

Terrestrial isopods of the genus *Protracheoniscus* (Isopoda: Oniscidea) in northern Iran with a description of two new species

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Abstract: In the present study, terrestrial isopods of the genus *Protracheoniscus* are investigated in northern Iran. *Protracheoniscus ehsani* Kashani, 2014 and *P. major* (Dollfus, 1903) are found for the first time in the region. Two other species, *P. kiabii* Kashani sp. nov. and *P. golestanicus* sp. nov., are described as new. The diagnostic characters of the new species are illustrated and their distribution is presented on a map.

Key words: Oniscidea, *Protracheoniscus*, new species, Iran

1. Introduction

The genus *Protracheoniscus* Verhoeff, 1917 is distributed throughout the Palearctic and Oriental regions. This genus has the highest species number in the family Agnaridae Schmidt, 2003 including 62 valid species, half of which exist in Central Asia (according to Schmalfuss, 2003 and recent data). Its species richness decreases to the west (Borutzky, 1975), whereas the low number of species identified in the eastern half of its geographical range might be the result of scarcity of investigations in these regions.

Borutzky (1945, 1957, 1959, 1961, 1975, 1976) was the most important contributor to the taxonomy of the genus in Central Asia. He deposited the type material of described species in the Zoological Museum of Moscow State University (ZMMU) (Borutzky, 1972). For safe identification of the species collected in the present study, the type specimens of Borutzky's species in ZMMU were reexamined. Original descriptions and illustrations were consulted for those species for which the type specimens have been presumably lost.

The presence of the genus *Protracheoniscus* in Iran was reported by Schmalfuss (1986), who described a female specimen collected in the north of the country as *Protracheoniscus* sp. In recent years, five species have been identified in Iran: *P. gacalicus* Kashani et al., 2013; *P. major* (Dollfus, 1903); *P. ehsani* Kashani, 2014; *P. darevskii* Borutzky, 1975; and *P. sarii* Eshaghi et al., 2015 (Kashani et al., 2013; Kashani, 2014a, 2014b; Eshaghi et al., 2015).

In the present study, three provinces in northern Iran, Gilan, Mazandaran, and Golestan, were investigated. In

total, four species belonging to the genus were identified, two of which are new to the science and two of which are new reports for the region. The aim of the present study is to report, describe, and illustrate the *Protracheoniscus* species found in northern Iran.

2. Materials and methods

Three provinces in northern Iran were investigated during June–September 2014 and June 2015. The material examined was collected by the authors, primarily by hand, in a range of localities (Figure 1) and preserved in 96% ethanol. The isopods were dissected and permanent microscopic slides of body parts were prepared using Euparal. Drawings were made using a drawing tube fitted on a SaIran ZSM-100 dissecting stereomicroscope and a Nikon Y-IDT compound microscope. Type material of the newly described species and the specimens of other collected species were deposited in the Zoological Museum of the University of Tehran (ZUTC), the Iranian Research Institute of Plant Protection (IRIPP), and the personal collection of the first author (PCGMK).

3. Results and discussion

Order Isopoda Latreille, 1817

Suborder Oniscidea Latreille, 1802

Family Agnaridae Schmidt, 2003

Protracheoniscus major (Dollfus, 1903)

Material examined. Golestan, 60 km S Azadshahr, Khosh-Yeylagh village, 36°50.9'N, 55°20.8'E, alt. 1700 m, 2 September 2014, leg. G. M. Kashani, one male and

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one female (PCGMK 2025); Mraveh-Tappeh, 37°54.1'N, 55°56.8'E, alt. 190 m, 28 July 2014, leg. G. M. Kashani, one male (PCGMK 2039); **Mazandaran**, 4 km to Kojoor, 36°23.8'N, 51°45.6'E, alt. 1470 m, 4 September 2014, leg. G. M. Kashani, five males and six females (PCGMK 1949); Firoozkooch to Polsefid, 28 km to Polsefid, 35°53.9'N, 52°59.0'E, alt. 1500 m, 8 June 2015, leg. G. M. Kashani, one male and five females (PCGMK 2086).

Remarks. Published (Kashani, 2014a; Eshaghi et al., 2015) and unpublished data confirm the wide distribution of *P. major* in Iran. However, this is the first time this species is reported from northern Iran. This species was identified based on the illustrations presented by Gruner (1966a: pp. 284–285; Figs. 221A–H; 1966b: p. 313; Figs. 1–2).

Distribution. From middle Europe to Central Asia; Iran.

Protracheoniscus ehsani Kashani, 2014

Material examined. Gilan, Nasir-Mahalleh, Lapavanadn village, 37°04.7'N, 49°17.8'E, alt. 160 m, 15 August 2014, leg. G. M. Kashani & S. Hamidnia, one female (PCGMK 1809).

Remarks. Recently, Kashani (2014) described *P. ehsani* from Iran and presented the geographical distribution of the species on a map. In the present study, this species was

found in only one locality, representing the northernmost borders for the species' range (Figure 1).

Distribution. Central and northern Iran.

Protracheoniscus kiabii Kashani, **sp. nov.**

Material examined. Holotype: male, 8 mm, **Golestan**, 10 km N Gomishan, 36°22.5'N, 53°38.8'E, alt. 30 m, 5 September 2014, **Mazandaran**, 55 km S Amol, 36°08.1'N, 52°20.3'E, alt. 640 m, 11 September 2014, leg. G.M. Kashani (ZUTC 5331).

Paratypes: **Mazandaran**, 55 km S Amol, 36°08.1'N, 52°20.3'E, alt. 640 m, 11 September 2014, leg. G.M. Kashani, two females (ZUTC 5332); 55 km S Amol, 36°08.1'N, 52°20.3'E, alt. 640 m, 11 September 2014, leg. G.M. Kashani, one male and one female (IRIPP Iso-1056); 55 km S Amol, 36°08.1'N, 52°20.3'E, alt. 640 m, 11 September 2014, leg. G.M. Kashani, two males and two females (PCGMK 1854); 60 km S Amol, 36°03.5'N, 52°15.5'E, alt. 1000 m, 11 September 2014, leg. G. M. Kashani, two males and five females (ZUTC 5333); 60 km S Amol, 36°03.5'N, 52°15.5'E, alt. 1000 m, 11 September 2014, leg. G. M. Kashani, two males and three females (IRIPP Iso-1057); 60 km S Amol, 36°03.5'N, 52°15.5'E, alt. 1000 m, 11 September 2014, leg. G. M. Kashani, six males, twenty females and ten juv. (PCGMK 1851); 3 km S Farim, 36°09.7'N, 53°13.2'E, alt. 800 m, 30 July 2014, leg. G. M. Kashani, three males, eight



Figure 1. Map of Iran with the location of the provinces of Gilan, Mazandaran, and Golestan highlighted; showing the sampling localities of *Protracheoniscus kiabii* **sp. nov.** (in black), *P. golestanicus* **sp. nov.** (in red), *P. ehsani* (in blue), and *P. major* (in green).

females, two with marsupium, and two subadults (PCGMK 1980); Farim to Sari, 36°11.8'N, 53°14.0'E, alt. 1080 m, 30 July 2014, leg. G. M. Kashani, two males and four females (PCGMK 1984); Neka, Homal village, 36°37.9'N, 53°16.7'E, alt. 35 m, 31 July 2014, leg. G. M. Kashani, two males and two females (PCGMK 1992); 3 km E Behshahr, 37°09.6'N, 54°01.7'E, alt. -35 m, 5 September 2014, leg. G. M. Kashani, one male, two females and one subadult male (PCGMK 2057); Golestan, 8 km to Azadshahr, 37°03.1'N, 55°06.9'E, alt. 120 m, 2 September 2014, leg. G. M. Kashani, two males and one female (PCGMK 2020); 2 km to Maraveh-Tappeh, Gharghecha village, 37°52.8'N, 55°57.7'E, alt. 240 m, 3 September 2014, leg. G. M. Kashani, one male (PCGMK 2035).

Diagnosis. Head with very small lateral lobes; male pereopod VII ischium with a dense setose area on dorsal margin, merus with a short crest on dorsal margin; pleopod-endopodite I straight, with a rectangular lobe at apex.

Description. Maximum length of both males and females 8 mm. Color pale to dark brown with the usual pale muscle spots. Body outline as in Figure 2A. Pereon smooth. Pereon tergite I with rounded posterolateral margin. Noduli laterales on pereonites I to IV distinctly more distant from the lateral margins than those on pereonites V to VII (Figure 2A). Cephalon with very small lateral lobes not protruding compared with rounded frons (Figure 2B). Antenna long, surpassing the posterior

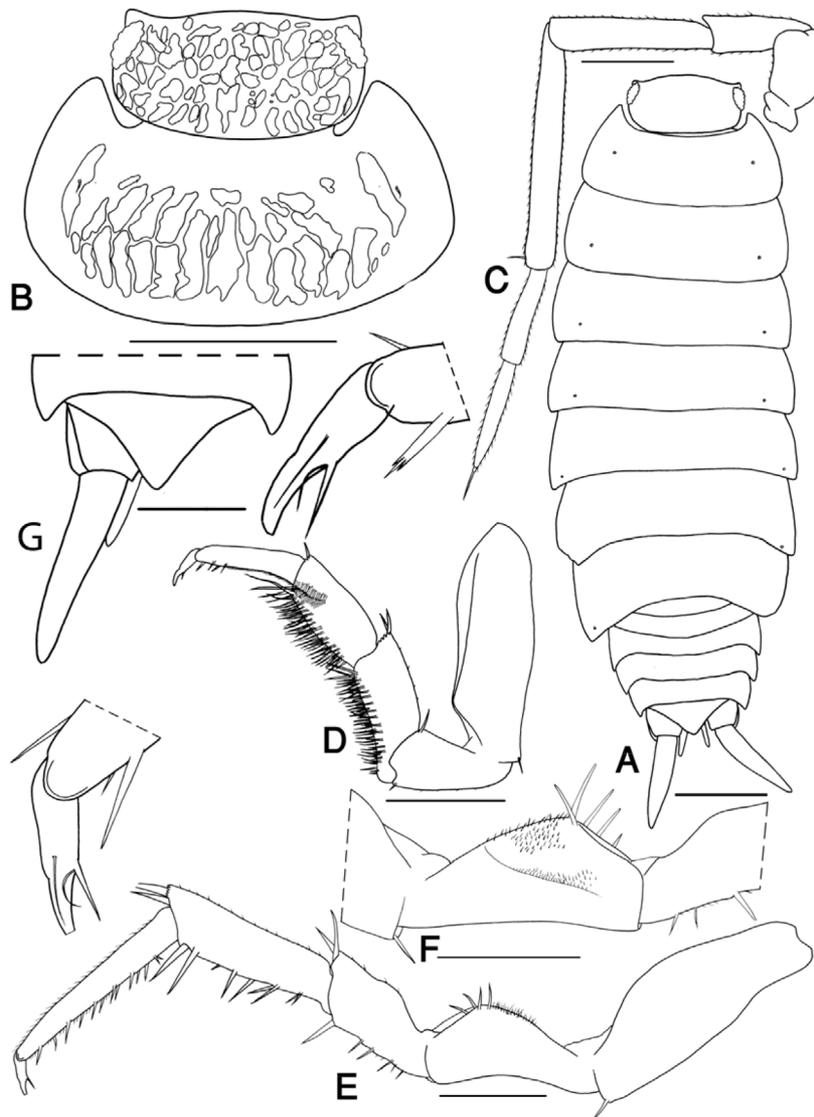


Figure 2. *Protracheoniscus kiabii* sp. nov., male, holotype. A, Body outline indicating the position of noduli laterales; B, cephalon and first pereonite; C, antenna; D, pereopod I; E, pereopod VII; F, pereopod VII ischium, rostral view; G, telson and uropods. Scale = A and B, 1 mm; C-G, 0.5 mm.

margin of pereon tergite III; fifth article of peduncle slightly longer than flagellum, with length:width ratio 8:1; flagellum with two articles, proximal article as long as the distal one (Figure 2C).

Pereopod I ischium triangular, carpus with depression on rostral surface equipped with slender scales; propodus narrow and long, proximal part of sternal margin concave with dense small scales, distal part bearing strong setae; pereopods I–VII dactylus with one dactylar and one unguis seta (Figures 2D–2F).

Pleon narrower than pereon. Telson triangular in distal part, with acute apex, slightly surpassing uropod protopodites (Figure 2G). Uropod exopodites long, almost two times as long as telson (Figure 2G). Pleopod exopodites I–V with monospiracular covered lungs.

Male: Pereopods I–III merus and carpus with brushes of setae (Figure 2D). Pereopod VII ischium with concave ventral margin and with a setose area on dorsal and rostral surface, merus with a short crest on dorsal margin, carpus with strong spine setae on ventral and distal margins

(Figures 2E and 2F). Pleopod endopodite I straight with a rectangular process and few small setae at apex (Figure 3A); exopodite I hind lobe with truncate long distal margin bearing few short setae; outer margin equipped with few longer setae (Figure 3B). Pleopod endopodite II longer than exopodite; exopodite triangular, outer margin concave equipped with a line of strong setae (Figure 3C). Pleopod exopodites III–V as in Figures 3D–3F.

Etymology. The name of the species is after Dr Bahram Kiabi, professor of ecology, Shahid Beheshti University, Tehran.

Remarks. *Protracheoniscus kiabii* Kashani sp. nov. is characterized by short lateral lobes of the head; a setose area on dorsal margin and a short crest on dorsal margin of male pereopod VII ischium and merus, respectively; and a rectangular lobe at apical part of male pleopod endopodite I. This species is similar to *P. ehsani* Kashani, 2014 but differs from it in terms of the shape of pleopod endopodite I and in lacking the conspicuous ridge on the dorsal margin of pereopod VII carpus.

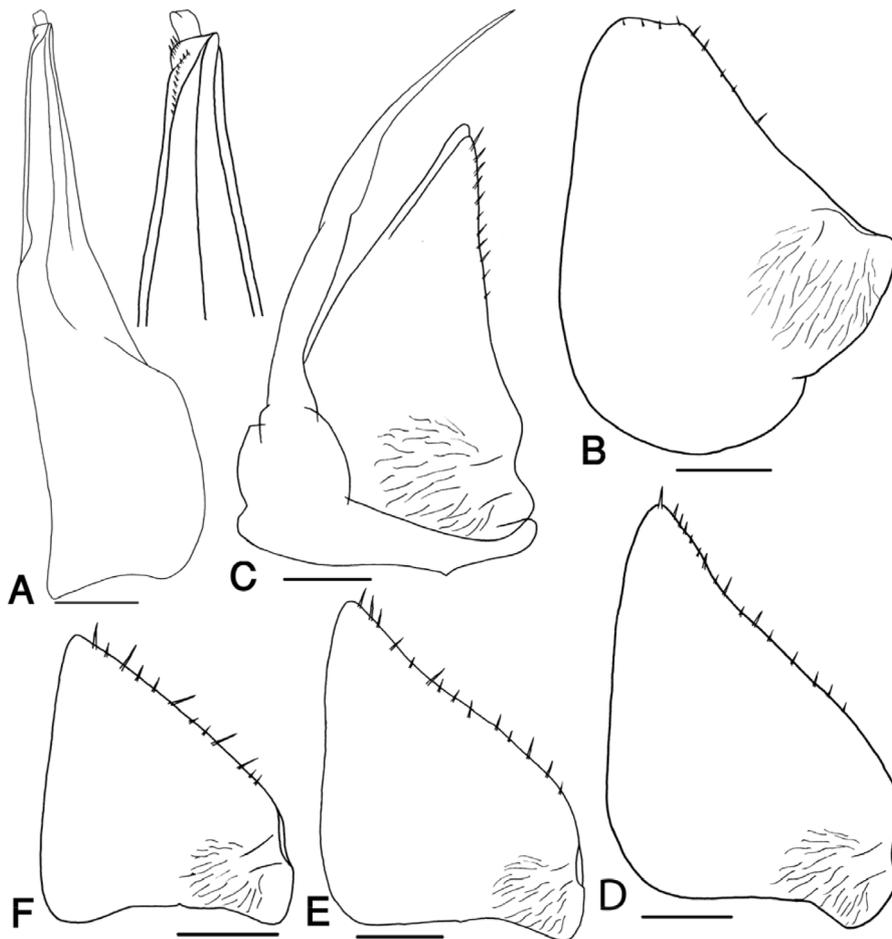


Figure 3. *Protracheoniscus kiabii* sp. nov., male, holotype. A, Pleopod endopodite I; B, pleopod exopodite I; C, pleopod II; D, pleopod exopodite III; E, pleopod exopodite IV; F, pleopod exopodite V. Scales = 0.2 mm.

Distribution. Northern Iran.

Protracheoniscus golestanicus sp. nov.

Material examined. Holotype: male, 6 mm, Golestan, 10 km NE Bandar Gaz, 36°50.1'N, 54°03.3'E, alt. -30 m, 5 September 2014, leg. G.M. Kashani (ZUTC 5334).

Paratypes: Golestan, same data as holotype, one female with marsupium (ZUTC 5335); same data as holotype, one male (IRIPP Iso-1058); same data as holotype, four males and one female (PCGMK 2055); 9 km N Aq-Qala, 37°06.5'N, 54°27.8'E, alt. -10 m, 4 September 2014, leg. G. M. Kashani, one male and four females, two with marsupium, and seven subadults (PCGMK 2046); 7 km E Maraveh Tappeh, 37°54.6'N, 56°02.1'E, alt. 220 m, 3 September 2014, leg. G. M. Kashani, one male and one female with marsupium (ZUTC 5336); 7 km E Maraveh

Tappeh, 37°54.6'N, 56°02.1'E, alt. 220 m, 3 September 2014, leg. G. M. Kashani, two males and two females with marsupium (PCGMK 2037).

Diagnosis. Head with very small lateral and median lobes; male pleopod I endopodite straight, with a finger-like lobe at apex; exopodite with obliquely truncate sinuous distal margin.

Description. Maximum length male 6.5, female 8.5 mm. Color pale to dark brown with the usual pale muscle spots. Body outline as in Figure 4A. Pereon smooth. Pereon tergite I with rounded posterolateral margin. Noduli laterales on pereonites I to IV distinctly more distant from the lateral margins than those on pereonites V to VII (Figure 4A). Cephalon with very small lateral lobes not protruding compared with broadly rounded

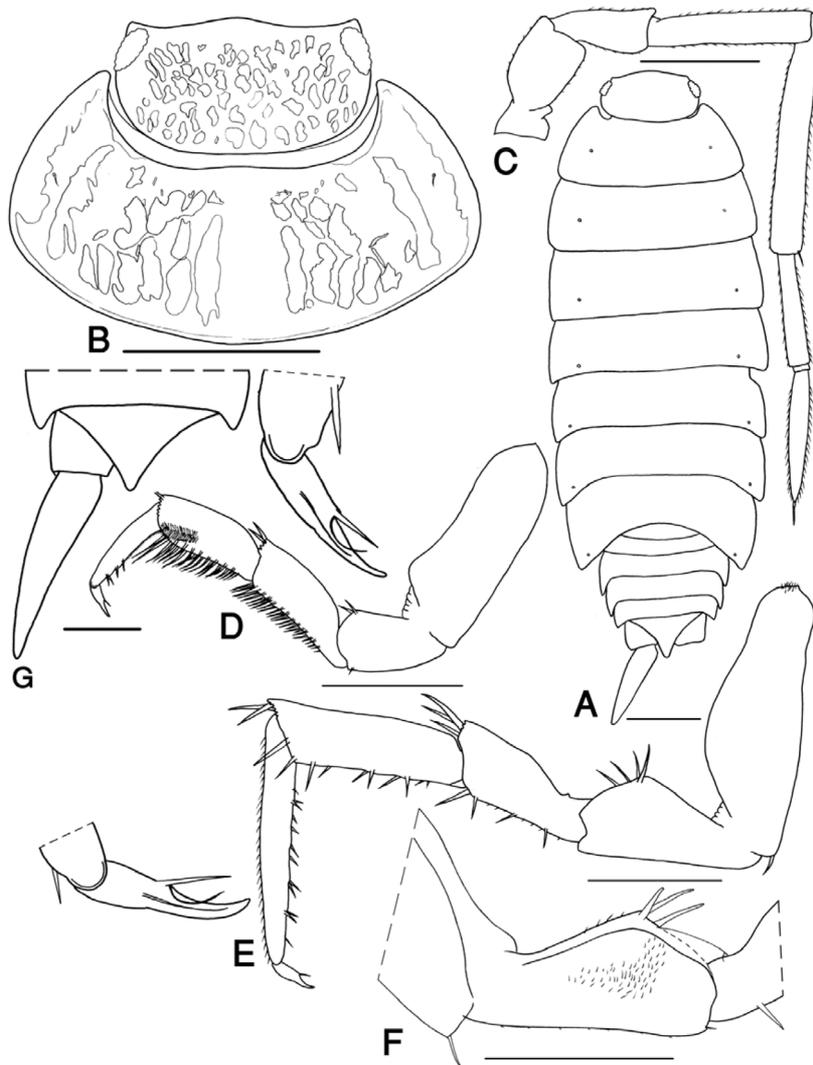


Figure 4. *Protracheoniscus golestanicus* sp. nov., male, holotype. A, Body outline indicating the position of noduli laterales; B, cephalon and first pereonite; C, antenna; D, pereopod I; E, pereopod VII; F, pereopod VII ischium, rostral view; G, telson and uropods. Scale = A and B, 1 mm; C-G, 0.5 mm.

frons (Figure 4B). Antenna long, surpassing the posterior margin of pereon tergite II; fifth article of peduncle as long as flagellum, with length:width ratio 8:1; flagellum with two articles, proximal article as long as the distal one (Figure 4C).

Pereopod I ischium triangular; merus and carpus elongated; carpus with depression on rostral surface equipped with slender scales; propodus narrow and long, proximal part of ventral margin concave with dense small scales, distal part bearing strong setae; pereopods I–VII dactylus with one dactylar and one unguis seta (Figures 4D–4F).

Pleon narrower than pereon. Telson short, two times as wide as long, triangular with concave lateral margins and acute apex, slightly surpassing uropod protopodites (Figure 4G). Uropod exopodites almost two times as long as telson (Figure 4G). Pleopod exopodites I–V with monospiracular covered lungs.

Male: Pereopods I–III merus and carpus with brushes of setae (Figure 4D). Pereopod VII ischium with straight to slightly concave ventral margin and a setose area on

rostral surface, merus and carpus with strong spine setae on ventral and distal margins (Figures 4E and 4F). Pleopod endopodite I straight with a finger-like lobe bearing a row of few small setae at apex (Figure 5A); exopodite I with an obliquely truncate sinuous long hind lobe; distal and outer margins bearing few short setae (Figure 5B). Pleopod endopodite II longer than exopodite; exopodite triangular, outer margin equipped with a line of short setae (Figure 5C). Pleopod exopodites III–V as in Figures 5D–5F.

Etymology. The name of the species is derived from the province of Golestan, in which the species is broadly distributed.

Remarks. *Protracheoniscus golestanicus* sp. nov. is characterized by very short lateral lobes of head; obliquely truncate sinuous distal margin of male pleopod exopodite I; and the finger-like lobe at the apical part of male pleopod endopodite I. This species is similar to *P. ehsani* Kashani, 2014 but differs from it in terms of the shape of pleopod endopodite I, and in lacking the conspicuous ridge on the dorsal margin of pereopod VII carpus.

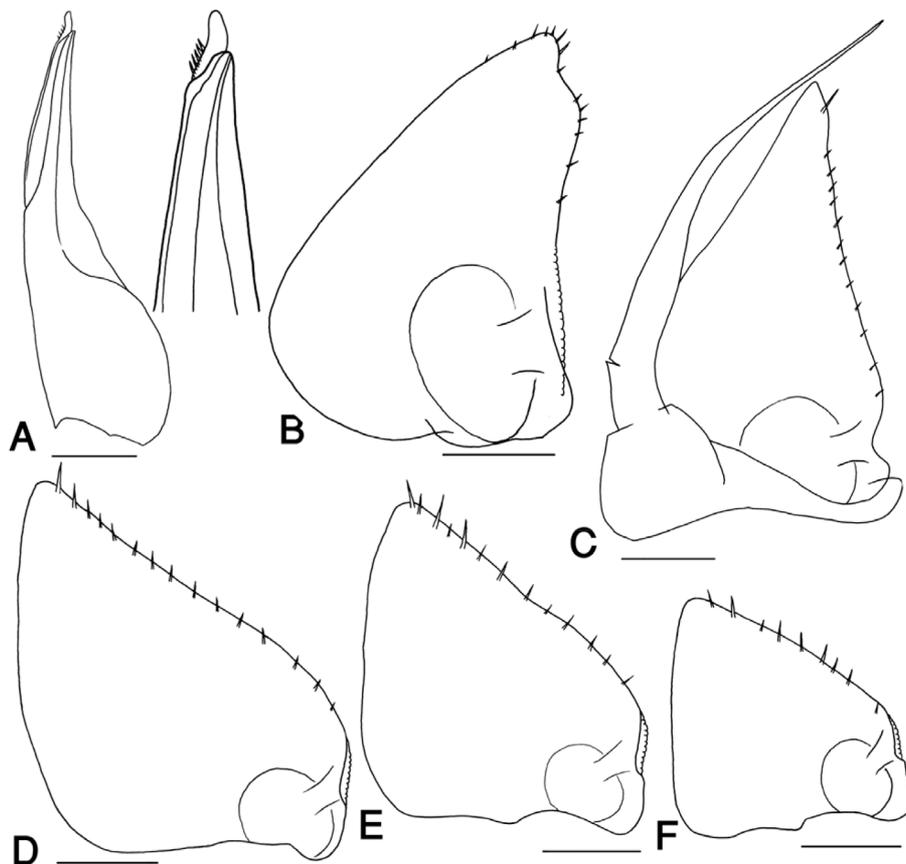


Figure 5. *Protracheoniscus golestanicus* sp. nov., male, holotype. A, Pleopod endopodite I; B, pleopod exopodite I; C, pleopod II; D, pleopod exopodite III; E, pleopod exopodite IV; F, pleopod exopodite V. Scales = 0.2 mm.

Distribution. Northern Iran.

Nomenclatural acts: This work and the nomenclatural acts it contains have been registered in ZooBank. The ZooBank Life Science Identifier (LSID) for this publication is: <http://zoobank.org/urn:lsid:zoobank.org:pub:4BD145BF-0767-4C8E-AA3E-5CD69C775776>

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