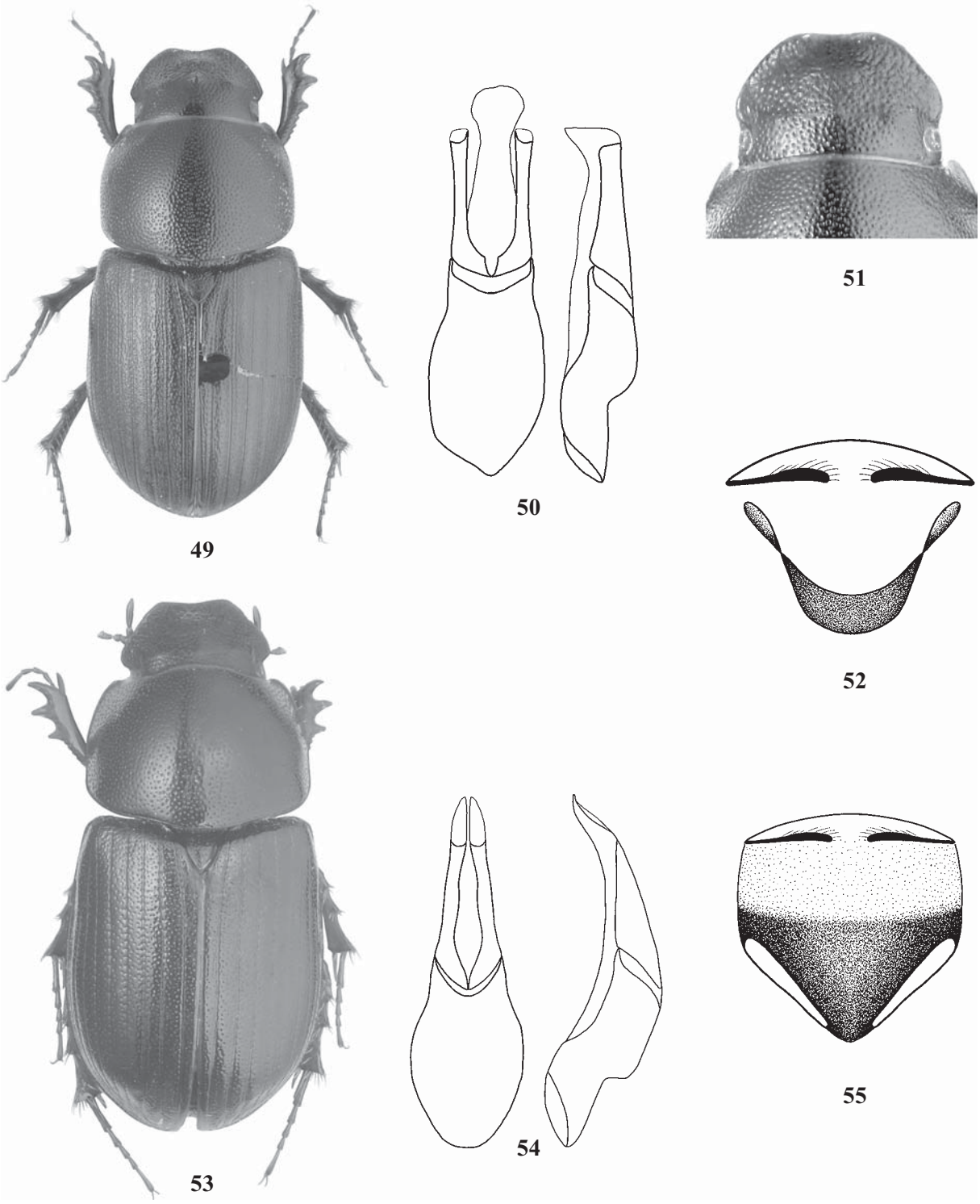
Female distinguished from male by narrower pronotum and denser punctation; apical front tibial spur slightly smaller.

Vaginal sac structure as in Fig. 55.

Length 5–6 mm.

DIAGNOSIS. This taxon is distinguished from all species of the genus *Aphodius* by the aedeagal shape and structure of vaginal sac, along with a complex of external characters.

DISTRIBUTION. Known only from southern Turkey.



Figs 49–55. 49–52 — *A. koshantschikovi*; 53–55 — *A. anatolicus* (53 — male, holotype); 49, 53 — habitus; 50, 54 — aedeagus in dorsal and lateral view; 51 — head; 52, 55 — vaginal sac structure.

Рис. 49–55. 49–52 — *A. koshantschikovi*; 53–55 — *A. anatolicus* (голотип); 49, 53 — габитус; 50, 54 — эдеагус сверху и сбоку; 51 — голова; 52, 55 — структура вагинального мешка.

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