

RESEARCH ARTICLE

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New data on the terrestrial isopod fauna of Iran (Isopoda: Oniscidea) with the first description of the male of *Schizidium golovatchi* Schmalfuss, 1988

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Abstract

In the present study, seven species of terrestrial isopods are reported from Iran for the first time. These include *Platyarthrus schoblii* Budde-Lund, 1885; *Trichorhina tomentosa* (Budde-Lund, 1893); *Armadillo alievi* Schmalfuss, 1990; *A. officinalis* Duméril, 1816; *Armadillidium azerbaijani* Schmalfuss, 1990, *A. nasatum* Budde-Lund, 1885 and *Schizidium golovatchi* Schmalfuss, 1988. The male of the latter species is described for the first time and its diagnostic characters are illustrated. Sampling localities for the species are presented on a map.

Key words: *Oniscidea*; *new record*; *terrestrial isopods*; *Iran*.

INTRODUCTION

In the recent years, the number of contributions on the terrestrial isopod fauna of Iran has been dramatically increased. Currently, 46 species are reported from Iran (Kashani 2018, Bakhshi & Sadeghi 2019), but even some higher taxa expected to be present in the country have not been recorded yet.

In the present study, seven species of terrestrial isopods were reported from Iran for the first time: *Platyarthrus schoblii* Budde-Lund, 1885 and *Trichorhina tomentosa* (Budde-Lund, 1893) of the family Platyarthridae; *Armadillo alievi* Schmalfuss, 1990 and *A. officinalis* Duméril, 1816 members of the new recorded family Armadillidae; *Armadillidium azerbaijani* Schmalfuss, 1990, *A. nasatum* Budde-Lund, 1885 and *Schizidium golovatchi* Schmalfuss, 1988 of the family Armadillidiidae. The aim of the present study is therefore, to introduce seven more species to the terrestrial isopod fauna of Iran and illustrate and describe the male characteristics of *Schizidium golovatchi* for the first time.

MATERIAL AND METHODS

The specimens of the present study were collected in a range of localities in Iran (Fig 1). The specimens were collected by hand and preserved in 96% ethanol. The species were identified based on comparison with the original descriptions and confirmed by Dr. H. Schmalfuss (Stuttgart) or Dr. S. Taiti (Florence). Detailed synonymies and distributional data are provided in Schmalfuss (2003). The specimens are deposited in the Iranian Research Institute of Plant Protection (IRIPP). Some more specimens are kept in the personal collection of the author (PCGMK).

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FIGURE 1. Map of Iran; indicating the sampling localities of *Platyarthrus schoblii* (▲), *Trichorhina tomentosa* (▼), *Armadillo alievi* (■), *A. officinalis* (*), *Armadillidium azerbaijani* (●), *A. nasatum* (◻) and *Schizidium golovatchi* (•). Ar: Ardabil; E. A: Eastern Azarbaijan; Gi: Guilan; Hm: Hamedan; K.B: Kohgilouyeh-Boyerahmad; Ke: Kermanshah; Kh: Khuzestan; Ku: Kurdistan; Mz: Mazandaran; Qm: Qom; Qz: Qazvin; W.A: Western Azarbaijan; Zn: Zanzan.

RESULTS

Taxonomy

Family Platyarthridae Budde-Lund, 1913

Platyarthrus schoblii Budde-Lund, 1885

Material examined: *Qom*, Qanavat, 5.4.2012, leg. G.M. Kashani, one female (IRIPP Iso-1062); same data as before, two females (PCGMK 1590); *Qazvin*, 10 Km S Abgarm, 35° 42' N, 49° 14' E, elev. 1660 m, 12.9.2013, leg. G.M. Kashani & B. Eshaghi, det. S. Taiti, one female (IRIPP Iso-1063); same data as before, four females (PCGMK 1709); Nikouiyeh, Charandagh village, 36° 07' N, 49° 28' E, elev. 1660 m, 4.6.2014, leg. G.M. Kashani & B. Eshaghi, two females (IRIPP Iso-1064); same data as before, one male, two females (PCGMK 1765); *Zanzan*, 3 Km E Ab-bar, 07.03.2014, one female (PCGMK 1726); Mazandaran, 60 Km S Amol, 36° 03' N, 52° 15' E, elev. 1000 m, 11.9.2014, leg. G.M. Kashani, one female (PCGMK 1850); 4 Km N Sari, 36° 41' N, 53° 03' E, elev. -30 m, 31.7.2014, leg. G.M. Kashani, two females (IRIPP Iso-1065); same data as before, two females (PCGMK 1991); *Guilan*, Lahijan, 37° 12' N, 50° 01' E, 18.8.2014, leg. G.M. Kashani & S. Hamidnia, two females (IRIPP Iso-1066); same data as before, five females (PCGMK 1833); Anzali Port, 22.5.2015, leg. A. Abedini, two males, thirty females (PCGMK 2081); *Khuzestan*, Baghmalek, 31° 31' N, 49° 52' E, elev. 650m, 20.6.2016, leg. G.M.

Kashani, four females (PCGMK 2352); **Eastern Azarbaijan**, Ahar, Naghdooz village, 38° 23' N, 49° 21' E, elev. 1040m, 27.6.2016, leg. G.M. Kashani, one female (PCGMK 2416); Ahar, 38° 27' N, 47° 05' E, elev. 1300m, 27.6.2016, leg. G.M. Kashani, one female (PCGMK 2420); 4 Km E Ahar, 38° 27' N, 47° 08' E, elev. 1300m, 27.7.2019, leg. G.M. Kashani, G. Morovati, seven females (PCGMK 2830);

Comments: Recently, Bakhshi & Sadeghi (2019) identified *Platyarthrus hoffmannseggii* Brandt, 1833 in southern Iran. *Platyarthrus schoblii* is the second species of the genus *Platyarthrus* reported from Iran. This species has been possibly introduced to Iran by human activities (Dr. Stefano Taiti, personal communications). This myrmecophilous species was found inside of the ant nests or in the soil, often in the gardens and parks. Due to its small size and its lifestyle ("creeper", according to the ecomorphological classification proposed by Schmalfuss (1984)), much more distribution can be expected for the species. Identification of the species was made based on the illustrations and description presented in Vandel (1946: p.218; Figs. 64–66) and confirmed by Dr. Taiti.

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

***Trichorhina tomentosa* (Budde-Lund, 1893)**

Alloniscus tomentosus Budde-Lund, 1893

Material examined: **Zanjan**, Mahneshan, 22.5.2011, leg. R. Sayadi, det. S. Taiti, five females (IRIPP Iso-1067); same data as before, twelve females (PCGMK 1564); same data as before, 29.4.2012, twenty females (PCGMK 1537).

Comments: This species was found in huge numbers only in one locality in a farm. All evaluated specimens were female, almost all bearing marsupium. A detailed description and illustrations of the species were presented in Schmidt (2003: p.63; Figs. 87–93). The identification of the species was made by Dr. Taiti.

Distribution: Tropical America; introduced to greenhouses worldwide.

Family Armadillidae Budde-Lund, 1899

Armadillo alievi Schmalfuss, 1990

Material examined: **Western Azarbaijan**, Poldasht, 39° 18' N, 45° 04' E, 8.11.2004, leg. A. Kazemi, det. H. Schmalfuss, one female (IRIPP Iso-1068); same data as before, one male, three females (PCGMK 1144); Poldasht to Makoo, Yulagoldi, 39° 17' N, 44° 42' E, 19.6.2008, leg. G.M. Kashani, one female (PCGMK 1248); **Eastern Azarbaijan**; Tabriz to Marand, Soofian, 38° 15' N, 46° 01' E, 19.6.2008, leg. G.M. Kashani, det. H. Schmalfuss, one male (PCGMK 1245).

Comments: This species was found in Northwestern Iran (Fig. 1) which is in continuity with the reported distribution of the species in Azerbaijan (Schmalfuss 1990). The identification of the species was made according to the original description and illustrations presented by Schmalfuss (1990: p.8, Figs. 12–15; 1996: p.20, Figs. 38–41) and confirmed by him.

Distribution: Azerbaijan; NW Iran.

Armadillo officinalis Duméril, 1816

Figure 2F

Material examined: **Hamadan**, Nahavand, Qaleh-Qobad village, 34° 06' N, 48° 25' E, 11.09.2016, leg. G.M. Kashani, A. Abedini, M. Dadashi, twelve males and nine females (PCGMK 2557); **Kurdistan**, Bijar, 35° 50' N, 47° 36' E, 14.09.2016, leg. G.M. Kashani, A. Abedini, M. Dadashi, three males and eight females (PCGMK 2596); Sanandaj, leg. A. Abedini, one male (PCGMK 2631).

Comments: This species was found in western Iran. Schmalfuss (1996, 2003) questioned the presence of this species in Mesopotamia (Iraq) reported by Omer-Cooper (1923). The occurrence of *A. officinalis* in western Iran would indicate the accuracy of Omer-Cooper's recognition. The identification of the species was made according to the description and illustrations presented by Schmalfuss (1996: p.4, Figs. 1–22).

Distribution: Mediterranean and western Black Sea coasts; Iraq; W Iran.

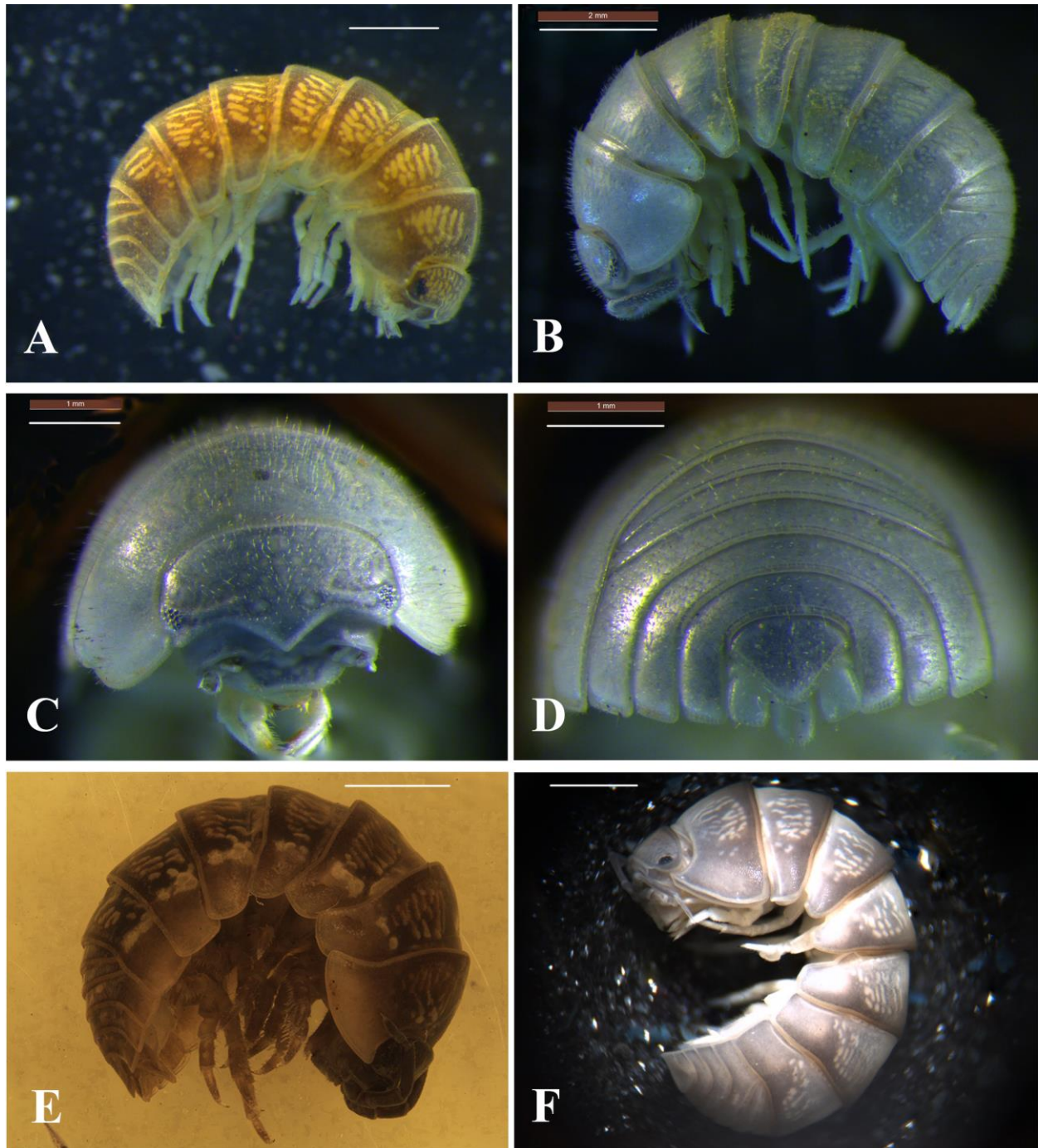


FIGURE 2. A-D, *Schizidium golovatchi*; E, *Armadillidium azerbaijanum*; F, *Armadillo officinalis*. A, B, habitus, lateral view; C, head, dorsal view; D, pleon, dorsal view; E, habitus, lateral view; F, habitus, dorsal view. Scale = A-B, E-F, 2 mm; C-D, 1 mm.



FIGURE 3. *Schizidium golovatchi*, male. A, pereopod I; B, pereopod VII, rostral view; C, pereopod VII ischium, caudal view; D, pleopod endopodite I; E, pleopod exopodite I; F, pleopod exopodite IV; G, pleopod exopodite V. Scales: A-C, 0.2 mm; D-G, 0.1 mm.

Family Armadillidiidae Brandt, 1833

***Armadillidium azerbaijani* Schmalfuss, 1990**

Figure 2E

Material examined: *Ardabil*, Meshkin-Shahr to Pars-Abad, Ziveh, 39° 09' N, 47° 37' E, elev. 480 m, 17.6.2008, leg. G. M. Kashani, det. H. Schmalfuss, two males, two females (IRIPP Iso-1069); same data as before, eight males, thirteen females (PCGMK 1233); Neer, Koorabbasloo village, 37° 57' N, 48° 03' E, elev. 1740 m, 17.4.2019, leg. F. Heydarnezhad, one male, two females (PCGMK 2729); 30 Km S Germe, 39° 00' N, 47° 54' E, elev. 920 m, 17.4.2019, leg. F. Heydarnezhad, one male, one female (PCGMK 2751); Khalkhal, Hashtjin, 37° 15' N, 48° 25' E, elev. 740 m, 1.4.2019, leg. F. Heydarnezhad,

one male, one female (PCGMK 2763); **Eastern Azarbaijan**, Asheghloo, Tatar-e-Olia village, 39° 04' N, 46° 47' E, elev. 300 m, 28.7.2016, leg. G.M. Kashani, A. Abedini, M. Dadashi, four males, eight females (PCGMK 2450); Asheghloo, to Siahroud, 38° 54' N, 46° 36' E, elev. 360 m, 28.7.2016, leg. G.M. Kashani, A. Abedini, M. Dadashi, two males, two females (PCGMK 2453).

Comments: This species is distributed in Northwestern Iran. The identification of the species was made based on the comparison with the original description and illustrations presented by Schmalfuss (1990: p.5, Figs. 6–7, 9–11) and confirmed by him.

Distribution: Eastern Caucasus region; NW Iran.

***Armadillidium nasatum* Budde-Lund, 1885**

Material examined. **Zanjan**, Tarom, 37° 04' N, 48° 50' E, elev. 500 m, 7.4.2016, leg. G. M. Kashani, one male (PCGMK 2263); Qeydar, 20.4.2017, leg. G. L. Karami, two males, one female (PCGMK 2492); **Kohgiluyeh-Boyerahmad**, Yasouj, 30°40'N, 51°34.8'E, elev. 2000m, 20.7.2015, leg. G. M. Kashani, one male, three females (PCGMK 2212); **Guilan**, Amlash, Rahimabad, 37°02'N, 50°19'E, elev. 20 m, 14.09.2014, leg. G. M. Kashani, two males, one female (PCGMK 1900); Rasht, 01.07.2017, leg. M. Pourlatifi, two males, one female (PCGMK 2627).

Comments: Schmalfuss (2003) considered the autochthonous distribution of *A. nasatum* in Western Europe which introduced to many other parts of the world by human activities. Scattered distribution of this species in Iran (Fig. 1) indicates the potential existence of the species in a broad range. Identification of the species was made according to Vandel (1962: p.787, Figs. 380) and confirmed by Dr. Schmalfuss.

Distribution: Western Europe, introduced to many other countries.

***Schizidium golovatchi* Schmalfuss, 1988**

Figures 2A-D

Material examined: **Kurdistan**, Baneh, 36°08'N, 54°40'E, alt. 1435, 2.10.2008, leg. G. M. Kashani, four females (PCGMK 1354); **Western Azarbaijan**, Sardasht to Mirabad, 36°23'N, 45°23'E, elev. 1390, 2.10.2008, leg. G. M. Kashani, one male and eight females (PCGMK 1358); **Eastern Azarbaijan**, Aghkand, Karow village, 37°24'N, 48°08'E, 25.7.2016, leg. G. M. Kashani, seven females (PCGMK 2388); same data as before, 19. 4.2017, leg. A. Abedini, six males, seven males (PCGMK 2619); 25 Km S Marand, 38°18'N, 45°56'E, 25.7.2019, leg. G. M. Kashani, G. Morovati, one female (PCGMK 2812); 45 Km S Miyaneh, 37°20'N, 47°46'E, 19.4.2017, leg. A. Abedini, three males, seven females (PCGMK 2620); **Qazvin**, Takestan, Changooreh village, 36°13'N, 49°28'E, 4.6.2014, leg. B. Eshaghi, one female (PCGMK 1766); Takestan, Nikouiyeh, 36°16'N, 49°31'E, 4.6.2014, leg. B. Eshaghi, one female (PCGMK 1773); **Kermanshah**, Tazeh-abad to Javanroud, 34°44'N, 46°15'E, elev. 1330m, 13.8.2018, leg. G. M. Kashani, one female (PCGMK 2687); Paveh, Ghouriqaleh village, 34°53'N, 46°30'E, elev. 1650m, 14.8.2018, leg. G. M. Kashani, one female (PCGMK 2693); **Zanjan**, Mahneshan, Behestan village, 36°39'N, 47°44'E, elev. 1290m, 10.3.2016, leg. G. M. Kashani, three females (PCGMK 2255); Nikpey to Mahneshan, 36°43'N, 47°50'E, elev. 1980m, 5.5.2016, leg. G. M. Kashani, one male, one female (PCGMK 2274); Armaghankhaneh, Mari village, 36°59'N, 48°28'E, 11.5.2014, leg. G. M. Kashani, nineteen males, nine females (PCGMK 1758); Zanjan, Gavazang district, 36°44'N, 48°31'E, elev. 2130m, 15.4.2016, leg. A. Abedini, two males, one female (PCGMK 2250); 17 Km S Chavarzagh, 7.3.2014, leg. G. M. Kashani, one male, three females (PCGMK 1721).

Description of male: Maximum length: 10 mm.

Coloration: pale to dark brown with the usual pale muscle spots (Fig. 2A). Body convex, able to roll up into a ball. Tergites with long upright setation. Head with interrupted frontal ridge and a further parallel interrupted ridge starting from behind eyes (Fig. 2C). Schisma with inner lobe somewhat shorter than outer one (Fig. 2B). Telson short, triangular with broadly rounded apex and straight sides, not reaching body outline formed by pleonites and uropod exopodites (Fig. 2D).

Pereopods I-VII merus and carpus with a brush of pointed setae on ventral margin (Fig. 3A, B). Pereopod VII basipodite not laterally enlarged, ischium distally with bulbous ridge on frontal side, with concave

ventral margin equipped with pointed setae; merus and carpus short and stout, with a sparse brush of setae on ventral margin (Fig. 3B, C).

Pleopod I endopodite (Fig. 3D) with distal part bent outward and pointed apex bearing a row of fine setae on inner margin; exopodite (Fig. 3E) with well-developed rounded hind lobe equipped with a row of pointed setae. Pleopods IV-V exopodites as in Figs 3 F-G.

Comments: Schmalfuss (1988) identified *Schizidium golovatchi* based on two female specimens from southern Armenia. Though the male features are usually exploited in the identification of terrestrial isopods, the presence of an interrupted ridge starting from behind the eyes was considered as distinguishing character of the species (Schmalfuss 1988). Here, the male characteristics were presented for the first time based on the specimens from Iran. Along with the features proposed by Schmalfuss (1988), *Schizidium golovatchi* is easily distinguished by the male pereopod VII ischium with a distinct projection in distal part and deeply convex ventral margin. This species has a broad distribution in west and northwestern Iran (Fig. 1), where it is a common species. The identification of the species was verified by Dr. Schmalfuss, *in situ*.

Distribution: S Armenia and W Iran.

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