

A new species of *Achenium* Leach, 1819 from Taman peninsula with the key to the Russian fauna of the genus (Coleoptera: Staphylinidae: Paederinae)

Новый вид *Achenium* Leach, 1819 с Таманского полуострова с определительной таблицей видов этого рода фауны России (Coleoptera: Staphylinidae: Paederinae)

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Ключевые слова: Coleoptera, Staphylinidae, Paederinae, *Achenium*, новый вид, Краснодарский край, Россия.

Abstract. *Achenium volcanus* sp. n. found in the ground at the Karabetova hill chain of Taman Peninsula is described. Presumably the new species belongs to the *Achenium caucasicum* species group of Assing and reliably differs from the closely related species in the structure of the aedeagus. Among species of *Achenium* that may occur sympatrically, it is distinguished by the structure of the aedeagus and smaller body size. To facilitate local studies of *Achenium* the key to species of this genus that are known from, or presumed to occur in Russia is provided.

Резюме. Описан новый для науки вид *Achenium volcanus* sp. n., собранный в поверхностных слоях почвы Карабетовой гряды Таманского полуострова. Новый вид предположительно близок к группе видов *Achenium caucasicum*. *Achenium volcanus* sp. n. можно надежно отличить от всех видов группы *caucasicum* только по форме эдеагуса. Среди видов *Achenium*, которые могут встречаться симпатрично, новый вид отличается не только формой эдеагуса, но и меньшими размерами тела. Составлена определительная таблица видов рода *Achenium*, которые известны с территории России или могут здесь обитать предположительно.

Introduction

Achenium Leach, 1819 is a paederine genus comprising 53 mainly Palaearctic species. The genus is thermophilic and particularly species-rich in the Mediterranean. Species of *Achenium* are usually found in the ground-based microhabitats of various kinds of grasslands, in arable lands, river banks, lakeshores, also near salt lakes and in coastal habitats, mostly at low altitudes. Apparently a significant part of the life cycle of many species of *Achenium* is confined to subterranean microhabitats [Assing, 2010].

Achenium remained a poorly understood group where species identification was difficult to impossible until Assing [2010] revised the genus. Among other improvements, that revision discarded an artificial subgeneric system providing a more comprehensive species group division

instead, primarily based on the aedeagus morphology and biogeographic plausibility. This revision greatly facilitates the discovery of a new species, including the one described here as *Achenium volcanus* sp. n. from Krasnodar Province of Russia. Most of the territory of Russia expands outside the area of distribution of *Achenium*. However, the southwestern and south-central parts of the country, where several species of this genus have been recorded, are still greatly understudied in that respect. To facilitate a specialized collecting effort and local knowledge of the genus, an identification key of the Russian fauna of the genus is provided.

Material and methods

Specimens were relaxed in warm water for dissection of the last abdominal segments containing the aedeagus. Detached parts were placed in KOH (10%) for several hours to dissolve soft tissues, then dipped into 75% alcohol for several minutes and finally transferred to microvials with glycerin for observation. All dissected parts are kept in the plastic genitalia vials with glycerin pinned under the respective specimens. Observations were made with a compound microscope (Leica MZ–APO). Photographs of the habitus (fig. 1) and the aedeagus of the new species (fig. 2–6) were taken with a Leica DFC 420 camera attached to a Leica MZ16A microscope (lighting by Leica CLS 150XE) with the help of Leica Application Suite (Leica Microsystems, 2003–2007) and Automontage Pro (Synoptics Ltd, 1997–2004). Photographs of the habitats (fig. 7, 8) in the Karabetova hill chain, where the holotype and some paratypes of *Achenium volcanus* sp. n. had been collected by one of us (A. Solodovnikov) in 1995, were recently taken by V. Shchurov (Krasnodar, Russia).

The holotype and two paratypes of the new species were deposited at the Natural History Museum of Denmark (Zoological Museum of the University of Copenhagen, ZMUC), two paratypes were donated to the private collection of V. Assing at Hannover, Germany (cAss).

Three specimens kindly provided for our examination by E. Khachikov from Rostov-on-Don, Russia, became paratypes that were left in his private collection (cKh).

All measurements were taken with an eyepiece micrometer. They are given in millimeters and abbreviated as follows:

- HL – head length (from base of labrum to neck constriction);
- HW – head width (maximal);
- EL – eye length (in dorsal view);
- AL – antennal length (from base of antennomere 1 to the apex of antennomere 11);
- PL – pronotum length (along median line);
- PW – pronotum width (maximal);
- ELL – elytral lateral length (from elytral base at the level of base of scutellum to the lateral angle of an elytron);
- EW – elytral width (maximal, includes both elytra);
- ESL – elytral sutural length (from tip of scutellum to sutural angle);
- AW – abdominal width (maximal).

Achenium volcanus sp. n.
(Color plate: 5, fig. 1–6)

Material. Holotype, ♂, “Russia: Krasnodar Province, Karabetova Gryada [Karabetova hill chain] nr. town Taman, 12.V.1995, in crevices under clay stones near mud volcano, leg. A. Solodovnikov”, “*Achenium* (s. str.) sp. 2 ? nova ex. gr. striatum A. Solodovnikov det. 1995” [handwritten label by A. Solodovnikov], “Holotype *Achenium volcanus* Solodovnikov & Li des. 2013” (ZMUC). Paratypes: 1♂, 2♀, same data as in the holotype but found in soil at the water pond edge (♂ in cAss, ♀♀ in ZMUC); 1♀, “Russia: Krasnodar Province, town Taman, 4.VII.1992, leg. M. Savitsky” (cAss); 1♂, 3♀, “Krasnodar Province, Karabetova Gryada [Karabetova hill chain] nr. town Taman, 02.05.1997, leg. D. Kassatkin” (cKh).

Description. Entire body length: 5.7–6.8 mm. Body parts: length: AL 2.45–2.48; HL 0.88–0.91; PL 0.93–0.96; ELL 1–1.02; width: HW 0.92–0.95; PW 0.89–0.91; EW 0.82–0.86; AW 1.13–1.16.

Body very strongly flattened dorso-ventrally, glossy, with slightly less glossy abdomen. Head, pronotum and scutellum dark brown; elytra brownish yellow, often with more or less darkened basal area; abdomen blackish brown; labrum and palpi brownish yellow; legs brownish yellow with yellow tarsi; mandibles brownish; antennae more or less brownish yellow (fig. 1).

Head with broadly rounded lateral margins, HL/HW = 0.97; eyes small and flat, in dorsal view HL/EL = 5; microsculpture on lateral sides only, disk smooth and glossy; punctation coarse, irregular and rather sparse, on frons mostly absent, frons glossy.

Pronotum widest in apical part and slightly narrowed posteriad, lateral margins straight, anterior angles well developed and slightly protruding anteriorly, posterior angles rounded; PL/PW = 1.06; disc flat and smooth, without microsculpture, longitudinal median area without punctation, lateral areas covered with dense coarse punctures usually smaller than punctures on head.

Scutellum with dull surface, with reticulate microsculpture, sparse punctation or fine pubescence.

Elytra about as long as wide, ELL/EW = 1.03; humeri distinct, but humeral angle very obtuse, broadly rounded; lateral margins straight, slightly diverging posteriad; punctation overall larger and denser than on head or pronotum, but slightly shallower, irregular, near elytral suture small and sparse; interspaces between punctures often narrower than diameter of puncture.

Hind wings strongly reduced: flightless species.

Abdomen widest at segment VII (5th visible), wider than head, pronotum or elytra; tergites with dense microsculpture and shallow punctation consisting of medium-sized punctures getting

very sparse near base of tergites; apex of tergite VII without distinct palisade fringe.

Aedeagus (fig. 2–6): dorsal plate of median lobe rather short, with thin obtusely pointed and dorsally slightly curved apex, and broader, weakly sclerotized basal portion of irregular shape; ventral process gradually narrowed and pointed apically (in ventral view); parameres weakly sclerotized, apically reaching about middle of length of median lobe; internal sac consisting of fields of numerous small spiny sclerites, without large sclerotized spines, apical part with dense and short spinules.

Secondary sexual dimorphism. Anterior tarsi distinctly wider in males than in females; posterior margins of male sternites V–VII slightly emarginated, middle areas of sternites IV–VII with oblique, sparse and small punctures, and apical margin of sternite VIII with triangle-shaped middle notch.

Distribution and bionomics. The species is known only from the type locality at the top of the Karabetova Gryada hill chain located ca. 5 km SE of the town Taman in Krasnodar Province of Russia. Karabetova Gryada is a spectacular geographical feature of the Taman Peninsula that preserves patches of the original steppe landscape from plowing and, partially, from cattle grazing. Temporary water ponds and an active mud volcano located at the top of the hill chain form an interesting landscape. In particular, large fields of crackly clay gradually produced by the volcano (fig. 7) provide moist ground crevices where some of the specimens of *A. volcanus* sp. n. were found. Some specimens were also collected in wet soil at the edge of the temporary water ponds (fig. 8).

Etymology. The species name is the Latin adjective “volcanus” (volcanic) that refers to the peculiar mud volcano at the type locality.

Comparison. Externally *Achenium volcanus* sp. n. does not have striking features to separate it from the congeners within a morphologically rather homogenous genus. The shape of the aedeagus of the new species (fig. 2–6), however, allows reliable identification of *A. volcanus* sp. n. within the genus, and at the same time, poses some problems to affiliate it with any of the species groups proposed in Assing [2010]. The new species seems to belong, or is related to, the *Achenium caucasicum* group of Assing [2010] based on the following characters of the aedeagus: ventral process with the apex showing a slight tendency to be curved ventrad (fig. 4–6); dorsal plate divided into a stronger sclerotized, curved dorsad (fig. 4–6) apical point and a lamellate, lesser sclerotized basal portion (fig. 3); internal sac without large spines. An affiliation of *A. volcanus* sp. n. to the *A. caucasicum* species group is also biogeographically plausible since the latter includes East Mediterranean or wide-spread Mediterranean species. However, unlike all the species of *A. caucasicum* group, the apex of the ventral process of the aedeagus of *A. volcanus* sp. n. is not acutely curved ventrad, but, instead, resembles the shape found in *A. nigiventre* Fairmaire, 1871. Also, the pattern of the sclerotized structures in the internal sac of *A. volcanus* sp. n. is roughly similar to that of the species from *A. nigiventre* group, the latter including three species from West Mediterranean [Assing, 2010]. Since neither phylogenetically informative character systems nor a phylogeny of the genus *Achenium* have been fully explored yet, sister group relationships for a new species remain to be established.

Among the five species of *Achenium* recorded from the south of European Russia in Assing [2010: *A. caucasicum* Laporte, 1835, *A. depressum* (Gravenhorst, 1802), *A. humile* (Nicolai, 1822), *A. planum* Erichson, 1840 and *A. quadriceps* Eppelsheim, 1889), the new species is rather peculiar because of its distinctly smaller size and short elytra. And none of these five species resembles *A. volcanus* sp. n. in the shape the aedeagus.

Remarks. *Achenium volcanus* sp. n. was earlier recorded for the fauna of the North-Western Caucasus as *Achenium* sp. [Solodovnikov, 1998], based on the same specimens as studied here.

Key to species of *Achenium* fauna of Russia

The key includes ten species. Seven of them were hitherto recorded from the territory of Russia. Three other species (*A. sumakowi* Bernhauer, *A. vitalyi* Assing and *A. kazakhicum* Assing) have not been recorded from Russia. However, they are included because their known distributions in the neighboring countries allow to suspect their occurrence in Russia as well. To stress their presumed but not confirmed belonging to the Russian fauna, the latter species are given in [square brackets]. Of the numerous new synonyms proposed in the revision of Assing [2010] only those known from Russia are mentioned. *Achenium picinum* Fauvel, 1875 known from Rhodos (Greece), Southern Turkey, and, based on a single female, from some unspecified locality recorded as "Caucasus" [Assing, 2010], is not included in this key since its occurrence in the Russian parts of the Caucasus is highly unlikely. This key refers to the illustrations in Assing [2010], and that revision should be consulted for other additional data as well.

1. Median dorsal portion of head with shallow microsculpture 2
 - Microsculpture present only in posterior and lateral portions of head: median dorsal portion without microsculpture and glossy 3
2. Smaller species: body length 5.5–7.3 mm. Aedeagus as in Assing [2010: fig. 89–94]. Wide-spread species known from North-Eastern China, Mongolia and South-Eastern Russia (Tschita Region) *A. chinense* Bernhauer, 1927 (= *A. arkhana* Shavrin, 2006)
 - Distinctly larger species: body length 8.5–11 mm. Aedeagus as in Assing [2010: fig. 360–363]. Wide-spread species known from Northern Iran and Middle Asia to Mongolia and China. No records from Russia [*A. sumakowi* Bernhauer, 1911]
3. Larger species: body length 6.4–11 mm: pronotal width > 0.8 mm; pronotal length at least 0.9 mm. Relative length of elytra varies. In smaller species (*A. volcanus* sp. n., body length 5.7–6.8 mm) elytra shorter, ca. as wide as long 4
 - Smaller species: body length 5–5.7 mm; pronotal width at most approximately 0.8 mm, pronotal length at most 0.9 mm. Elytra distinctly longer than wide. Illustrations of external characters and aedeagus in Assing [2010: fig. 118–122, 163]. West Kazakhstan. No records from Russia [*A. vitalyi* Assing, 2010]
4. Elytra distinctly bicoloured, anteriorly narrowly to extensively blackish and posteriorly largely to narrowly reddish; the reddish portion distinctly contrasting also with the blackish-brown to blackish head and pronotum; occasionally the elytra may be uniformly bright reddish. Species of mostly large size. 5

- Body of more uniform coloration; head and pronotum usually brown to dark-brown, or blackish; elytra not distinctly bicoloured and not bright reddish posteriorly, but diffusely more or less darkened anteriorly or posteriorly 7
- 5. Larger species; body length 6.5–11 mm. Aedeagus not as in Assing [2010: fig. 79, 80] 6
 - Smaller species: body length 6.4–7.8 mm. Aedeagus as in fig. 79 and 80 in Assing [2010]. Known from Kazakhstan. No records from Russia [*A. kazakhicum* Assing, 2010]
- 6. Aedeagus with ventral process distinctly pointed in ventral or dorsal view (fig. 76 in Assing [2010]); and, in lateral view, with stronger curved and acute apex (fig. 77 in Assing [2010]). Elytra always about as long as pronotum. Body length 6.5–11 mm. Known from Crimea, Western and Northern Caucasus (Russian records), to Iran and Middle Asia *A. planum* Erichson, 1840
 - Aedeagus with ventral process truncate or vaguely pointed in ventral or dorsal view (fig. 32–48 in Assing [2010]); and, in lateral view, with weaker curved and less acute apex (fig. 12–26 in Assing [2010]). Elytra of variable shape and length, 0.85–1.1 times as long as pronotum. Body length 6.5–11 mm. Wide-spread and rather commonly collected species known from most of Europe, including south-western parts of European Russia *A. depressum* (Gravenhorst, 1802)
- 7. Eyes relatively longer: length of eye in dorsal view 0.3–0.6 times as long as postocular region. Elytra distinctly longer than pronotum 8
 - Eyes relatively shorter: length of eye in dorsal view at most 0.3 times as long as postocular region. Elytra about as long as pronotum. Aedeagus as in fig. 2–6; habitus as in fig. 1. Body length 5.7–6.8 mm *A. volcanus* sp. n.
- 8. Head, pronotum and abdomen reddish to brown 9
 - Head, pronotum and abdomen blackish-brown to blackish. Habitus, external characters and aedeagus as in Assing [2010: fig. 95–104]. Body length 6.5–10 mm. Wide-spread species known from Balkans, Asia Minor, south of Great Britain, Southern Italy and Western France, the Central and Southern European Russia, as well as from Middle Asia *A. humile* (Nicolai, 1822) (= *A. ustulatum* J. Sahlberg, 1880)
- 9. Body on average larger: body length 7.2–9.5 mm. Aedeagus (in ventral or dorsal view) with ventral process more distinctly pointed, and with apical part of dorsal plate expanded (fig. 183, 184 in Assing [2010]). Known from the Southern European Russia, Transcaucasia and Middle Asia *A. caucasicum* Laporte, 1835
 - Body on average smaller: body length 5.7–8 mm. Aedeagus (in ventral or dorsal view) with ventral process less distinctly pointed and with apical part of dorsal plate narrow (fig. 248, 249 in Assing [2010]). Wide-spread species, reliably known from Central and Southern European Russia, Eastern Transcaucasia, Middle Asia and Northwestern China *A. quadriceps* Eppelsheim, 1889

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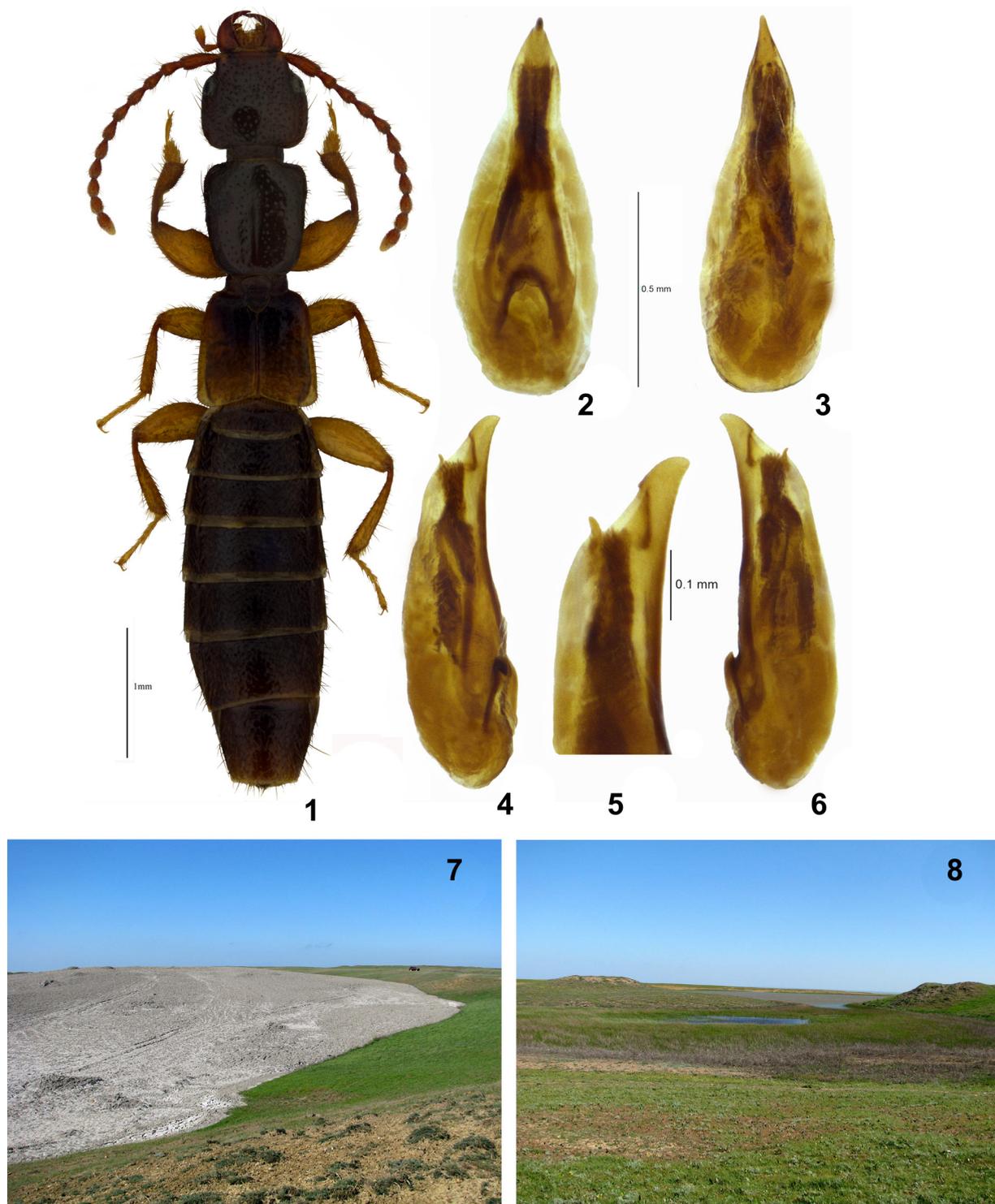


Fig. 1–8. *Achenium volcanus* sp. n.
1 – habitus; 2–6 – aedeagus: 2 – view from the parameral side; 3 – view from the side opposite to parameres; 4, 6 – opposite lateral views; 5 – enlarged view of the apical portion of aedeagus from lateral side; 7–8 – Karabetova hill chain of the Taman Peninsula, habitats: 7 – clay field produced by the mud volcano; 8 – temporary water pond.

Рис. 1–8. *Achenium volcanus* sp. n.
1 – габитус; 2–6 – эдеагус: 2 – вид со стороны прикрепления парамер; 3 – вид с противоположной стороны; 4, 6 – вид сбоку (противоположные боковые стороны); 5 – увеличенный вид вершинной части эдеагуса сбоку; 7–8 – местообитания Карабетовой Гряды Таманского полуострова: 7 – поле глины, изверженной грязевым вулканом; 8 – временный водоем.