

# A Review of Scarabs of the Subgenus *Nobius* Mulsant et Rey, Genus *Aphodius* Illiger (Coleoptera, Scarabaeidae), of the Fauna of Russia and Neighboring Countries

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**Abstract**—Scarab beetles of the subgenus *Nobius* Mulsant et Rey, genus *Aphodius* Illiger, distributed in Russia and neighboring countries are reviewed. A key to the species and notes on their biology are given. The tree new synonymies are established: *A. serotinus* (Panz.), 1799 = *A. x-signum* Reitter, 1892, **syn. n.**; *A. gresseri* Sem. 1898 = *A. korgaldzhensis* Nikolajev, 1987, **syn. n.**; *A. chaldaeus* Petr., 1971 = *A. moreleti* Baraud, 1980, **syn. n.** Lectotypes of *A. inclusus* Reitt., 1892 and *A. gresseri* are designated.

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The subgenus *Nobius* Mulsant et Rey, 1869, genus *Aphodius* Illiger, 1798, was described on the basis of the presence of a single character, the dark brown elytra with a small pale macula near the apex of each elytron. However, the coloration of elytra in *Aphodius* species is subject to much intraspecific and interspecific variability. A number of species unrelated to *A. serotinus* Panzer, 1799 (the type species of the subgenus *Nobius*) were previously placed in this subgenus because of using the elytral coloration without consideration of other characters. Among the species occurring in Russia and neighboring countries, this concerns *A. (Chilothorax) flammulatus* Harold, 1876 and *A. (Carinaulus) costatellus* A. Schmidt, 1916 (authors data). At the same time, some species with a similar shape of the aedeagus and other structures were placed in different subgenera: *A. pustulifer* Reitter, 1892, and *A. chaldaeus* Petrovitz, 1971 in *Volinus* Mulsant, 1870, and *A. moreleti* Baraud, 1980 in *Esymus* Mulsant et Rey, 1869.

Incomplete descriptions of most species, absence of illustrations to characters, and rarity of the majority of these species in collections did not allow to identify them reliably. The goal of the present study is to clarify the diagnosis of the subgenus *Nobius*, diagnostic characters of the species included in this subgenus, nomenclature of the names, and distribution of the species in Russia and neighboring countries. During examination of the collection of the Zoological Institute, Russian Academy of Sciences (ZIN), a new species was found. Its description is given below.

This study is based on the large material deposited in ZIN, including the specimens collected by the authors over the past years. Also, the material from the Hungarian Museum of Natural History in Budapest (HNHM) and Department of Zoology of Moscow Pedagogical State University (MGPU) was examined. Coordinates of the collecting localities for the distribution map were taken from the specimen labels, available atlases, and the GNS database (<http://earth-info.nga.mil/gns/html/index.html>). Scheme of measurements of the aedeagus is shown in Fig. 25. The material examined is deposited in ZIN, if not indicated otherwise.

## GENUS *APHODIUS* ILLIGER

Subgenus *NOBIUS* Mulsant and Rey, 1869

Type species *A. serotinus* Panzer, 1799.

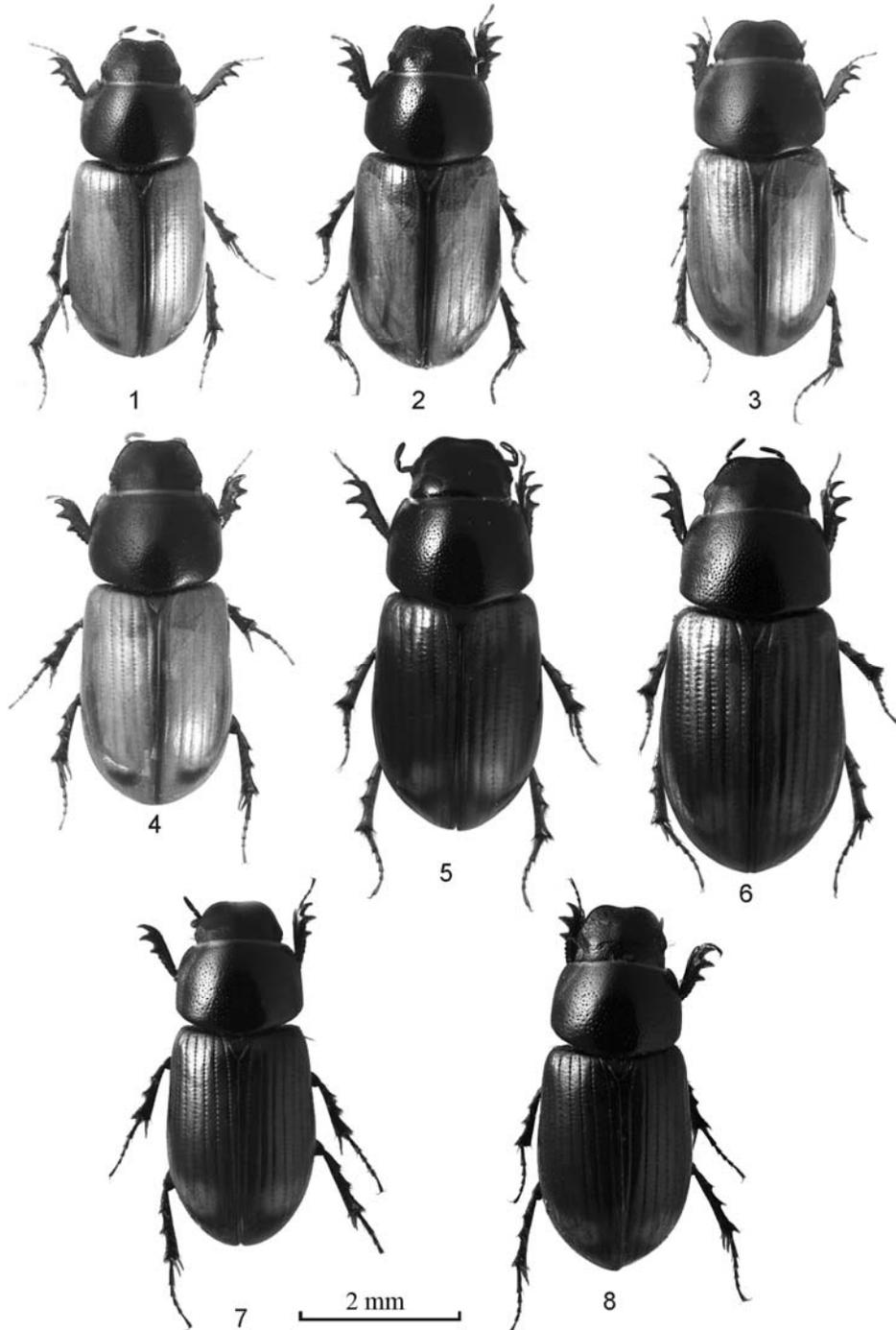
**Description.** Body length 3.0–5.5 mm. Elytra shiny, glabrous, colored from yellowish-straw to dark brown. Most species have an obscure macula occupying the most part of each elytron, or only a few small maculae and dark sutural intervals. The shape of the maculae and intensity of the elytral coloration is subject to some interspecific variability. Scutellum small, triangular. Lateral sides and base of pronotum with fine border. Head slightly convex or flat. Dorsal surface of head without setae. Frontoclypeal suture indistinct. Clypeus sinuate at middle, rounded at sides. Genae slightly protruding past eyes. Adjacent apical setae of middle and hind tibiae of different length. Parameres

without feebly sclerotized processes, more or less acute apically.

The most reliable diagnostic characters for the members of the subgenus are the shape and relative size of the parameres and the coloration of elytra. Reliable identification of females, especially of single specimens, can be difficult in some cases. We have studied spermathecae of about 30 specimens of all *Nobius* species included in this review. Most species have curved and evenly thickened spermatheca with the largest part of its surface folded (Fig. 33). Spermatheca of *A. serotinus* differs in being pear-shaped basally, less curved, and having less folded surface (Fig. 34). Spermatheca of *A. chaldaeus* Petrovitz, 1971, is similar to that of *A. serotinus*, but more curved (Fig. 35). However, diagnostic reliability of the shape of spermatheca cannot be appreciated without morphometric analysis which is beyond the scope of this work.

*A Key to the Nobius Species Occurring in Russia and Adjacent Countries*

1. Elytra yellowish-straw, with brown sutural intervals and 1–2 small brown maculae on each elytron (Figs. 1–4). Metasternum of male pubescent ..... 2.
  - Elytra entirely brown (Figs. 9–12) or pale with large dark obscure macula occupying most part of each elytron (Figs. 5–8, 15, 16). Metasternum of male pubescent or not ..... 3.
2. Clypeus granulate. Each elytron with 2 brown maculae (one longitudinal macula located approximately in middle of elytron closer to the lateral margin, and another near apex) (Figs. 1, 2). Diameter of eye in ventral view approximately equal to minimum interval between eye and gula. Middle and hind femora in male with relatively sparse, fine setae ventrally (Fig. 17). Basal sclerite of aedeagus approximately 1.8 times as long as parameres (Fig. 25) ..... *A. pustulifer* Reitt.
  - Clypeus punctate. Elytra with small brown macula located on intervals 2–4 near apex of each elytron (Figs. 3, 4). Diameter of eye in ventral view approximately twice larger than minimum interval between eye and gula. Middle and hind femora in male with only single fine setae ventrally (Fig. 18). Basal sclerite of aedeagus approximately 2.8 times longer than parameres (Fig. 26). Spermatheca smooth on most part of surface, folded apically, and slightly widened basally (Fig. 35) ..... *A. chaldaeus* Petr.
3. Metasternum of male glabrous. Middle and hind femora with single fine setae ventrally (Fig. 19). Spermatheca smooth on convex side, folded on concave side and apically, and pear-shaped basally (Fig. 34). Parameres approximately as long as basal sclerite of aedeagus (Fig. 27). Elytra reddish-orange, with darken apices and large dark obscure macula occupying almost entire surface of each elytron (Figs. 5, 6) ..... *A. serotinus* (Panz.).
  - Metasternum of male pubescent. Middle and hind femora of male with dense setae ventrally (Figs. 20, 21) or with only single setae (Figs. 22–24). Spermatheca folded, elongate, not pear-shaped basally (Fig. 33). Parameres shorter than basal sclerite ..... 4.
4. Middle and hind femora of male with dense setae ..... 5.
  - Middle and hind femora of male with only single fine setae ..... 6.
5. Elytra orange-yellow, with brown or dark brown sutural intervals, apices, and large longitudinal macula on each elytron. Sometimes apices of elytra pale with dark macula or elytra entirely dark brown with paler humeral umbones and part of interval 2 near the base (Figs. 7, 8). Parameres more curved, acute apically. Basal sclerite of aedeagus approximately 1.5 times longer than parameres (Fig. 28) ..... *A. inclusus* Reitt.
  - Elytra yellowish brown, with dark brown suture and brown sutural intervals (Figs. 9, 10). Parameres less curved, smoothly tapering and acute apically. Basal sclerite of aedeagus approximately twice longer than parameres (Fig. 29) ..... *A. bonnairei* Reitt.
6. Elytra brown or dark brown, almost uniformly colored (Figs. 11, 12). Basal sclerite of aedeagus approximately 1.8 times longer than parameres (Fig. 30) ..... *A. gresseri* Sem.
  - Elytra with more or less contrasting pattern (Figs. 13–16). Basal sclerite of aedeagus more than 3 times longer than parameres (Figs. 31, 32) ..... 7.
7. Elytra with very contrasting pattern, yellowish-straw with dark brown sutural intervals, apices, and large longitudinal macula not occupying interval 2 and sometimes interval 3 (Figs. 13, 14). Api-



**Figs. 1–8.** *Aphodius* Ill., general view: (1, 2) *A. pustulifer* Reitt., (3, 4) *A. chaldaeus* Petr., (5, 6) *A. serotinus* (Panz.), (7, 8) *A. inclusus* Reitt. [(1, 3, 5, 7) male, (2, 4, 6, 8) female].

ces of parameres less curved, straight angled to basal sclerite (Fig. 31) ..... *A. circumductus* Solsky.

—Elytra with less contrast pattern, with dark brown suture, brown apices and large brown obscure macula occupying almost entire surface of elytron except for small part of intervals 2 and 3 near the base, humeral umbones, and area near apices of each elytron (Figs. 15, 16). Apices of parameres

more curved, not straight angled to basal sclerite (Fig. 32) ..... *A. dosangi* sp. n.

***Aphodius (Nobius) inclusus* Reitter, 1892**  
(Figs. 7, 8, 20, 28, 36)

—*inclusum* Reitter, 1892 : 97, 1906 : 441.—*inclusus* Reitter (incorrect subsequent spelling): Schmidt, 1910 : 33; Yablokov-Khnzoryan, 1967 : 110; Niko-

lajev, 1987 : 118.—*glasunowi* D. Koshantschikow, 1894 : 108–109 (synonymy by: Reitter, 1906); Nikolajev, 1987 : 117.

**Differential diagnosis.** The species is most similar to *A. bonnairei* Reitter, 1892, but can be distinguished from it by the elytral pattern and the shape and size of parameres. Males of this species differ from those of *A. serotinus* Panzer, 1799 in having setae on the perimeter of metasternal disc and on the ventral surface of middle and hind femora, and also by the shape and length of the parameres.

**Description.** Male (Fig. 7). Head with black disc and lighter anterior margin. Frontoclypeal suture indistinct. Frons not tuberculate. Clypeus sinuate at middle, rounded at sides. Genae rounded, almost not separated from lateral margins of clypeus, slightly protruding past eyes. Diameter of eye in ventral view approximately as wide as minimum interval between eye and gula.

Pronotum shiny, dark brown becoming nearly black on disc, with paler lateral margins. Its surface with irregular and sparse punctation (punctures separated by 1–3 puncture diameters on disc). Lateral sides and base of pronotum with fine border; hind angles rounded. Scutellum triangular, dark brown, becoming nearly black laterally.

Elytra without humeral teeth, glabrous, shiny on disc and shagreened apically, colored orange-yellow with brown or dark brown sutural intervals, apices, and large longitudinal macula on each elytron. Sometimes apices of elytra pale with dark macula or elytra entirely dark brown with paler humeral umbones and part of interval 2 near the base. Striae relatively deep, punctures of striae wider in diameter than width of stria. Elytral intervals flat, very finely and sparsely punctate.

Venter of body dark brown. Perimeter of metasternal disc with dense, long setae. Legs brown. Hind femora with relatively dense setae ventrally. Middle femora with sparser setae. Outer teeth of fore tibia relatively long. Spur of fore tibia slightly curved downward and acute apically. Lower spur of middle tibia shorter than the first segment of tarsi and as long as half length of upper spur. First segment of hind tarsi slightly longer than upper spur and as long as 3 following segments combined. Adjacent apical setae of middle and hind tibiae of different length.

Parameres relatively strongly curved, acute apically, 1.5 times shorter than length of basal sclerite.

Female (Fig. 8) differs from male in glabrous disc of metasternum and in having only a few setae on middle and hind femora. Spermatheca folded, elongate, not pear-shaped basally.

Body length 3.7–4 mm.

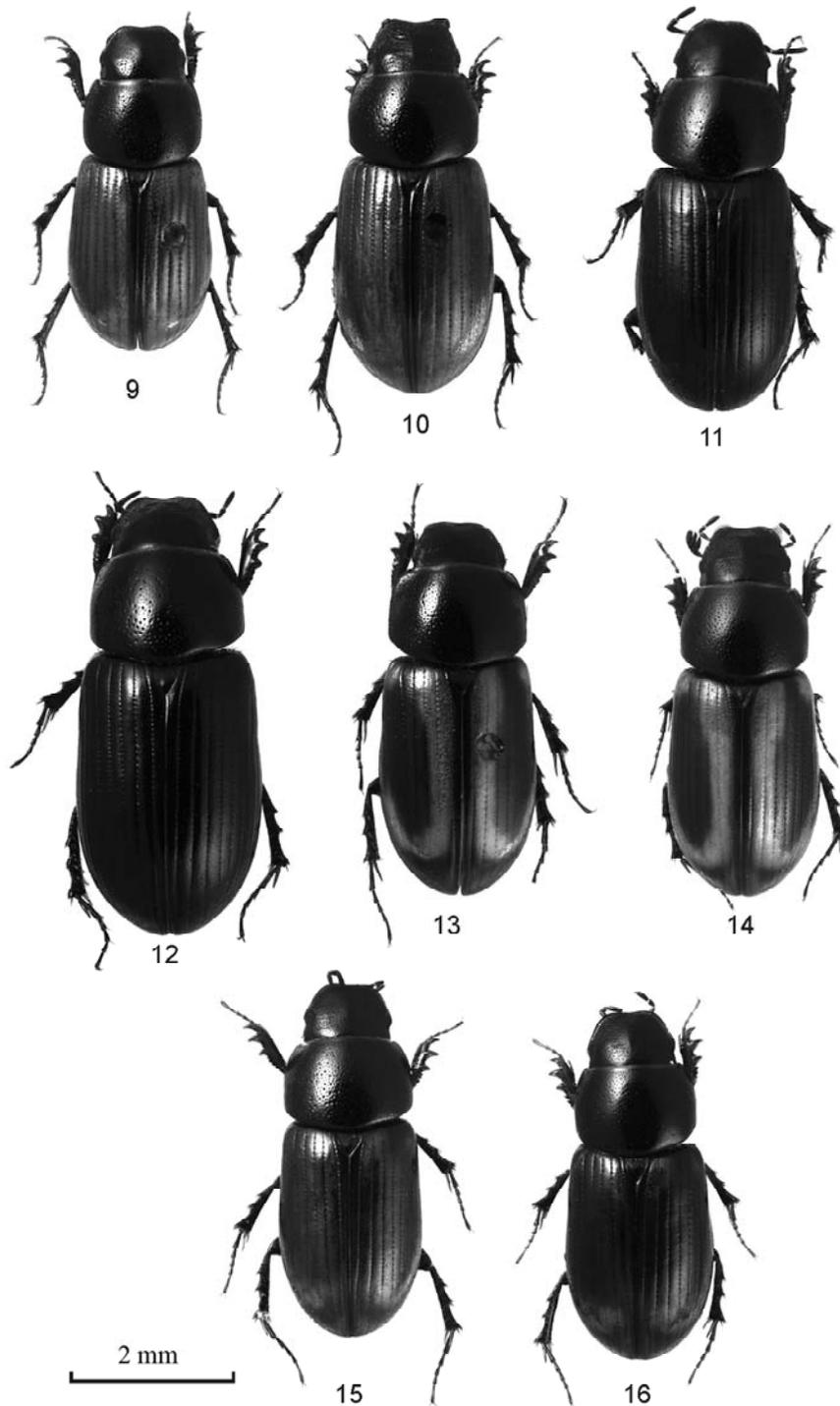
**Distribution.** Russia (Dagestan), Georgia, Armenia, Tajikistan, Azerbaijan, Afghanistan.

**Type material.** *A. inclusus*: lectotype (designated here): female with labels “Caucasus. Arexesthal. Leder. Reitter.,” “*inclusum* m.,” “coll. Reitter,” “Paratypus, 1891, *Aphodius (Melinopterus) inclusus* Reitter” (HNHM); paralectotype female with labels “Caucasus. Arexesthal. Leder. Reitter.,” “coll. Reitter” and “Holotypus, 1891, *Aphodius (Melinopterus) inclusus* Reitter” (HNHM). *A. glasunowi*, syntypes: female with labels “Turkestan Lac. Kulikulan Glasunov 1892.” and “Glasunowi Kosh. type!;” 4 males and 4 females with labels “Turkestan, Lac. Kulikulan, Glasunov, 1892.” and “*Aphodius glasunowi*;” 3 males and 4 females with labels “Seravschan Kshtut. Artutsh, Glasunov, 1892” and “*Aphodius glasunowi*.”

**Additional material.** Russia. Dagestan, Derbent, 5 spms. Georgia. Tbilisi, 29.XII.1927, 2 spms. (Ya. Kirshenblatt). Armenia. Yerevan, 10–25.XI.12, 3 spms. Iran. Lorestan, 1 spm.; Teheran, 8.V.1915, 1 spm.; Teheran, 4.VI.1915, 1 spm.; Khurasan, 5–9.XI.1900, 1 spm. (N.A. Zarudny). Afghanistan. Herat, NE of Adraskan, 1300 m, 20.XI.1971, 1 spm. (O.N. Kabakov); Gnor Tulak, 2400 m, 4.X.1969, 1 spm. (O.N. Kabakov).

**Remark.** It can be inferred from the original description of *A. inclusus* that the author examined several specimens of this species, but their exact number is not mentioned. The label “Holotypus [...]” was added to one of the specimens by the HNHM staff later and does not indicate the holotype. To insure stability of the nomenclature we designate as lectotype the specimen with the Reitter’s handwritten label.

Schmidt (1910) was probably the first author who used incorrect the subsequent spelling “inclusus” instead of the original “inclusum.” This spelling has been commonly used since then and attributed to Reitter (1892).



**Figs. 9–16.** *Aphodius* Ill.: (9, 10) *A. bonnairei* Reitt., (11, 12) *A. gresseri* Sem., (13, 14) *A. circumductus* Solsky, (15, 16) *A. dosang* sp. n. [(15) holotype]. (9, 11, 13, 15) male, (10, 12, 14, 16) female.

*Aphodius (Nobius) serotinus* Panzer, 1799  
(Figs. 5, 6, 19, 27, 34, 36)

Panzer, 1799; Nikolajev, 1987 : 117; Dzhambazishvili, 1979 : 97–98; Medvedev, 1965 : 177.–*x-signum* Reitter, 1892 : 97, **syn. n.**

**Differential diagnosis.** The species is most similar to *A. inclusus*, but can be distinguished by the glabrous metasternal disc in both sexes, presence of only a few setae on the ventral surface of middle and hind femora, and by the shape and length of parameres.



**Figs. 17–24.** *Aphodius* Ill., underside of male body: (17) *A. pustulifer* Reitt., (18) *A. chaldaeus* Petr., (19) *A. serotinus* (Panz.), (20) *A. inclusus* Reitt., (21) *A. bonnairei* Reitt., (22) *A. gresseri* Sem., (23) *A. circumductus* Solsky, (24) *A. dosang* sp. n.

**Description. Male** (Fig. 5). Head black on disc, sometimes with paler margins. Frontoclypeal suture indistinct. Frons not tuberculate. Clypeus slightly sinuate at middle, rounded at sides. The shape and size of genae vary from rounded, almost not separated from lateral margins of clypeus and slightly protruding past eyes to obtuse-angled, distinctly protruding past eyes. Diameter of eye in ventral view approximately as wide as minimum interval between eye and gula.

Pronotum shiny, dark on disc, sometimes with reddish-brown lateral margins or fore angles. Its surface

with irregular and dense punctation. Sides and base of pronotum with fine border; hind angles rounded. Scutellum triangular, dark brown, sometimes nearly black.

Elytra without humeral teeth, glabrous, shiny. Elytra colored orange-red, with darken apices and large dark obscure macula occupying almost entire surface of each elytron. Size and shape of the macula vary, but normally it doesn't reach humeral umbones and the base of elytron except for interval 5. Striae relatively deep, wide, punctures of striae wider in diameter than

width of striae. Elytral intervals flat, very finely and sparsely punctate.

Venter of body dark brown. Metasternal disc paler, reddish-brown or orange-red, shiny, glabrous or, rarely, with a few fine setae.

Legs reddish-brown to orange-red, orange in paler specimens. Middle and hind femora glabrous or with a few fine setae ventrally. Outer teeth of fore tibia relatively long and fine. Spur of fore tibia slightly curved downward and acute apically. Lower spur of middle tibia as long as or slightly shorter than first segment of tarsi, acute apically, and as long as 1/2 length of upper spur. First segment of hind tarsi longer than upper spur and as long as or a bit shorter than 3 following segments combined. Adjacent apical setae of middle and hind tibiae of different length.

Parameres feebly curved, tapering and slightly acute apically, approximately as long as basal sclerite of the aedeagus.

Female (Fig. 6) differs from male in slightly narrower pronotum with denser punctation. Spermatheca smooth on the convex side, folded on the concave side and apically, pear-shaped basally.

Body length 3.5–5.5 mm.

**Distribution.** The species is widespread in Europe and Asia to Siberia. Records from northeastern China require confirmation.

**Type material.** *A. x-signum*: holotype (?), male with labels "Quellgebiet des Irkut Leder.," "coll. Reiter," "*x-signum*" (HNHM).

**Additional material.** Hungary. 1 spm. without exact data. Moldova. Orhei Distr., Furceni, 29.IV.1978, 1 spm. (Kabakov). Ukraine. Zakarpatskaya Prov., 15.X.1971, 1 spm. (Stepanov); Krivoj Rog, 15.IX.1987, 1 spm. (Kiselev); Crimea, Ishun, 9.X.1990, 1 spm. (Gusarov); Baidarskie vorota Pass 15.IX.1903, 16 spms.; Lastochkino, 10.IV.1907, 1 spms.; Kerch, 5.VI.1902, 4 spms., X.1906, 1 spm.; Sevastopol, 1.X.1911, 1 spm. (V. Pliginsky); Simferopol Distr., Balka Dzhalman, 19–29.IX.1906, 4 spms., 21.IX.1910, 2 spms. (Kakhovskiy); Poltava Prov., 1908, 1 spm.; Vilkovo, Odessa Prov., 2.X.1990, 1 spm. (V. Gusarov); Kharkov Prov., Zmiev, 11.IX.1926, 1 spm. (Arnoldi); Merefa, 11.IX.1956, 1 spm. (Stepanov). Russia. Leningrad Prov.: St.-Petersburg, 1 spm. (E. Koenig); Luga, 1 spm. (Yakobson). Novgorod

Prov.: Valdai, 5 spms. Nizhni Novgorod Prov.: Sarov, 15.IX.1872, 1 spm. Voronezh Prov.: Bobrov, 21.VIII.1912, 1 spm. (B. Karavaev). Ryazan Prov.: Dubrovka, 14 spms., 7.VIII.1903, 1 spm. (Olsufiev); Gremyachka, 14.VIII.1903, 2 spms., 20.VIII.1899, 1 spm. (A. Semenov); Saraevskii Distr., Kozlovka, 20.VIII.1897, 2 spms. (Olsufiev); Grotovskii, 12.VIII.1898, 1 spm. (A. Semenov); Kemerovo Prov.: 27.VII.1911, 1 spm. (Gorchakovskii). Yaroslavl Prov.: 10.VIII.1895, 4 spms., 31.VIII.1899, 5 spms., 5–11.IX.1899, 7 spms., 29.VIII.1896, 2 spms.; Yaroslavskii Distr., Berditsyno Vill., 17.VIII.1895, 2 spms., 8.IX.1898, 5 spms., 1 spm. (A.I. Yakovlev); Danilovskii Distr., 5 spms. (Shestakov). Penza Prov.: environs of Penza, 25.VIII.1918, 1 spm. (V. Strogashevich). Rostov Prov.: Nokolai-Pol'e, 26.XI.1906, 3 spms. (Fisher). Samara Prov.: Samara, 1 spm.; Volzhskii Distr., Kurumoch Vill., 12.IX.2004, 6 spms. (L. Akhmetova). Ul'yanovsk Prov.: Mainskii Distr., 2.IX.1990, 2 spms. (Isajev). Volgograd Prov.: Sarepta (Volgograd), 1 spm.; Kotluban Vill., 13.IX.1991, 2 spms. (K. Grebennikov). Astrakhan Prov.: Dosang Vill., flood-plain of Akhtuba River, 6.X.2006, 3 spms., 7.X.2006, 19 spms., 17.IV.2007, 8 spms., 17.V.2007, 9 spms., 18.V.2007, 8 spms. (A. Frolov, L. Akhmetova). Republic of Tatarstan: Kazan, 12.IV.1915, 2 spms., 22.VIII.1917, 2 spms. (I. Ivanov). Karachaevo-Cherkessia: Bechasyn Plato, 14.VIII.1911, 1 spm.; Teberda, 19.VIII.1897, 1 spm. (N. Shchukin). Sverdlovsk Province: environs of Yekaterinburg, 15.VI.1893, 1 spm. Republic of Altai: Katanda, 26.VIII.1902, 1 spm.; Kyrsai, 11.IX.1901, 2 spms. Irkutsk Prov.: Irkutsk, 9 spms. (V.E. Yakovlev), 21.VIII.1976, 5 spms. (Berlov). Tyumen Prov.: Tobolsk, 30.IX.1926, 1 spm. (Samko). Khakassia: environs of Minusinsk, Beya, VIII.1916, 19 spms. (Kozhanchikov). Krasnoyarsk Terr.: Krasnoyarsk, 1 spm. (V.E. Yakovlev); Achinskii Distr., Novaya Elovka, 1912, 5 spms. (Uspenskaya). Georgia. Tbilisi, 3–5 X 1910, 2 spms. (K. Satunin), 30 IX 1916, 1 spm. (Olsufiev), 2 spms. (E. Kenig); Mtskheta, 24.X.1965, 2 spms. (Kryzhanovskij). Abkhazia, Chkhalty River, 25.VIII.1897, 1 spm. (N. Shchukin). Armenia. Yerevan, 10–25.XI.1912, 3 spms. Azerbaijan. Baku, 1.IV.1930, 1 spm. Kazakhstan. environs of Uralsk, 22.VIII.1906, 17 spms. Turkmenia. Repetek, 1 spm. (A. Krikheldorff). Tajikistan. Petr Velikii Range, 16.VI.1969, 1 spm. (G.S. Medvedev).

**Remark.** *A. x-signum* was described from the environs of Irkutsk. According to the original description,

specimens of this species differ from *A. serotinus* in the longer spurs of hind tibiae, denser punctation of the elytra, and in the body slightly widened posteriorly. Examination of the type specimen has shown that the first two characters are within the limits of variability of *A. serotinus*. The body relatively widened posteriorly is typical of females of most *Aphodius* species. We suppose that the diagnoses of *A. x-signum* and *A. serotinus* (Reitter, 1892) were based on females and males, respectively, of one species treated here as *A. serotinus*.

*Aphodius (Nobius) circumductus* Solsky, 1876  
(Figs. 13, 14, 23, 31, 36)

Solsky, 1876 : 338; Nikolajev, 1987 : 117.

**Differential diagnosis.** The species is most similar to *A. dosangi* sp. n., but differs in the contrasting elytral pattern, less curved apices of the parameres, and in an angle between the parameres and basal sclerite.

**Description. Male** (Fig. 13). Head with dark brown disc and paler margins. Frontoclypeal suture indistinct. Frons not tuberculate. Clypeus slightly sinuate at middle, with rounded fore angles. Genae rounded, almost not separated from lateral margins of clypeus, slightly protruding past eyes. Diameter of eye in ventral view approximately 1.5 times as wide as minimum interval between eye and gula.

Pronotum shiny, dark brown to almost black on disc, with paler, brown lateral margins. Its surface with relatively dense punctation (punctures approximately equal in diameter, separated by 1–2 puncture diameters). Lateral sides and base of pronotum with fine border; hind angles rounded. Scutellum wide, triangular, dark brown, sometimes nearly black.

Elytra glabrous, shiny on disc and laterally, shagreened apically. Elytra colored yellowish-straw, with dark brown sutural intervals, apices, and large dark brown longitudinal macula, which does not occupy interval 2 and at least the part of interval 3 of each elytron. Striae shallow, punctures of striae larger than width of striae. Elytral interstices flat, very finely and sparsely punctate on disc of elytron, coarser and denser punctate apically.

Legs and venter of body brown. Perimeter of metasternal disc with dense, long setae.

Hind and middle femora with single fine setae ventrally. Outer teeth of fore tibia relatively long. Spur of

fore tibiae slightly curved downward and acute apically. Lower spur of middle tibia as long as or slightly shorter than first segment of tarsi and as long as 1/2 length of upper spur. First segment of hind tarsi longer than upper spur and slightly shorter than 3 following segments combined. Adjacent apical setae of middle and hind tibiae of different length.

Parameres very short, tapering and acute apically. In lateral view, parameres 3.3 times shorter than length of basal sclerite.

**Female** (Fig. 14) differs from male in denser punctation of head and pronotum, narrower pronotum and glabrous disc of metasternum. Spermatheca folded, elongate, not pear-shaped basally.

Body length 3.1–4.5 mm.

**Distribution.** Kazakhstan, Uzbekistan, Turkmenia.

**Material examined.** Kazakhstan. Moiyunkum Desert, III.1907, 2 spms. (E. Fischer); 15.V.1910, 2 spms. (Golbek); Taraz, 1 spm.; Aidar-Kuduk, 12.V.1912, 10 spms. (Zarudny); Baigakum, III.1912, 29 spms., 6.IV.1913, 1 spm. (V. Kozhanchikov), 15–18.V.1908, 24 spms. (Glazunov). Turkmenia. Krasnovodsk, 30.IV–12.V.1899, 2 spms. (K.O. Anger); Kara-Bogaz, 17.V.1953, 1 spm. (Odintsova), 30.IV.1953, 1 spm. (Steinberg); Pereval Station, 26.IV.1889, 7 spms. (A. Semenov). Uzbekistan. Samarkand, 1 spm.; Ul'yano-vo, IV.1908, 18 spms. (Golbek); Kyzylkum Desert, Baimakhan, 16.V.1995, 4 spms. (Ovchinnikov); Gulistan Station, 15–20.V.1903, 2 spms. (G. Jakobson); Kyzylkum Desert, 1 spm. (F. Moravits); border between Kyzylkum Desert and Golodnaya Step near Syr Darya, 10.V.1903, 1 spm. (G. Jakobson).

*Aphodius (Nobius) gresseri* Semenov, 1898  
(Figs. 11, 12, 22, 30, 36)

Semenov, 1898 : 611–613; Yablokov-Khinzoryan, 1967 : 110; Medvedev, 1965 : 177.—*korgalzhensis* Nikolajev, 1987 : 118, **syn. n.**

**Differential diagnosis.** The species is most similar to *A. circumductus* and *A. serotinus*, but differs from them in the almost uniformly brown or dark brown coloration of elytra. Males can be easily distinguished by the shape and length of the parameres; from *A. serotinus*, they also differ in pubescent perimeter of the metasternal disc.

**Description. Male** (Fig. 11). Head dark brown. Frontoclypeal suture indistinct. Clypeus slightly sinu-

ate at middle, with rounded fore angles, finely punctate (punctures separated by approximately 2 puncture diameters, punctation becoming denser laterally). The shape and size of genae vary from rounded, almost not separated from lateral margins of clypeus and slightly protruding past eyes to obtusely angled, separated from lateral margins of clypeus and distinctly protruding past eyes. Diameter of eye in ventral view approximately as wide as or slightly larger than minimum interval between eye and gula.

Pronotum shiny, dark brown to nearly black on disc, with paler sides or fore angles. Its surface with irregular, relatively dense punctation (adjacent punctures clearly differ in size). Lateral sides and base of pronotum with fine border; hind angles rounded. Scutellum wide, triangular, brown.

Elytra without humeral teeth, glabrous, shiny, brown or dark brown, almost uniformly colored (some specimens have slightly paler intervals 1 and 2 near the base and humeral umbones, or the the entire sutural interval slightly paler). Striae relatively deep, punctures of striae wider in diameter than width of striae. Elytral intervals flat, very finely and sparsely punctate.

Legs and venter of body brown or dark brown. Perimeter of metasternal disc with dense, long setae. Hind and middle femora with a few fine setae ventrally. Outer teeth of fore tibia relatively long. Spur of fore tibia slightly curved downward and acute apically. Lower spur of middle tibia as long as the first segment of tarsi and longer than 1/2 upper spur. First segment of hind tarsi slightly longer than upper spur and slightly shorter than 3 following segments combined. Adjacent apical setae of middle and hind tibiae of different length.

Parameres relatively curved, acute apically, 1.8 times shorter than basal sclerite.

**Female** (Fig. 12) differing from male in more convex, rugose clypeus, narrower pronotum with denser punctation, and glabrous metasternal disc. Spermatheca folded, elongate, not pear-shaped basally.

Body length 4–5 mm.

**Distribution.** Russia (from the center of the European Region to the Lower Volga Area), western Kazakhstan.

**Type material.** *A. gresseri*: lectotype (designated here), male with labels “Olgino, Vladim. gub.

1.X.1898, T.S. Chicherin” and “*Aphod. Gresseri* male. Typ. m. XII.98. A. Semenow det.” *A. korgaldzhensis*: holotype, male with labels “Kurgaldzhino, Sultan-Keldy 18.04.1982 Tarantul” and “Holotypus *Aphodius korgaldzhensis* Nikolajev 1985;” paratypes: 2 males and 3 females with the same data, that holotype; male and 5 females with the same data but the date (15.IV.1982).

**Additional material.** Russia. Voronezh Prov.: Korotoyak, 23.IX.1911, 5 spms. (B. Karavaev). Volgograd Prov.: near Elton Vill., Sorocho'ya Balka, 8.IV.2007, 1 spm. (K. Makarov, A. Matalin) (MGPU); northern environs of Elton Vill., 10.IV.2007, 2 spms. (K. Makarov, A. Matalin) (MGPU); environs of Lake Elton, right bank of Khara River, 2.IV.2007, 12 spms. (K. Makarov, A. Matalin) (MGPU); near Elton Vill., Utinaya Balka, 9.IV.2007, 3 spms. (K. Makarov, A. Matalin) (MGPU). Astrakhan Prov.: near Dosang Vill., 10.IV.2007, 2 spms., 17.IV.2007, 12 spms., 16.IV.2007, 2 spms., 21.IV.2007, 2 spms. (A. Frolov, L. Akhmetova); 1.5–5.0 km NE of Dosang Vill., 14.IV.2007, 1 spm. (K. Makarov, A. Matalin) (MGPU). Kazakhstan: environs of Uralsk, 4.IV.1906, 1 spm. (B. Uvarov).

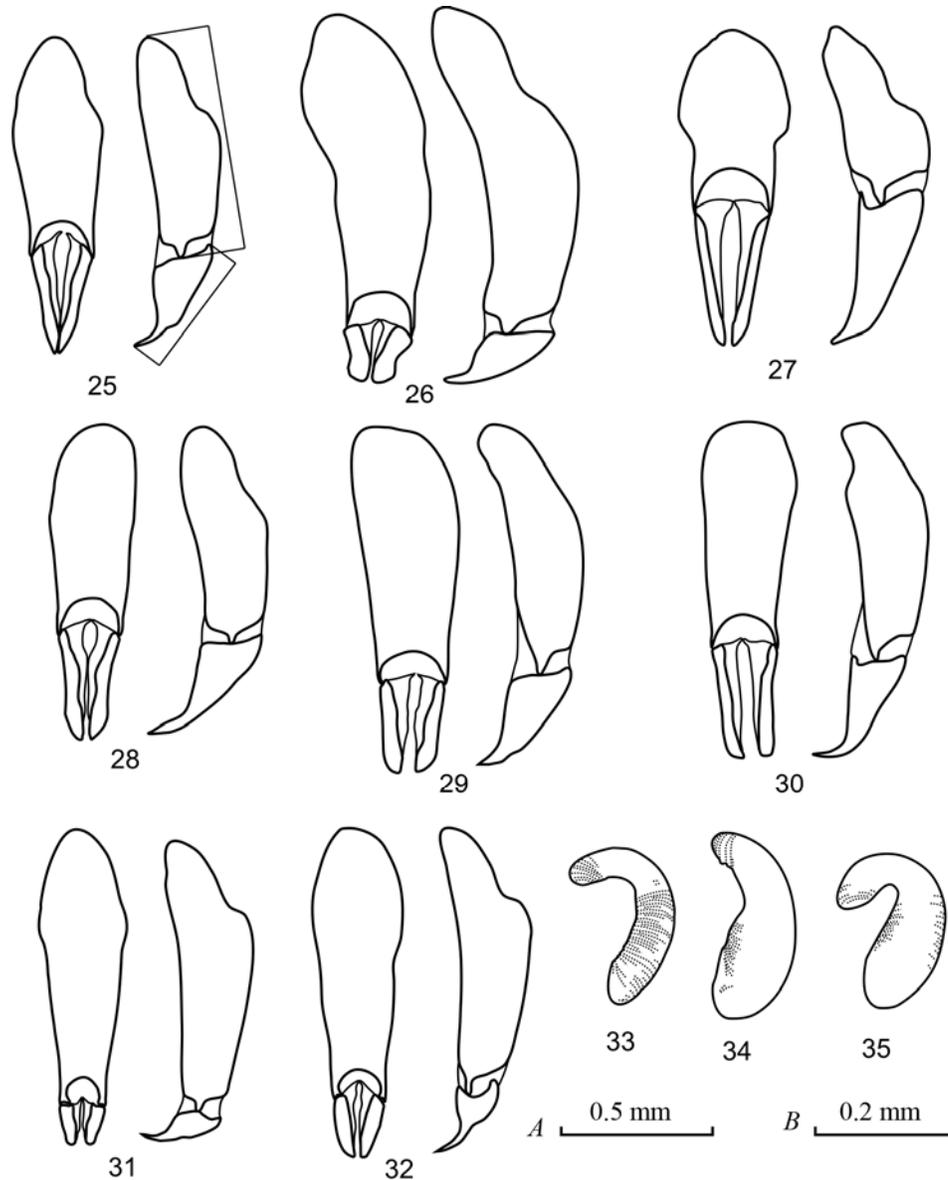
**Remark.** *A. korgaldzhensis* was described from the Kurgaldzhino Nature Reserve (central Kazakhstan). Comparison of the type specimens of this species with the types of *A. gresseri* has shown that they are similar in all the characters, except for the darker, almost homogeneously colored elytra in *A. korgaldzhensis*. However, we found specimens with a somewhat intermediate coloration (paler elytra with obscure dark macula) in the series from the environs of lakes Elton and Dosang. Therefore we think that all these color aberrations are within the range of variability of one species.

*Aphodius (Nobius) pustulifer* Reitter, 1892  
(Figs. 1, 2, 17, 25, 36)

Reitter, 1892 : 90; Nikolajev, 1987 : 114.

**Differential diagnosis.** The species is most similar to *A. chaldaeus*, but differs from it in the granulated clypeus, number of elytral maculae, and smaller diameter of eyes.

**Description. Male** (Figs. 1). Head dark brown, with paler margins, granulated on clypeus and coarsely punctate on disc. Frons not tuberculate. Frontoclypeal suture indistinct. Clypeus sinuate at middle, rounded at sides. Genae rounded, almost not separated from lat-



**Figs. 25–35.** *Aphodius* Ill.: (25–32) aedeagus, dorsal and lateral view; (33–35) spermatheca [(25) *A. pustulifer* Reitt., (26, 35) *A. chaldaeus* Petr., (27, 34) *A. serotinus* (Panz.), (28) *A. inclusus* Reitt., (29) *A. bonnairei* Reitt., (30) *A. gresseri* Sem., (31) *A. circumductus* Solsky, (32, 33) *A. dosang* sp. n.]. A, scale to Figs. 25–32; B, to Figs. 33–35.

eral margins of clypeus, slightly protruding past eyes. Diameter of eye in ventral view approximately as wide as minimum interval between eye and gula.

Pronotum shiny, dark brown on disc, with paler, brown lateral margins. Its surface with relatively dense punctation (approximately equal punctures separated by 1–2 puncture diameters). Sides and base of pronotum with fine border; hind angles rounded. Scutellum brown, wide, triangular, punctate.

Elytra without humeral teeth, glabrous, shiny on disc and laterally, slightly shagreened apically, colored yellowish-straw with brown sutural intervals and 2

brown maculae on each elytron (one longitudinal macula located approximately in the middle of elytron closer to the lateral margin, and another—near the apex). Size of maculae vary, one of them may be absent. Striae shallow, punctures of striae larger than width of striae. Elytral intervals flat, finely and sparsely punctate except for apices where punctation is coarser and denser.

Venter of body brown. Perimeter of metasternal disc with dense, long setae.

Legs yellowish brown. Hind and middle femora with relatively sparse, fine setae ventrally. Outer teeth

of fore tibia relatively long. Spur of fore tibia slightly curved downward and acute apically. Lower spur of middle tibia as long as the first segment of tarsi and longer than 1/2 length of upper spur. First segment of hind tarsi longer than upper spur and slightly shorter than 3 following segments combined. Adjacent apical setae of middle and hind tibiae of different length.

Parameres curved, tapered and acute apically, 1.8 times shorter than length of basal sclerite.

Female (Fig. 2) differs from male in narrower pronotum, glabrous disc of metasternum and having only a few setae on the middle and hind femora. Spermatheca of specimens studied by the authors folded, elongate, not pear-shaped basally.

Body length 3.0–4.5 mm.

**Distribution.** The species is distributed in the arid regions of Middle Asia. Record from the southeastern part of European Russia (Sarepta Station, Reitter, 1992 : 90) was probably based on a mislabeled material and was not confirmed by subsequent findings.

**Material examined.** Kazakhstan. Balamurun, 6.IV.1913, 2 spms. (V. Kozhanchikov). Turkmenia. Krasnovodsk, 1899, 1 spm. (K.O. Anger); Krasnovodsk, 30.IV–12.V.1899, 4 spms. (K.O. Anger); Anna, 26.IV.1902, 5 spms. (K.O. Anger); 20 km S of Kerki Vill., 23.IV.1984, 6 spms. (T.N. Vereshchagina); Ashkhabad, 3.V.1889, 15 spms. (A. Semenow); Repetek, 18.XI.1938, 17 spms. (Vinogradov); Yolatan, 5–14.V.1926, 3 spms. (V. Kizeritskii); Imambaba, 6–14.IV.1912, 1 spm. (Kozhanchikov); Kopet-Dagh, 1892, 1 spm. Uzbekistan. Samarkand, 1892, 8 spms. (Glazunov), 9–11.V.1904, 7 spms. (G. Suvorov), 1 spm.; Nurata, 1892, 1 spm. (Glazunov); Ul'yanovo, IV.1908, 86 spms. (Golbek); Sarai, 1892, 5 spms. (Glazunov); Baba-Tau Mts. [Babatag], 18.V.1897, 1 spm. (Kaznakov); Kyzylkum Desert, Baimakhan, 16.V.1995, 1 spm. (Ovchinnikov); "Kisil-Kum mer. Jgam-Berdy," 1892, 13 spms. (Glazunov); Tajikistan. Shartuzskii Distr., Chilichor-Chamma, desert, 21.IV.1959, 3 spms. (I. Lopatin); Artuch, 1892, 1 spm. (Glazunov); Pendzhikent, 1892, 3 spms. (Glazunov).

**Remark.** *A. pustulifer* was described in the subgenus *Volinus* Mulsant, but the shape of its aedeagus and other characters suggest close relationship with the other species treated here.

*Aphodius (Nobius) chaldaeus* Petrovitz, 1971  
(Figs. 3, 4, 18, 26, 35, 36)

Petrovitz, 1971 : 217.—*moreleti* Baraud, 1980 : 140, **syn. n.**

**Differential diagnosis.** The species is most similar to *A. pustulifer*, but differs from it in the not granulated clypeus, presence of only one macula on each elytron, and in larger diameter of eyes.

**Description. Male** (Fig. 3). Head brown, lateral sides paler than disc. Frons not tuberculate. Frontoclypeal suture indistinct. Clypeus slightly sinuate at middle, with rounded fore angles, finely punctate (punctures on disc separated approximately by 2–4 puncture diameters, on sides punctuation denser). Genae rounded, almost not separated from lateral margins of clypeus, slightly protruding past eyes. Diameter of eye in ventral view approximately 2 times larger than minimum interval between eye and gula.

Pronotum shiny, brown. Its surface with irregular punctuation. Lateral sides and base of pronotum with fine border; hind angles rounded. Scutellum brown, triangular.

Elytra without humeral teeth, glabrous, shiny on disc and shagreened apically, colored yellowish-straw with brown sutural intervals and small brown macula located on 2–4 intervals near the apex of each elytron. Striae shallow, fine, punctures of striae larger than width of striae. Elytral interstices flat, punctate.

Legs and venter of body brown. Perimeter of metasternal disc with dense setae.

Hind and middle femora with single, fine setae ventrally. Outer teeth of fore tibia relatively long. Spur of fore tibia slightly curved downward and acute apically. Lower spur of middle tibia acute, as long as the first segment of tarsi and longer than 1/2 length of upper spur. First segment of hind tarsi longer than upper spur and as long as 3 following segments combined. Adjacent apical setae of middle and hind tibiae of different length.

Parameres short, evenly tapered and acute apically. Basal sclerite 2.8 times longer than length of parameres.

**Female** (Fig. 4) differs from male in denser punctuation of head and pronotum, narrower pronotum and glabrous metasternal disc. Spermatheca smooth on most part of surface and folded on the apex, slightly widened basally (Fig. 35).

Body length 4–5 mm.

**Distribution.** Turkmenia, Iran, Iraq.

**Additional material.** Turkmenia. Kara-Bogaz, XII.1894, 3 spms. (Maksimovich); Kizyl-Arvat,

30.IV.1896, 1 spm. (Anger); Kopet Dagh, 10–11.X.1902, 1 spm. (K.O. Anger); near Uyar well (30 km W of Yaskhan), 7.V.1952, 1 spm. (Kryzhanovskij); Serakhs, 14.V.1903, 8 spms. (K.O. Anger); Pereval Station, 17.IV.1903, 1 spm. (K.O. Anger), 26.IV.1889, 8 spms. (A. Semenow); Tersakan, 21.X.1902, 2 spms. (K.O. Anger); Chat, 1–3.XI.1903, 1 spm. (K.O. Anger). Iran. Kerman, 23–25.II.1928, 1 spm. (V. Kuznetsov); Atrek, 13.IV.1916, 1 spm. (Il'in); "Persia," 2 spms.

**Remark.** Comparison of the type specimens of *A. moreleti* and *A. chaldaeus* has shown that they belong to one species.

*Aphodius (Nobius) bonnairei* Reitter, 1892  
(Figs. 9, 10, 21, 29, 36)

Reitter, 1892 : 96.

**Differential diagnosis.** The species is most similar to *A. inclusus*, but differs from it in the elytral pattern and the shape and size of parameres.

**Description. Male** (Fig. 9). Head dark brown, sometimes almost black. Frons not tuberculate. Frontoclypeal suture indistinct. Clypeus sinuate at middle, with rounded fore angles, irregularly punctate. Genae rounded, almost not separated from lateral margins of clypeus, slightly protruding past eyes. Diameter of eye in ventral view approximately as wide as minimum interval between eye and gula.

Pronotum shiny, dark brown becoming nearly black on the disc, with paler lateral margins. Lateral sides and base of pronotum with fine border; hind angles rounded. Scutellum triangular, dark brown.

Elytra without humeral teeth, glabrous, shiny, colored yellowish brown, with dark brown suture and brown sutural intervals. Striae relatively deep, punctures of striae wider in diameter than width of striae. Elytral intervals flat, finely and sparsely punctate.

Legs and venter of body brown. Perimeter of metasternal disc and middle and hind femora with dense, long setae ventrally.

Outer teeth of fore tibia relatively long. Spur of fore tibia slightly curved downward and acute apically. Lower spur of middle tibia as long as the first segment of tarsi and as long as or slightly longer than 1/2 length of upper spur. First segment of hind tarsi longer than upper spur and as long as 3 following segments combined. Adjacent apical setae of middle and hind tibiae of different length.

Parameres less curved, evenly tapering and acute apically. Basal sclerite of aedeagus approximately 2 times longer than the length of parameres.

**Female** (Fig. 10) differs from male in coarser punctation of head, more convex, rugose clypeus, narrower pronotum with denser punctation, glabrous metasternal disc, and in having only sparse setae on the middle and hind femora. Spermatheca folded, elongate, not pear-shaped basally.

Body length 3.1–4 mm.

**Distribution.** The range of this species is poorly known. It was found in southern Europe (Italy, Spain) and North Africa (Algeria, Morocco).

**Additional material.** Afghanistan: Gereshk, 6.XII.1969, 1 spm. (O.N. Kabakov). "Gallia," 2 spms.

*Aphodius (Nobius) dosangi* Akhmetova et Frolov  
sp. n. (Figs. 15, 16, 24, 32, 33, 36)

**Description. Male**, holotype (Fig. 15). Body length 3.9 mm. Head shiny, dark brown, almost black on disc and paler on sides. Its surface densely punctate (punctures separated approximately by 1 puncture diameter). Clypeus slightly sinuate at middle, with rounded fore angles. Genae rounded, almost not separated from lateral margins of clypeus, slightly protruding past eyes. Frontoclypeal suture indistinct. Frons not tuberculate. Diameter of eye in ventral view slightly larger than minimum interval between eye and gula.

Pronotum shiny, dark brown, almost black on disc, with paler, brown lateral margins. Fore margin not bordered, lateral margins and base of pronotum with fine border. Disc of pronotum relatively densely, irregularly punctate (punctures separated by 1–3 times puncture diameter); hind angles rounded. Scutellum wide, triangular, shiny, dark brown, sparsely punctate.

Elytra shiny, yellowish-straw, with dark brown suture, brown apices and large brown obscure macula, which occupy almost entire surface of elytron, except for small part of the intervals 2 and 3 near base, humeral umbones and area near the apices of each elytron. Humeral teeth absent. Striae relatively deep, punctures of striae larger than width of striae. Elytral intervals flat, very finely and sparsely punctate.

Venter of body dark brown. Perimeter of metasternal disc with dense setae.

Legs brown. Hind and middle femora with few fine setae ventrally.

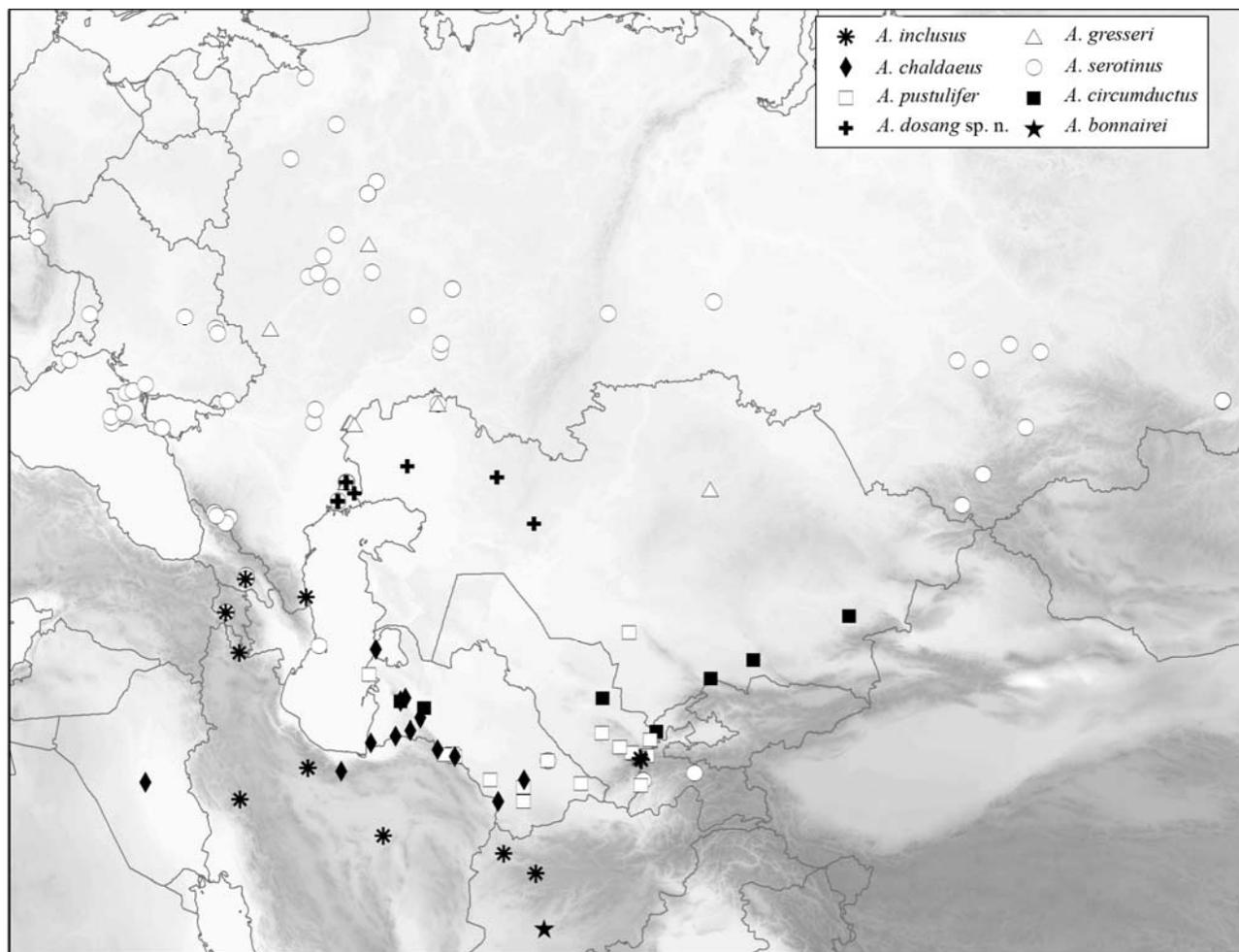


Fig. 36. *Aphodius* Ill., distribution of species of the subgenus *Nobius* in the territory of Russia and adjacent countries.

Outer teeth of fore tibia relatively long. Spur of fore tibia slightly curved downward and acute apically. Lower spur of middle tibia as long as the first segment of tarsi and slightly longer than 1/2 length of upper spur. First segment of hind tarsi longer than upper spur and slightly shorter than 3 following segments combined. Adjacent apical setae of middle and hind tibiae of different length.

Parameres very short, tapering and acute apically. In lateral view, basal sclerite approximately 3 times longer than length of parameres.

**Female** (Fig. 16) differs from male in coarser punctuation of head, rugose clypeus, narrower pronotum and glabrous metasternal disc. Spermatheca folded, elongate, not pear-shaped basally.

**Variability.** Body coloration, punctuation of pronotum and head, and size of genae slightly varying in the specimens examined. Body length of paratypes 3.1–4.2 mm.

**Differential diagnosis.** The new species is most similar to *A. circumductus*, but differs from it in the less contrasting elytral pattern, more curved apices of the parameres and in the angle between the parameres and basal sclerite.

**Etymology.** The species name is derived from Dosang Village (Russia, Astrakhan Province), where the holotype and larger part of the paratypes were collected.

**Type material.** Holotype, male: Russia, Astrakhan Prov.: Dosang Vill., at night, near railway station, attracted to light, 24.V.2007 (A. Frolov, L. Akhmetova). Paratypes (27 males and 32 females): as holotype, 5 females, flood-plain of Akhtuba River, cattle dung, 6.X.2006, 2 females, sands, horse dung, 11.X.2006, male and female (A. Frolov, L. Akhmetova); environs of Dosang, fixed sands, horse dung, 17.IV.2007, 12 males and 6 females reared from larvae, old horse dung, 13–15.IV.2007, female, horse

dung, 17.IV.2007, 3 females (A. Frolov, L. Akhmetova). Kazakhstan. Chelkar, 28.IV.1984, male and female (G. Nikolajev); Malye Barsuki, 2.VII.1907, male (Andreev); Uralsk Prov., Temirskii Distr., 1.VI.1908, male and 2 females (Uvarov), IV-V.1908 2 males, Astau-Saldy River, 5.VI.08, 4 males and 7 females, Daumchar cemetery, 1.IV.1908, 2 males and female, Kuzha-Tugai, IV.V.1908, 3 males and 3 females (Borodin and Uvarov).

The specimen from Georgia (Marneuli environs, 15.V.1960, Kabakov) probably belongs to *A. dosangi* sp. n., but it is damaged and, therefore, not included in the type series.

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