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Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

SHORT COMMUNICATION

ADDITION OF FOUR WOODLICE SPECIES (CRUSTACEA: ISOPODA) TO THE CHECKLIST OF IRANIAN ONISCIDEA

Yaser Bakhshi, Saber Sadeghi, Hamid Darvishnia & Meysam Dashan

26 March 2021 | Vol. 13 | No. 3 | Pages: 18015–18019

DOI: 10.11609/jott.6164.13.3.18015-18019



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Addition of four woodlice species (Crustacea: Isopoda) to the checklist of Iranian Oniscidea

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Abstract: Four new records of Oniscidea from Iran including *Armadillidium azerbaijani*, *A. nasatum*, *Platyarthus schoeblii*, and *Armadillo alievi* are provided. Important diagnostic characters of the recorded species are photographed.

Keywords: *Armadillidium*, *Armadillo*, Iran, *Platyarthus*, terrestrial Isopods, woodlice.

Terrestrial isopods comprise more than 3,700 species with worldwide distribution (Sfenthourakis & Taiti 2015). They have occupied various terrestrial habitats from seashores to the extremely dry environments of deserts (Oliver & Meehan 1993).

The environmental heterogeneity of Iran, hosting a variety of habitats from deserts to dense woodlands, provides rich opportunities for woodlice speciation. Hence, many species of terrestrial isopods are estimated to be present in the country. Existence of *Ligia persica* Khalaji-Pirbalouty & Wägele 2010, adapted to life in the intertidal zones of Persian Gulf islands, and *Hemilepistus* spp., living in the dry environments of the eastern deserts of Iran, indicates the remarkable variety of habitats and hence, the potentially high diversity

of terrestrial isopods adapted to these habitats in the country.

In order to protect biodiversity and to recognise threatened species, it is very important to know what species are present in a continent, a country or smaller area, and exactly where they occur.

Several studies that have been published by Schmalzfuss (1986), Kashani et al. (2013, 2016, 2018), Kashani (2014, 2016, 2018), Eshaghi et al. (2015), Kashani & Hamidnia (2016), and Bakhshi et al. (2020) have considerably increased our knowledge of terrestrial isopods of Iran. Kashani (2018) published a comprehensive checklist of all the terrestrial isopods reported from Iran including 45 species belonging to 25 genera and 11 families. Nevertheless, due to the geographic situation of Iran, which is in between the three biogeographic realms (i.e., Palaearctic, Oriental, and Afrotropical faunal regions), it can be expected that there are many new species and new records of these crustaceans are expected to be discovered in the country.

Here we report one genus and four species of the suborder Oniscidea from Iran, all of which are considered

Editor: Anonymity requested.

Date of publication: 26 March 2021 (online & print)

Citation: Bakhshi, Y., S. Sadeghi, H. Darvishnia & M. Dashan (2021). Addition of four woodlice species (Crustacea: Isopoda) to the checklist of Iranian Oniscidea. *Journal of Threatened Taxa* 13(3): 18015–18019. <https://doi.org/10.11609/jott.6164.13.3.18015-18019>

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Funding: None.

Competing interests: The authors declare no competing interests.

Acknowledgments: We cordially thank Dr. Ghasem Mohammadi Kashani (Zanjan University) for sending us some hardly accessible papers on terrestrial isopods. We also thank Hossein Bakhshi and Reza Bakhshi for their help during the field trips. Farzaneh Morovat is also thanked for collecting some of the specimens.

to be new records based on their absence in the checklist of the terrestrial isopods of Iran published by Kashani (2018). Images of the whole body and the body parts with diagnostic importance are provided for each of the newly recorded species, so that they can be used for further studies and comparison with other specimens from different regions. According to these findings, the number of known species of the genera *Armadillidium*, *Armadillo*, and *Platyarthrus* in Iran is increased to three, one, and two, respectively.

Genus *Armadillo* is also recorded in Iran for the first time, although it seems that the genus is distributed in many parts of the country (unpublished data).

MATERIAL AND METHODS

The present study was conducted during 2015–2019 and a number of woodlice were collected from different parts of Iran. Our new records are from north (Guilan and Mazandaran provinces), northwest (Azarbaijan-e Gharbi Province), west (Kermanshah Province), and south (Fars Province) of Iran. The collected specimens were preserved in 70% ethanol and transferred to the Entomology Research Lab in the Biology Department at Shiraz University. Identification of the specimens conducted based on morphological characters. Images of whole body and body parts with diagnostic importance are provided for each species. Digital photographs of the specimens were taken by a Canon 7D digital camera mounted on a Zeiss stemi11 stereomicroscope and on an Olympus CH40 compound microscope, and the microphotographs were taken using a Tescan Vega3 scanning electron microscope. The studied material is deposited in the Zoological Museum, Collection of Biology Department of Shiraz University (ZM-CBSU).

RESULTS

Order Isopoda Latreille, 1817

Suborder Oniscidea Latreille, 1802

A: Family Armadillidiidae Brandt, 1833

Genus *Armadillidium* Brandt, 1833

Armadillidium azerbaijdzhanum Schmalzfuss, 1990

Material examined: ZM-CBSU 1282, 22.iv.2015, 7 males & 7 females, Guilan Province, Talesh, 37.75°N, 48.91°E, 206m, leg. H. Darvishnia. ZM-CBSU 1286, 10.ix.2016, 6 males & 3 females, Azarbaijan-e-Gharbi Province, Urmia, near the Urmia Lake, 37.708°N, 45.216°E, 1,276m, leg. Y. Bakhshi & M. Dashan.

The identification of the collected specimens was performed based on the description and line drawings presented by Schmalzfuss (1990): pages 5–7; Figures 6, 7, 9–11).

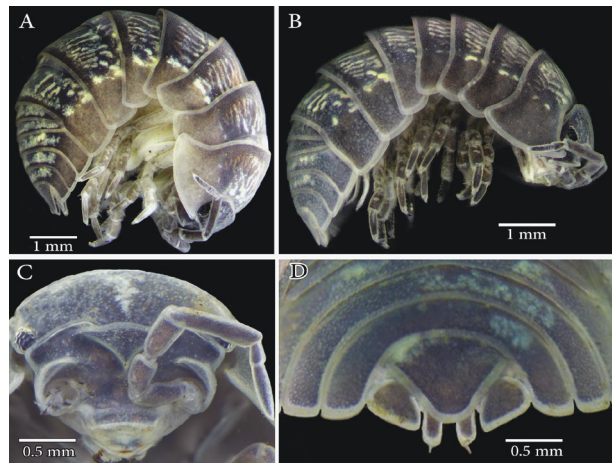


Image 1. *Armadillidium azerbaijdzhanum*: A—female habitus, lateral view | B—male habitus, lateral view | C—head, frontal view | D—telson and uropods, dorsal view | © Y. Bakhshi.

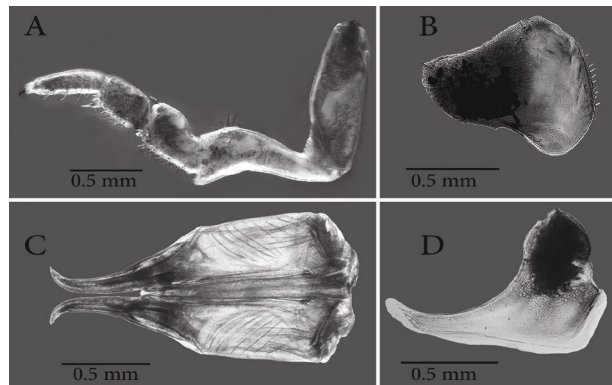


Image 2. *Armadillidium azerbaijdzhanum* male appendages: A—pereopod VII | B—pleopod exopodite I | C—pleopod endopodites I | D—pleopod exopodite II | © Y. Bakhshi.

Distribution: Armenia, Azerbaijan, Georgia, Iran (new record).

Remarks: Males are darker in colour and have fewer bright spots than females, especially on the body sides (Image 1). *Armadillidium azerbaijdzhanum* is very similar to *A. vulgare* but differs from it by its smaller size and different shape of pleopods I and II, as well as the shape and size of the segments of pereopod VII (Image 2). *A. azerbaijdzhanum* has previously been recorded from Caucasus region (Armenia, Azerbaijan, and Georgia) (Schmalzfuss 1990). In contrast to *A. vulgare* which is widely distributed in Iran (Kashani 2014), it seems that the distribution area of *A. azerbaijdzhanum* is restricted to the northern and northwestern parts of the country.

Armadillidium nasatum Budde-Lund, 1885

Material examined: ZM-CBSU 1289, 23.iv.2015, 7 males & 4 females, Qazvin province, Qazvin-Buin Zahra road, 36.166°N, 50.016°E, 1,227 m, leg. H. Darvishnia. ZM-CBSU 1291, 27.viii.2017, 6 males & 5 females, Mazandaran Province, Tonekabon, 36.816°N, 50.858°E, 15m, leg. Y. Bakhshi. ZM-CBSU 1293, 03.vii.2019, 2 males & 1 female, Fars Province, Shiraz, 29.633°N, 52.533°E,

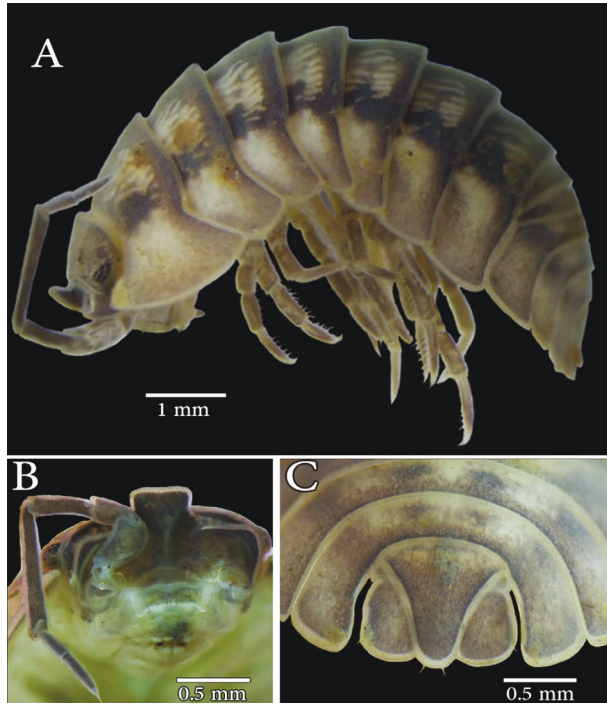


Image 3. *Armadillidium nasatum*: A—male habitus, lateral view | B—head, frontal view | C—telson and uropods, dorsal view | © Y. Bakhshi.

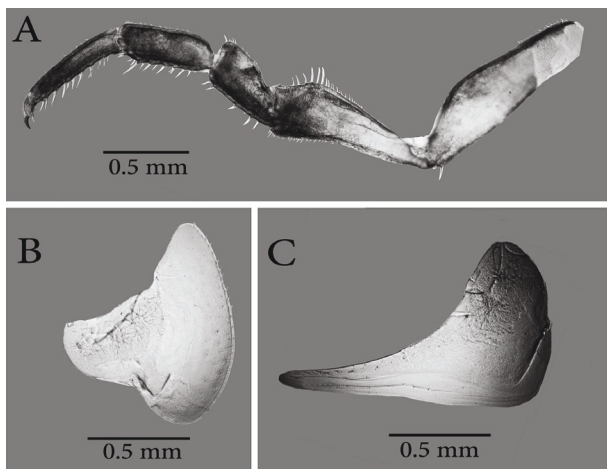


Image 4. *Armadillidium nasatum*: A—pereopod VII | B—pleopod exopodite I | C—pleopod exopodite II | © Y. Bakhshi.

1,577m, leg. F. Morovat.

The identification of the collected specimens is performed based on the description and line drawings presented by Oliver & Meehan (1993: pages 88, 98–99, figures 32 D–F, 38)

Distribution: Northern and western Europe (France, Germany, Italy, the Netherlands, Russia, Spain, United Kingdom), Caucasus Mountains, Japan, United States, Iran (new record).

Remarks: The conspicuous upright scutellum of the head (Image 3) and the structure of pleopod exopodite I and pereopod VII of male (Image 4) make *Armadillidium nasatum* easily distinguishable from all other congeneric species. Previous records of *A. nasatum* were mainly from Europe, however, it has probably been introduced in Asia and many other parts of the world. Even though this species is considered to be cosmopolitan (Schmalzfuss 2006), it had not been recorded in Iran until now. Some specimens were collected from a garden in Shiraz, which may indicate the possibility of the introduction of this species into the country along with the imported plants.

B: Family Platyarthridae Verhoeff, 1949**Genus *Platyarthrus* Brandt, 1833*****Platyarthrus schoeblii*** Budde-Lund, 1885

Material examined: ZM-CBSU 1273, 19.v.2016, 7 males & 9 females, Kermanshah Province, Sarpole Zahab, 34.633°N, 45.966°E, 855m, leg. Y. Bakhshi & H. Darvishnia. SEM photographs for the collected specimens are presented in images 5 and 6.

The identification of the collected specimens was based on the description and drawings presented by Budde-Lund (1885: pages 200–201) and Vandel (1946: pages 218–223, figures 64–66).

Distribution: Macaronesian Islands; Mediterranean region and the Black Sea coasts.

Remarks: The genus *Platyarthrus* is mainly distributed in the Mediterranean region. *P. schoeblii* is the second species of the genus recorded in Iran. Before the present study, only *P. hoffmannseggii* was reported from the country (Bakhshi & Sadeghi 2019). The specimens were collected in some ant nests under stones.

Our specimens belong to the *Platyarthrus-schoeblii*-complex and show some similarities to *P. schoeblii esterelanus* (or *P. esterelanus*) according to the structure of dorsal sculptures (Image 5) and the male pleopod endopodite I (Images 6E,F).

The systematics of the *Platyarthrus-schoeblii*-complex is not clear. Some members of this species-complex are considered either as subspecies by some authors (e.g., *P. s. esterelanus*) or as a distinct species

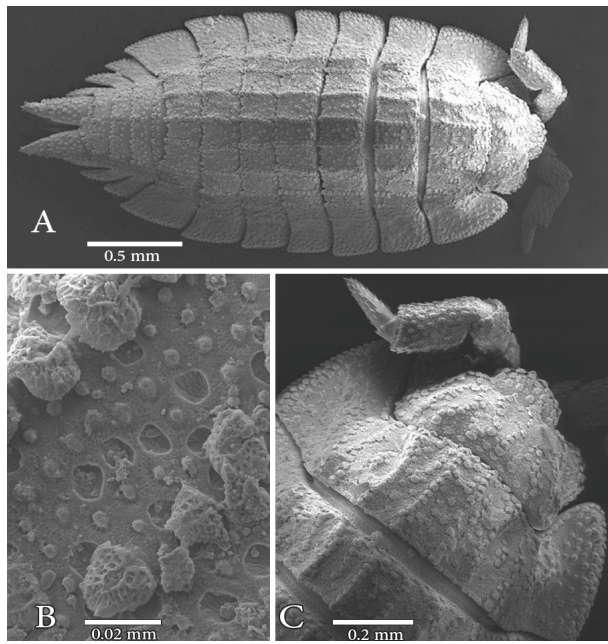


Image 5. *Platyarthrus schoeblii* male: A—whole body, dorsal view | B—dorsal scale setae (enlarged) | C—head and first pereonite, dorsal view | © Y. Bakhshi.

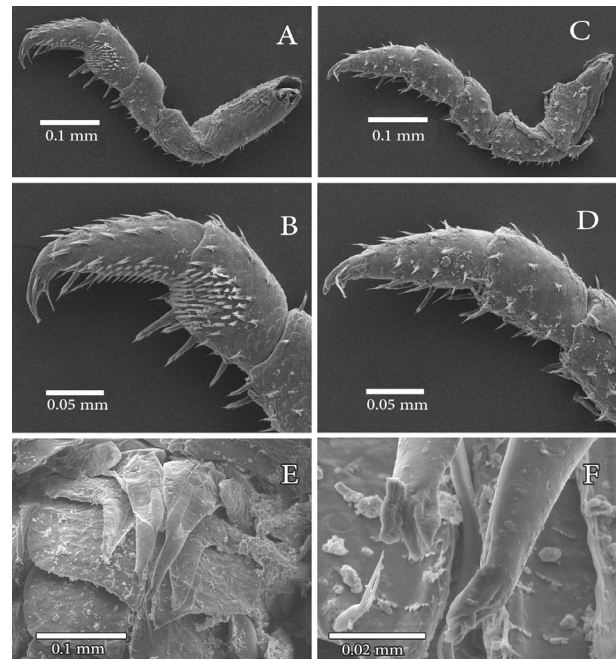


Image 6. *Platyarthrus schoeblii* male appendages: A—pereopod I | B—pereopod I distal segments | C—pereopod VII | D—pereopod VII distal segments | E—pleopods ventral view | F—apex of pleopod endopodites I | © Y. Bakhshi.

by others (e.g., *P. esterelanus*) (Schmalfuss, 2003). Therefore, more morphological and molecular studies are required to clarify the systematic situation of this species complex.

C: Family Armadillidae Verhoeff, 1917

Genus *Armadillo* Latreille, 1802

***Armadillo alievi* Schmalfuss, 1990**

Material examined: ZM-CBSU 1280, 23.iv.2015, 3 males & 2 females, Qazvin Province, Qazvin-Buin Zahra road, 36.166°N, 50.016°E, 1,227m, leg. H. Darvishnia. The identification of the collected specimens was based on the description and drawings presented by Schmalfuss (1990: figures 38–41). Photographs of whole body and male appendages are presented in image 7.

Distribution: Azerbaidjan, northwestern Iran (new record).

Remarks: *Armadillo alievi* has previously been recorded in Azerbaidjan, the type locality of the species. Some other species of the genus *Armadillo* have also been reported from the neighbouring countries of Iran such as Iraq and Turkey (Schmalfuss 2003). Therefore, although *Armadillo alievi* is considered as the first representative of the genus *Armadillo* in Iran, several species of the genus are expected to be found in the country.

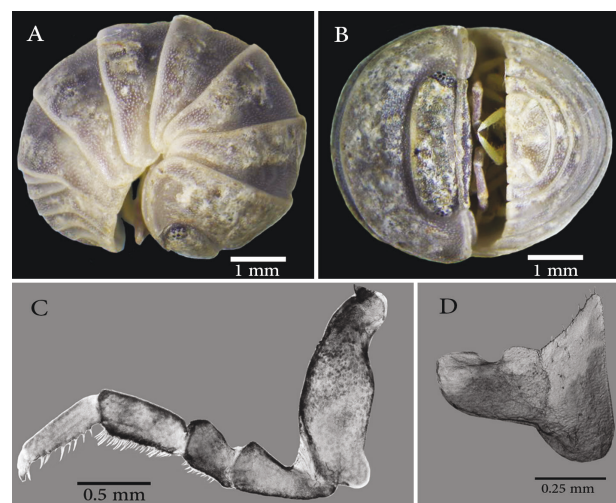


Image 7. *Armadillo alievi* male: A—lateral view of body | B—frontal view of body, showing head, pereonite I, telson and uropods | C—pereopod VII | D—pleopod exopodite I | © Y. Bakhshi.

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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

March 2021 | Vol. 13 | No. 3 | Pages: 17847–18058
Date of Publication: 26 March 2021 (Online & Print)
DOI: 10.11609/jott.2021.13.3.17847-18058

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