

A redescription of *Desertoniscus linearis* (Budde-Lund, 1885) (Isopoda: Oniscidea: Agnaridae) from the Republic of Karakalpakstan, Uzbekistan

Переописание *Desertoniscus linearis* (Budde-Lund, 1885) (Isopoda: Oniscidea: Agnaridae) из Республики Каракалпакстан, Узбекистан

Konstantin B. Gongalsky¹, Philipp S. Byzov^{1,2}, Roza E. Koschanova³
К.Б. Гонгальский¹, Ф.С. Бызов^{1,2}, Р.Е. Кошанова³

¹A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Leninsky pr., 33, Moscow 119071 Russia.

¹Институт проблем экологии и эволюции им. А.Н. Северцова РАН, Москва 119071 Россия.

²M.V. Lomonosov Moscow State University, Leninskie Gory, 1, Moscow 119991 Russia.

²Московский государственный университет им. М.В. Ломоносова, Москва 119991 Россия.

³Berdakh Karakalpak State University, Abdirov str., 1, Nukus, Republic of Karakalpakstan 742000 Uzbekistan.

³Каракалпакский государственный университет им. Бердаха, Нукус 742000 Узбекистан.

Konstantin Gongalsky gongalsky@gmail.com ORCID 0000-0003-1600-8448

Philipp Byzov byzzovv@list.ru ORCID 0009-0007-2276-983X

Roza Koschanova koshanova@inbox.ru ORCID 0000-0001-8201-6732

KEY WORDS: Isopoda, Oniscidea, woodlouse, *Desertoniscus*, *Protracheoniscus*.

КЛЮЧЕВЫЕ СЛОВА: мокрицы, Isopoda, Oniscidea, *Desertoniscus*, *Protracheoniscus*.

ABSTRACT. Woodlouse *Desertoniscus linearis* (Budde-Lund, 1885) comb.n. formerly ascribed to the genus *Porcellionides* Miers, 1878, is redescribed from Karakalpakstan, NW region of Uzbekistan. The diagnostic features of the species, as well as its affinities within the genus are provided and discussed.

How to cite this paper: Gongalsky K.B., Byzov Ph.S., Koschanova R.E. 2024. A redescription of *Desertoniscus linearis* (Budde-Lund, 1885) (Isopoda: Oniscidea: Agnaridae) from the Republic of Karakalpakstan, Uzbekistan // Arthropoda Selecta. Vol.33. No.2. P.175–181. doi: 10.15298/arthscl.33.2.04

РЕЗЮМЕ. Мокрица *Desertoniscus linearis* (Budde-Lund 1885) comb.n., ранее относимый к роду *Porcellionides* Miers, 1878, переописан из Каракалпакстана, Северо-Западный Узбекистан. Приводятся и обсуждаются диагностические признаки вида, а также его родство внутри рода.

Introduction

The genus *Desertoniscus* Verhoeff, 1930 has a Central Asian distribution. Currently, there are thirteen described species of the genus. The type species, *Desertoniscus subterraneus* Verhoeff, 1930, was described from Turkestan [Verhoeff, 1930]. Later, E.V. Borutzky described eight more species in two papers: five species in 1945 and three more in 1978 [Borutzky, 1945, 1978]. All of them originated from Uzbekistan, Kyrgyzstan and Turkmenistan, except for one species, *Desertoniscus mongolicus* Borutzky, 1978, from Bulgan, Mongolia. Much later, Taiti & Ceccucci [2011] described *Desertoniscus arabicus* Taiti et Ceccucci, 2011 from the United Arab Emirates,

and Kashani & Allspach [2012] discovered *Desertoniscus schmalfussi* Kashani et Allspach, 2012 from Southern Turkestan. The latter two authors also transferred one more species, *Protracheoniscus taschkentensis* Verhoeff, 1930 to the genus *Desertoniscus*. The most recently described species, *Desertoniscus zaitsevi* Gongalsky, 2017, was found in Kalmykia, the south of European Russia [Gongalsky, 2017], the only species outside Asia and *Desertoniscus iranensis* Bakhshi et Sadeghi, 2023 from Iran [Bakhshi, Sadeghi, 2023].

In his review, Borutzky [1978] critically revised the approach to this genus. He stated that only *D. subterraneus*, divided into four subspecies, and the three new species belonged to *Desertoniscus*. Following the approach by Borutzky [1978], *D. schmalfussi* and *D. zaitsevi* may not belong to this genus. At present, the genus includes species with different morphological characters (exopod of male pleopod 1 with straight and concave distal margin) (see Schmalfuss [2003]; Boyko *et al.* [2008]). This situation invites a molecular analysis of the genus which we have begun but results are not included in the current paper.

In the Zoological Institute in Saint-Petersburg (ZISP), there is an individual marked as *Metoponorthus linearis* Budde-Lund, with the label “Nukus, 1875, Dohrandt leg.” According to Jeppesen [2000], the “holotype by monotypy” of this species is deposited in ZISP, so most probably the above mentioned specimen belongs to the type series and therefore marked as “Lectotype” in this study. According to Schmalfuss [2003], this species was later transferred to the genus *Porcellionides* Miers, 1878.

The investigation conducted by the authors in the desert ecosystems of Karakalpakstan in 2022 yielded a collection of woodlice belonging to the genus *Deser-*



Fig. 1. Lectotype of *Desertoniscus linearis* (Budde-Lund, 1885), female, from Karakalpakstan, NW Uzbekistan collected in 1875 (ZISP, #1737).

Рис. 1. Лектотип *Desertoniscus linearis* (Budde-Lund, 1885), самка, из Республики Каракалпакстан, СЗ Узбекистан, собранный в 1875 г. (коллекция ЗИН РАН, №1737).



Fig. 2. Alive male specimen of *Desertoniscus linearis* (Budde-Lund, 1885), from Karakalpakstan, NW Uzbekistan kept in culture.

Рис. 2. Общий вид *Desertoniscus linearis* (Budde-Lund, 1885), содержащийся в культуре, из Республики Каракалпакстан, СЗ Узбекистан (♂).

toniscus. In this area there is only one species belonging to this genus. It is most probably identic with the species described by G. Budde-Lund [1885], so we provide its redescription below.

Material and Methods

The specimens were taken by hand and fixed in 96% ethanol. The terminology used in the species description is mainly follows Vandel (1960). Dissections were done with the help of a Leica MZ8 microscope. Diagnostic body appendages were mounted on slides in euparal (Carl Roth GmbH). Line drawings were done with the help of an Olympus U-DA camera lucida attached to an Olympus BX41 microscope. Some individuals were attached to stubs, coated with gold in a S150A Sputter Coater, and studied under a Tescan Vega TS5130MM scanning electron microscope.

Position of noduli laterales in each pereonite was expressed as the distance to posterior margin (b/c) and the distance to lateral margin (d/c) related to the length of pereonite according to Vandel [1960].

Material is deposited in the Zoological Museum of the Moscow State University, Russia (ZMMU), and partly retained also in the private collection of the author (KG), as indicated below.

Taxonomy

Agnaridae Schmidt, 2003

Desertoniscus Verhoeff, 1930

Desertoniscus linearis (Budde-Lund, 1885) **comb.n.** Figs 1–8.

Syn.: *Metoponorthus linearis* Budde-Lund, 1885 [Budde-Lund, 1885]

Porcellio (*Metoponorthus*) *linearis* Budde-Lund, 1885 [Jeppesen, 2000]

Porcellionides linearis (Budde-Lund, 1885) [Schmalfuss, 2003; Boyko *et al.*, 2008].

MATERIAL EXAMINED. [Lectotype] *Metoponorthus linearis* Budde-Lund: female (ZISP, #1737), [Uzbekistan, Republic of Karakalpakstan,] Nukus, 1875. Leg. Dohrandt (Fig. 1). — 3 ♂♂, 3 ♀♀ (ZMMU, Mc-1463), 14 ♂♂, 18 ♀♀ (KG): Uzbekistan, Republic of Karakalpakstan, Nukus, environs of Ashshiko'l (Komsomolskoe) Lake, 42.460341° N, 59.617996° E, 1.05.2022, leg. K. Gongalsky et M. Degtyarev.

DIAGNOSIS. Antennal flagellum with ratio of articles 1 to 2 being 1:2; male exopod of male pleopod 1 with concave apex; ischium of male pereopod 7 subtriangular in shape as on Fig. 7A.

DESCRIPTION. Body. Maximum body length: male 3.5 mm; female 4.0 mm. Body length of holotype 3.2 mm. Body light grey-brown. Uropods (Fig. 3D) of same colour as dorsal surface of body. Body elongate; pleon forming no continuous outline with pereion (Figs 1, 2A). Cephalic lobes well-developed; distal part of head covered with γ-shaped dorsal setae (Fig. 2B). Median lobe with rounded distal edge (Figs 2A, 3A). Dorsal surface smooth. Posterior edges of coxal plates of pereionites straight (Figs 2A, 3A). Noduli laterales on pereionites 1–4 distant from lateral margins of coxal plates (Figs 3A, 8). Telson triangular with slightly concave sides and acute apex (Fig. 3A). Exopods elongate, broadest at about proximal 1/3.

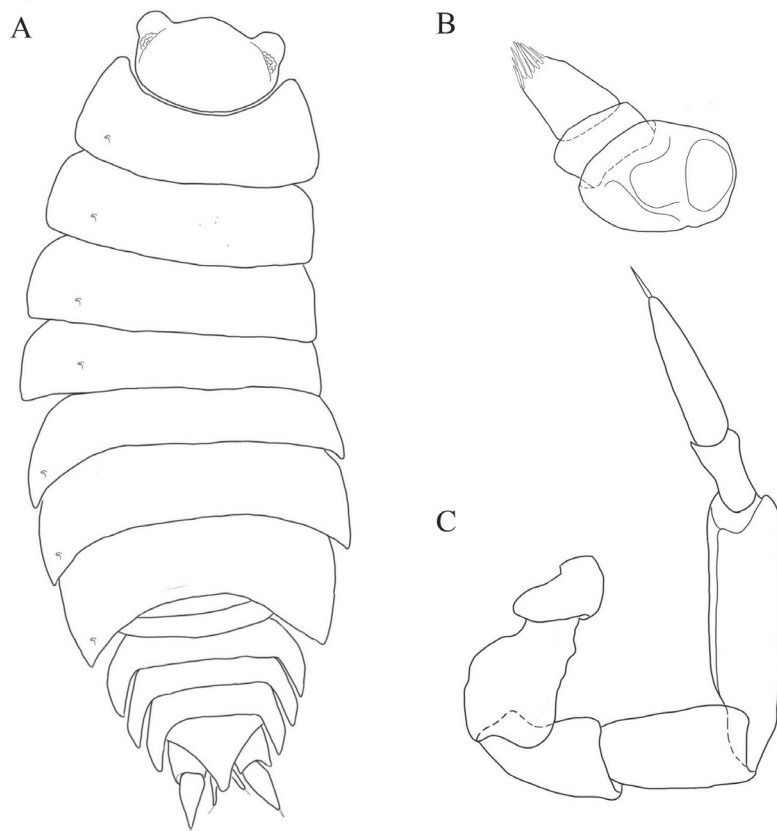
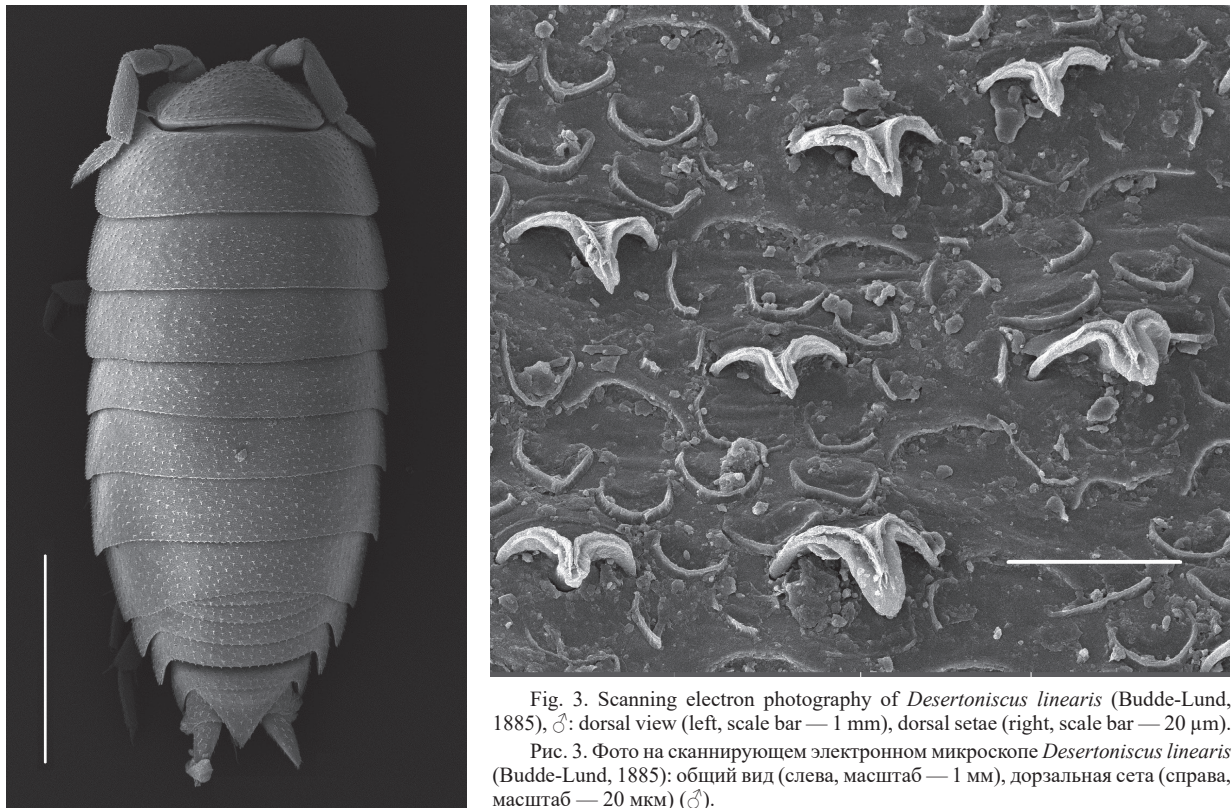


Fig. 4. *Desertoniscus linearis* (Budde-Lund, 1885), ♂: A — body outline; B — antennula; C — antenna (♂).

Рис. 4. *Desertoniscus linearis* (Budde-Lund, 1885): A — тело; B — антеннула; C — антенна (♂).

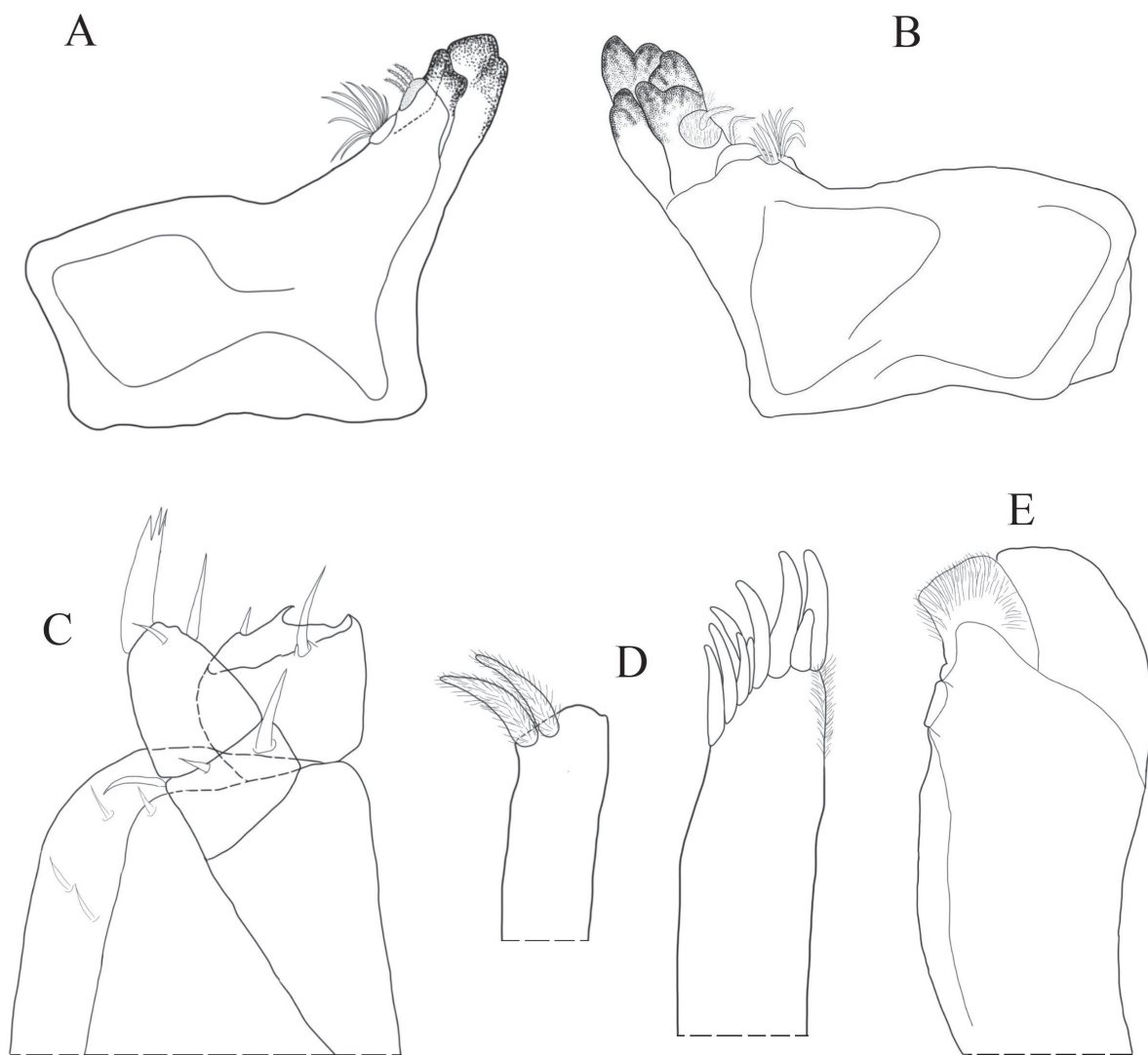


Fig. 5. *Desertoniscus linearis* (Budde-Lund, 1885): A — left mandible; B — right mandible; C — maxilliped; D, maxillula; E, maxilla (♂).

Рис. 5. *Desertoniscus linearis* (Budde-Lund, 1885): А — левая мандибула; В — правая мандибула; С — максиллипед; D — максиллула; Е — максилла (♂).

Cephalon. *Antennula* 3-segmented (Fig. 3B); article 1 wide and relatively long; article 2 ca 1.5 times shorter than 1st; article 3 almost as long and narrow as 1st, bearing tuft of setae at apex. *Antenna* short, barely reaching pereonite 2 (Fig. 2A); flagellum 2-segmented, proximal article ca 2 times shorter than distal one (Fig. 3C).

Right mandible (Fig. 4B) with 1+1 free penicils and dichotomized molar penicil; left mandible with 2+1 free penicils (Fig. 4A) and dichotomized molar penicil. *Maxillula* (Fig. 4D) with two strong penicils at medial corner of inner endite. Apical edge of outer endite bearing nine teeth divided into two groups: 5+4. Tip of endite covered with brush of dense setae. Edge of *maxilla* bilobate, medial half of apical edge of inner lobe with brush of dense short setae (Fig. 4E). *Maxilliped* with outer corner of endite bearing two acute tips (Fig. 4C). Eyes with 9 ommatidia.

Pereiopods (Fig. 5A–5C). Ischium of male pereopod 7 subtriangular (Fig. 5C). Setae on distal parts of carpus 1 with split tips.

Pleopods. All exopods of pleopods with monospiracular lungs. Exopod of male *pleopod 1* (Fig. 6A) with concave tip, inner margin slightly concave. Endopod of pleopod 1 with dorsal furrow of ca 15 setae (Fig. 6B). *Pleopod 2* exopod triangular, with straight outer margin bearing 5–7 setae (Fig. 6C); endopod much longer than exopod, narrow, with acute tip (Fig. 6D). *Pleopod 3* exopod triangular (Fig. 4E). *Pleopods 4–5* exopod trapezoidal, with broadly rounded corners, 5th slightly smaller than 4th (Fig. 6F, G).

REMARKS. The genus *Desertoniscus* is characterized within the family Agnaridae by the position of the noduli laterales on pereonites 1 to 4 being distinctly more distant from the lateral margins than those on pereonites 5 to 7, by the short antennae that reach back or slightly surpass the posterior margin of pereonite 1, and by the male pleopod 1 exopod distally more or less bilobate [Borutzky, 1978; Kwon, 1993, Taiti, Cecucci, 2011]. Based on the body shape, this species seems to be especially similar to *D. subterraneus*. However, these two

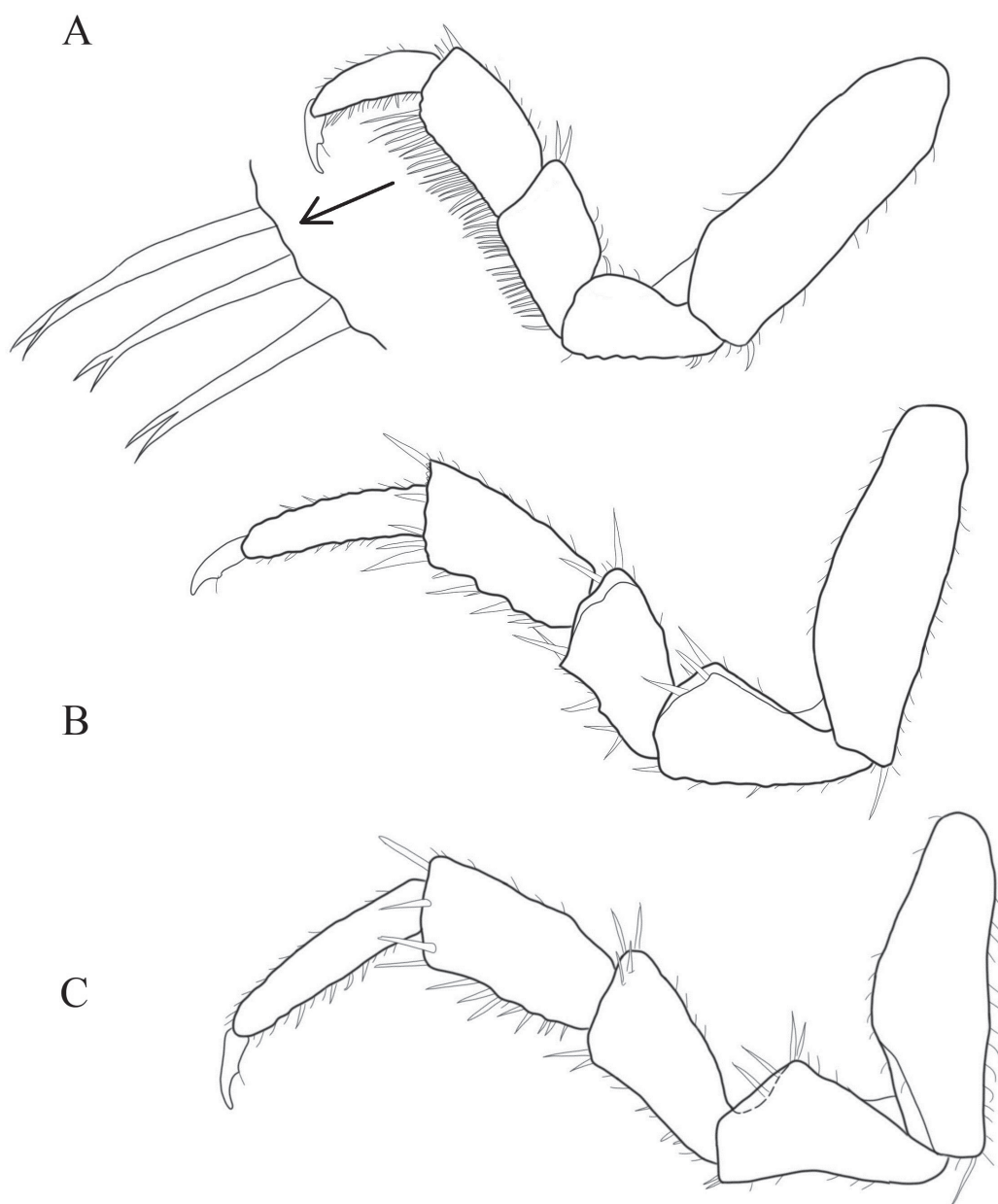


Fig. 6. *Desertoniscus linearis* (Budde-Lund, 1885) A — pereopod 1; B — pereopod 6; C — pereopod 7 (♂).

Рис. 6. *Desertoniscus linearis* (Budde-Lund, 1885): A — перепод 1; B — перепод 6; C — перепод 7 (♂).

species differ as follows: (I) head is smooth, there are no oblique bumps behind the frontal line, as in *D. subterraneus*; (II) sides of dorsal scale setae are strongly concave, whereas in *D. subterraneus* dorsal setae are heart-shaped, with almost straight sides; (III) the exopod of male pleopod 1 does not carry any setae, while in *D. subterraneus*, the outer posterior outgrowth of the exopodite carries several setae, as well as the entire inner side of the exopod; (IV) end of the endopod of male pleopod 1 is slightly bent to the side, similar to that of *D. reductus* Borutzky, 1978 and *D. kirghizicus* Borutzky, 1978, but not straight, as in *D. subterraneus*; (V) deeper notch on the anterior edge of the exopod male of pleopod 5 than in *D. subterraneus*.

DISTRIBUTION. The species has been recorded so far only in surroundings of Nukus, Uzbekistan. It inhabits ruderal

deserts parts of the Republic of Karakalpakstan, Uzbekistan (*Halostachys belangeriana*, *Peganum harmala*, *Ammodendron conollyi*, *Koelpinia linearis*), being common in various biotopes. This species inhabits Kyzyl-Kum (Red Desert) ecosystems.

We hypothesize that *D. linearis* could be a senior synonym for both Iran's *Desertoniscus iranensis* Bakhshi et Sadeghi, 2023 [Bakhshi, Sadeghi, 2023] and *Mongoloniscus persicus* Kashani, 2014 [Kashani, 2014]. However, in order to make such a conclusion, a molecular study is necessary. If verified, the range of *D. linearis* may extend all the way down to Iran.

Compliance with ethical standards

CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.

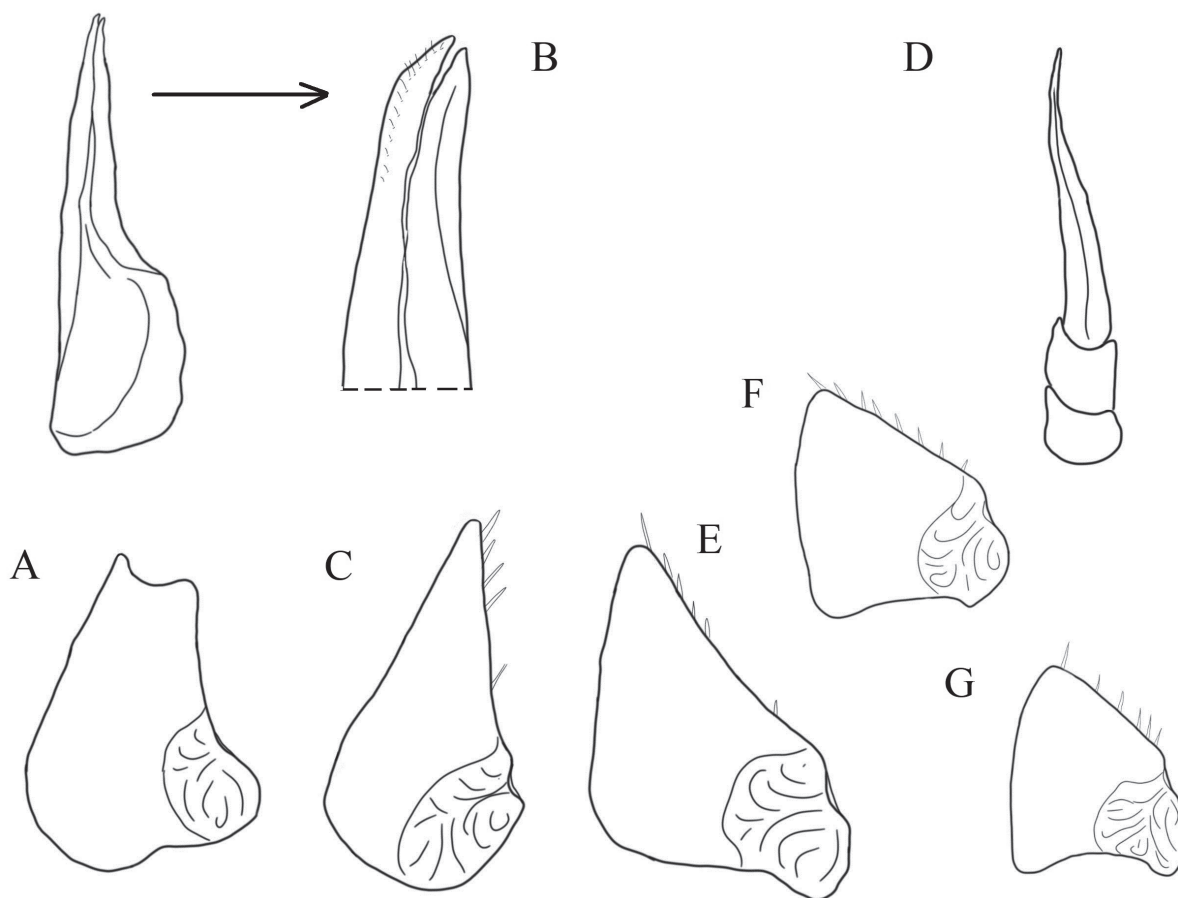


Fig. 7. *Desertoniscus linearis* (Budde-Lund, 1885): A — exopod of pleopod 1; B — endopod of pleopod 1; C — exopod of pleopod 2; D — endopod of pleopod 2; E — exopod of pleopod 3; F — exopod of pleopod 4; G — exopod of pleopod 5 (♂).

Рис. 7. *Desertoniscus linearis* (Budde-Lund, 1885): A — экзопод плеопода 1; B — эндопод плеопода 1; C — экзопод плеопода 2; D — эндопод плеопода 2; E — экзопод плеопода 3; F — экзопод плеопода 4; G — экзопод плеопода 5 (♂).

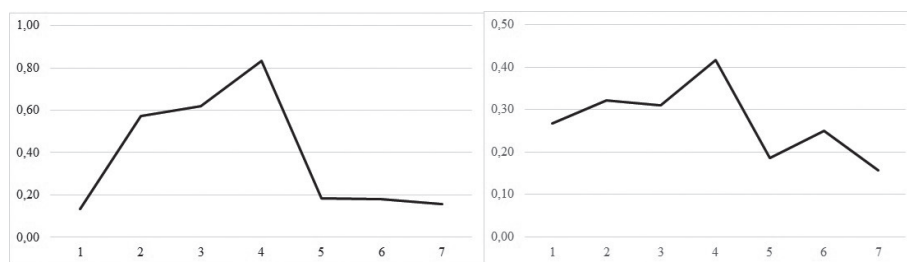


Fig. 8. Position of noduli laterales in *Desertoniscus linearis* (Budde-Lund, 1885): b/c (left) and d/c (right).

Рис. 8. Расположение noduli laterales у *Desertoniscus linearis* (Budde-Lund, 1885): b/c (левый график) и d/c (правый график).

Ethical approval: No ethical issues were raised during our research.

Acknowledgements. We thank Maksim Degtyarev for the help in field sampling, Dr. Natalia Kozlova (Zoological Museum-Institute, Saint-Petersburg, Russia) for lending material. We thank Dr. Raisa M. Khatsaeva for preparing scanning electron microphotographs in the Joint Usage Center “Instrumental Methods in Ecology” at the A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences (both Moscow,

Russia). The field work was funded by the Russian Science Foundation, project #21-14-00227.

References

- Bakhshi Y., Sadeghi S. 2023. First record of the genus *Desertoniscus* Verhoeff, 1930 (Isopoda: Agnaridae) from Iran, with the description of a new species // *Zoology in the Middle East*. Vol.69. P.248–253.

- Borutzky E.V. 1945. [Woodlice fauna of Turkmenia and adjacent areas of Central Asia] // *Uchenye zapiski Moskovskogo gosudarstvennogo universiteta*. Vol.83. P.165–202 [in Russian].
- Borutzky E.V. 1978. [The genus *Desertoniscus* Verhoeff, 1930] // *Sbornik trudov Zoologicheskogo Muzeya MGU*. Moscow. Vol.16. P.3–21 [in Russian].
- Boyko C.B., Bruce N.L., Hadfield K.A., Merrin K.L., Ota Y., Poore G.C.B., Taiti S. (eds.). 2008 onwards. World Marine, Freshwater and Terrestrial Isopod Crustaceans database. *Desertoniscus* Verhoeff, 1930. Accessed through: World Register of Marine Species at: <https://www.marinespecies.org/aphia.php?p=taxdetails&id=248684> on 2023-02-02
- Budde-Lund G. 1885. *Crustacea Isopoda terrestria per familias et genera et species descripta*. Copenhagen. 319 pp.
- Gongalsky K.B. 2017. The first record of the genus *Desertoniscus* Verhoeff, 1930 (Isopoda, Oniscidea, Agnaridae) from Europe, with the description of a new species // *Zootaxa*. Vol.4347. P.583–591.
- Jeppesen P. 2000. Catalogue of terrestrial isopod taxa and type material described by Gustav Budde-Lund (Crustacea: Isopoda) // *Steenstrupia*. Vol.25. P.221–265.
- Kashani G.M. 2014. Description of two new species and redescription of one species of agnarid terrestrial isopods (Oniscidea, Agnaridae) from western Iran // *ZooKeys*. Vol.440. P.45–56.
- Kashani G.M., Allspach A. 2012. Redescription of *Desertoniscus taschkentensis* (Verhoeff, 1930) and description of *Desertoniscus schmal-fussi* n. sp. (Isopoda: Oniscidea) // *Zootaxa*. Vol.3154. P.40–46.
- Schmalfuss H. 2003. World catalog of terrestrial isopods (Isopoda: Oniscidea) // *Stuttgarter Beiträge zur Naturkunde, Serie A*. Vol.654. P.1–341.
- Taiti S., Checcucci I. 2011. Order Isopoda, suborder Oniscidea // *Arthropod Fauna of the United Arab Emirates*. Vol.4. P.33–58.
- Vandel A. 1960. *Isopodes terrestres (Première Partie)*. Faune de France. Vol.64. Paris: Lechevalier. 416 pp.
- Verhoeff K. 1930. Über Isopoden aus Turkestan // *Zoologischer Anzeiger*. Bd.91. S.101–125.

Responsible editor K.G. Mikhailov