New pseudoscorpion records (Arachnida: Pseudoscorpiones) from Lorestan province, western Iran, with redescriptions of Olpium lindbergi (Olpiidae) and Geogarypus shulovi (Geogarypidae)

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New pseudoscorpion records (Arachnida: Pseudoscorpiones) from Lorestan province, western Iran, with redescriptions of *Olpium lindbergi* (Olpiidae) and *Geogarypus shulovi* (Geogarypidae)

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Abstract. Redescriptions of the pseudoscorpion species (Arachnida: Pseudoscorpiones) *Olpium lindbergi* Beier, 1959 (Olpiidae) and *Geogarypus shulovi* Beier, 1963 (Geogarypidae) are provided. Additionally, distribution data for ten species belonging to three families, Olpiidae, Menthidae and Geogarypidae, occurring in Lorestan province (western Iran) are provided. *Olpium lindbergi* is recorded for the first time in Iran.

Keywords: distribution, faunistic, new record, taxonomy

Zusammenfassung. Neue Pseudoskorpion-Nachweise (Arachnida: Pseudoscorpiones) aus der Provinz Lorestan, West-Iran, mit Wiederbeschreibungen von *Olpium lindbergi* (Olpiidae) und *Geogarypus shulovi* (Geogarypidae). Wiederbeschreibungen der Pseudoskorpion-Arten (Arachnida: Pseudoscorpiones) *Olpium lindbergi* Beier, 1959 (Olpiidae) und *Geogarypus shulovi* Beier, 1963 (Geogarypidae) werden vorgelegt. Zusätzlich werden Nachweisdaten von zehn Arten der Familien Olpiidae, Menthidae und Geogarypidae, die in der Provinz Lorestan (West-Iran) vorkommen, genannt. *Olpium lindbergi* wird erstmals für den Iran nachgewiesen.

So far, only three pseudoscorpion species, *Acanthocreagris iranica* Beier, 1976, *Neobisium* (*N.*) *alticola* Beier, 1973 and *Neobisium* (*N.*) *validum* (L. Koch, 1873), have been reported from Lorestan province (western Iran) (Nassirkhani et al. 2017, Nassirkhani & Zamani 2017). Recent collections in Lorestan province resulted in a total of ten species belonging to three families, Olpiidae, Menthidae and Geogarypidae, of which *Olpium lindbergi* Beier, 1959 is recorded for the first time in Iran.

There are no published descriptions of *Olpium lindbergi*, originally described from Afghanistan, and *Geogarypus shulovi* Beier, 1963, originally described from Israel, other than Beier (1959, 1963). Due to the presence of some variations noted within *O. lindbergi* and *G. shulovi* found in Lorestan province (western Iran), these two species are redescribed here. Moreover, the diagnostic figures of these species are illustrated here because Beier (1959, 1963) only illustrated the pedipalps of the types in dorsal view, and there are no published illustrations of the other important characteristics which may assist in the identification of these species.

Material and methods

The specimens examined in this study were permanently mounted on glass microscope slides in Hoyer's medium or studied as temporary slides made by glycerine, examined with an Olympus CH–2 compound microscope and illustrated using a drawing tube. Measurements were taken using a calibrated ocular micrometer (WF10X–18MM). The specimens are deposited in the collection of the Acarology Laboratory, Arak branch, Iran (IAUA). Morphological terminology and measurements follow Chamberlin (1931), Harvey (1992), Harvey et al. (2012) and Judson (2007). Coordinates are given in the Geodetic System WGS 84.

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Redescription

Family Olpiidae Banks, 1895 – Olpiinae Banks, 1895

Genus *Olpium* L. Koch, 1873

***Olpium lindbergi* Beier, 1959** (Figs 1a-g)

Olpium lindbergi Beier 1959: 265, fig. 8.

Material examined. IRAN: Lorestan province: 1 ♂, Khorramabad County, Deh-e-pir, 33.4708°N, 48.4469°E, 1320 m a.s.l., soil, 20. Jul. 2017, leg. M. Zamani (IAUA). 2 ♂♂, Doroud, Bastam, 33.6286°N, 48.9005°E, 934 m a.s.l., litters including soil and leaf fragments of *Quercus* spp., 11. Jul. 2017, leg. M. Zamani (IAUA).

Carapace. Entirely smooth; distinctly longer than broad, L/W 1.10–1.21; with 2 pairs of well-developed corneate eyes, anterior eyes slightly larger and wider than posterior eyes, anterior eyes extending to lateral margin, posterior eyes slightly spaced from lateral margin (Fig. 1a); transverse furrows absent (Fig. 1a); all setae simple; carapace with 22–24 setae, chaetotaxy: 4:6:4–6:2–4:2–4:2; with 10 lyrifissures (Fig. 1a).

Tergites. Lightly sclerotized and not granulate; IX with 2 long tactile setae situated laterally; X with 4 long tactile setae situated laterally and medially; XI with two long setae situated sub-medially; chaetotaxy: 2:4:4:4:4:4:4:4:T1TT1T:T1T T1T:1T1T1:2.

Sternites. Poorly sclerotized and smooth; sternites II with 8 simple setae and 7–8 large lyrifissures; lateral genital sacs with very long ducts enlarged terminally, with 3 pairs of internal setae (3+3); setae narrower and longer than tergal setae; IX with 2 median slightly long setae; X with 2 long tactile setae situated medially and 2 slightly long setae situated laterally; XI with four long tactile setae situated laterally and sub-medially; spiracles without setae, with normal enlarged tracheal trunks, posterior trachea thinner than anterior trachea; chaetotaxy: 8:(0)4(0):(0)4(0):6:4:4:4:6:2TT2:TT1TT–T1T1T1T:2.

Pleural membrane. Longitudinally striate.

Chelicera. Galeal seta present and situated distally; galea with 3 terminal rami; hand with 5 setae (Fig. 1b); rallum with 3 blades, distal blade relatively long and superlative wide with short lateral denticulations (Fig. 1b); serrula exterior with 17 blades; lamina exterior present on fixed finger; fixed finger with 6 teeth, distal teeth small and acute; movable finger with one small curved apical lobe and two small teeth.

Tab. 1: Locations and habitat data of the newly collected species of the families Olpiidae, Geogarypidae and Menthidae from Lorestan province, western Iran (all species were collected by the first author during Apr. 2017–Aug. 2018)

Taxon	Localities	GPS Coordinate	Altitude (m. a.s.l.)	Microhabitat	Specimens ♀	Specimens ♂	Date of collection
Calocheiridius centralis	Azna	33.3155°N, 49.4313°E	2270	Leaf litter	1	4	12. May2017
	Chalanchoulan	33.6286°N, 48.9005°E	1510	Soil and litter	-	2	22. May2017
	Morad-Ali	33.7261°N, 47.8191°E	1278	Under stone	2	1	25. May 2017
	Itivand	33.8797°N, 47.6905°E	2002	Under stone	2	1	22. Jul. 2017
	Nour-Abad	34.0663°N, 47.9761°E	1795	Leaf litter	3	-	17. Jul. 2017
	Ali-Abad	33.9525°N, 47.8333°E	1717	Soil and litter	1	1	28. Jul. 2017
	Kouhdasht	33.4955°N, 47.6136°E	1177	Under stone	-	2	15. Jul. 2017
	Jaidar	33.0363°N, 47.7591°E	874	Under stone	-	2	19. Jul. 2017
Cardiolpium asiaticum	Veysian	33.4777°N, 48.0511°E	1042	Leaf litter	4	3	13. May2017
Cardiolpium bisetosum	Kouhdasht	33.5858°N, 47.6125°E	1262	Leaf litter	1	1	1. Jul. 2017
	Silakhour	33.7077°N, 49.0244°E	1731	Under stone	-	2	15. Jul. 2017
	Khave	33.9997°N, 48.1238°E	1983	Soil and litter	-	3	25. Jul. 2017
	Siah-darreh	34.2330°N, 47.9761°E	2400	Soil and litter	-	2	18. Jul. 2017
	Ordoudar	33.3744°N, 49.6817°E	2120	Soil and litter	1	3	25. Jul. 2017
	Paran Parviz	33.2572°N, 47.6961°E	822	Soil and litter	-	1	25. Jul. 2017
	Darreh-Seyyedi	33.9297°N, 48.8494°E	1997	Under stone	-	1	13. May 2017
Minniza babylonica	Keshvar	33.1444°N, 48.6238°E	882	Leaf litter	2	4	12. Oct. 2017
	E. Mian-kouh	33.1075°N, 48.3547°E	2100	Soil	1	3	13. Oct. 2017
	W. Mian-kouh	33.1811°N, 47.7888°E	894	Under stone	2	4	13. Oct. 2017
	Kandar	33.5538°N, 49.7197°E	2370	Soil and litter	3	1	26. Apr. 2017
	Deh-e-pir	33.4708°N, 48.4469°E	1320	Soil, leaf fragments	1	1	12. May 2017
	Chalanchoulan	33.6286°N, 48.9005°E	1510	Under stone	1	1	15. May 2017
	Khave	33.9997°N, 48.1238°E	1983	Under stone	-	1	2. May 2017
	N. Mirbag	33.9752°N, 47.9872°E	1666	Under stone	-	1	26. May 2017
	Kouhdasht	33.4955°N, 47.6136°E	1177	Under stone	-	1	30. May 2017
	Tang-e-haft	33.0780°N, 48.4825°E	1274	Soil, leaf fragments	-	1	26. May 2017
Minniza gallagheri	Seire sofla	33.4027°N, 49.1705°E	2119	Under stone	2	-	12. May 2017
Minniza persica	W. Borborud	33.3466°N, 49.7388°E	2094	Under stone	-	1	25. Jun. 2017
	Kouhdasht	33.5858°N, 47.6125°E	1262	Leaf litter	-	3	12. Jun. 2017
	Silakhour	33.7077°N, 49.0219°E	1748	Leaf litter	2	2	15. Jun. 2017
	Jaidar	33.0363°N, 47.7591°E	874	Leaf litter	-	3	20. Jun. 2017
	Malavi	33.2250°N, 47.6602°E	1321	Under stone	1	3	25. Jun. 2017
Olpium lindbergi	Bastam	33.6286°N, 48.9005°E	934	Soil	-	2	11. Jul. 2017
	Deh-e-pir	33.4708°N, 48.4469°E	1320	Soil, leaf fragments	-	1	20. Jul. 2017
Paramenthus nanus	Jaidar	33.0363°N, 47.7591°E	874	Under stone	2	-	15. Jul. 2017
Geogarypus harveyi	W. Mian-kouh	33.1811°N, 47.7888°E	894	Leaf litter	-	2	26. Apr. 2017
	Astaneh	33.7886°N, 49.4244°E	2184	Under stone	2	2	26. Apr. 2017
	Kandar	33.5538°N, 49.7197°E	2371	Under stone	2	1	20. Jul. 2017
Geogarypus shulovi	Dehkhord	33.8388°N, 48.8891°E	1800	Under Stone	3	-	26. Apr. 2017

Pedipalps. Chela distinctly darker in colour than femur and patella; entirely smooth; all setae simple; femur with 2 long tactile setae without enlarged alveoli situated on retrolateral face (Fig. 1c), first seta situated on basal third and second tactile seta situated distal to middle of femur; femur with distinct pedicel, L/W 3.30–3.69; patella with 5 lyrifissures, 4 lyrifissures situated basally, one lyrifissure located ventromedially, L/W 2.53–2.80; chela with distinct pedicel (Fig. 1d–e); chela (with pedicel) L/W 3.77–3.85; chela (without pedicel) L/W 3.50–3.62; hand (with pedicel) L/W 1.59–1.61; movable finger 1.37–1.44 times longer than hand (with pedicel); fixed finger with 8 and movable finger with 4 trichobothria (Fig. 1e); fixed finger with trichobothrium *et* situated close to tip of finger, *it* and *est* situated in the middle of the finger, *it* located slightly distal to *est*, *ist* situated between *est* and *isb* and slightly closer to *isb*, *isb* situated on retrolateral side of the finger, *ib* situated basally; movable finger with trichobothrium *st* situated closer to *sb* than to *t*, *sb* situated in the middle between *st* and *b*; fixed finger with 16–18 sensory setae, 5–7 of them situated close to trichobothrium *et* and fingertip on the distolateral face; fixed finger with 28–30 teeth, 6–7 basal teeth extremely reduced; movable fingers with 22–28 teeth becoming small at the middle between trichobothria *t* and *st*; teeth of the movable chelal finger smaller than those of fixed chelal finger; nodus ramosus situated slightly proximal to trichobothrium *et* in fixed finger and approximately in the middle between tip of finger and trichobothrium *t* in movable finger (Fig. 1e); primary venom ducts inconspicuous in both fingers.

Legs. Not granulate; all setae simple; claws symmetrical, stout and short; arolia simple and much longer than claws, not divided; each coxa I with 4, coxa II with 4–5, coxa III with 4–5 and coxa IV with 6–8 setae (Fig. 1f). Leg I: femur L/D 2.71–2.86; patella L/D 2.00; ratios of femur L/patella L 1.36–1.43; tibia L/D 3.80–4.00; metatarsus 2.50–2.75; tarsus 3.67–4.00. Leg IV (Fig. 2g): femur L/D 1.33–1.34; patella L/D 2.31–2.40; femur + patella L/D 2.50–2.94; tibia L/D 3.56–4.00; metatarsus with one long tactile seta situated basally (TS =

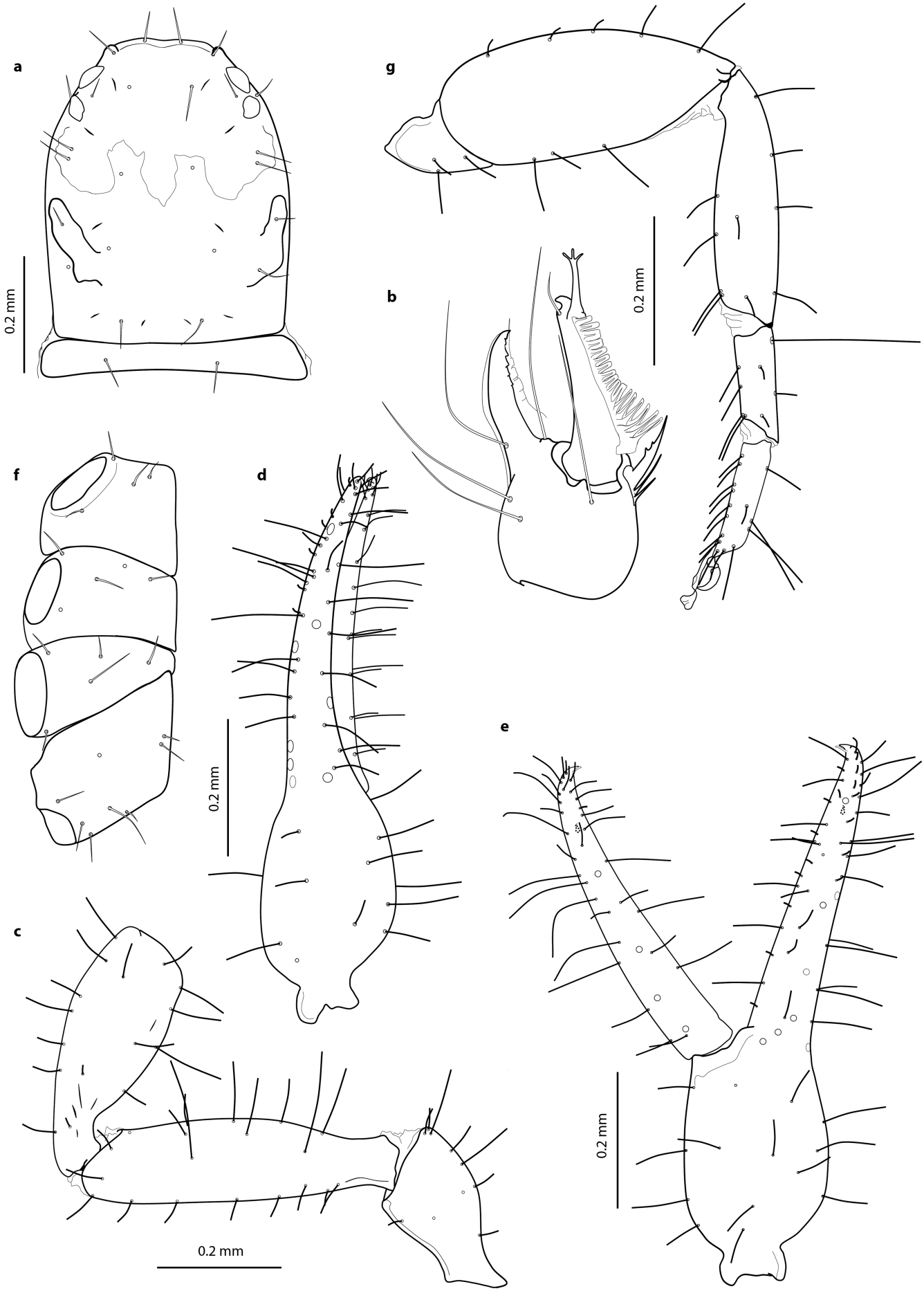

Fig. 1: *Olpium lindbergi* Beier, 1959, ♂: **a.** carapace and tergite I, dorsal view; **b.** chelicera, dorsolateral view; **c.** basal segments of pedipalp, dorsal view; **d.** left chela, dorsal view; **e.** right chela, lateral view; **f.** right coxae, ventral view; **g.** leg IV

0.16), chaetotaxy: T + 1/2/4(one pair), L/D 2.80–3.00; tarsus 4.00.

Dimensions (length/width, depth in mm)**.** Body length: 1.55–1.77 mm. Carapace: 0.52–0.54/0.43–0.47. Pedipalp: trochanter 0.25/0.13–0.14; femur 0.43–0.48/0.13; patella 0.38–0.42/0.15; chela (with pedicel) 0.81–0.83/0.21–0.22; chela (without pedicel) L. 0.76–0.77; hand (with pedicel) L.0.34–0.35; movable finger L. 0.48–0.49. Leg I: femur 0.19–0.20/0.07; patella 0.14/0.07; tibia 0.19–0.20/0.05; metatarsus 0.10–0.11/0.04; tarsus 0.11–0.12/0.03. Leg IV: femur 0.12/0.09; patella 0.36–0.37/0.15–0.16; femur + patella 0.44–0.45; tibia 0.32/0.08–0.09; metatarsus 0.14–0.15/0.05; tarsus 0.16/0.04.

Remarks. *Olpium lindbergi* Beier, 1959 was originally described from Afghanistan and subsequently recorded from India and Kazakhstan (Harvey 2013). It can be easily separated from the most similar species *O. omanense* Mahnert, 1991 from Oman and Iran and *O. intermedium* Beier, 1959 from Afghanistan by its chaetotaxy of the carapace and tergite I [the presence of two setae on the posterior margin of the carapace and tergite I (Beier 1959)], the loss of transverse furrows (Beier 1959), the chelal shape in lateral view (see Beier 1959: Fig. 8), and the structure of the chelal teeth [in the movable chelal finger, cusped teeth are only present in the distal half of the finger (Mahnert 1991)].

The types of *O. lindbergi* (Beier 1959) are slightly stouter than the specimens found in Iran, e.g. the pedipalpal femur proportion is 3.20–3.30× and the chela (with pedicel) is 3.30–3.50× longer than broad in the types. Loss of some fine granules on the mediodistal face of the chelal hand and the presence of greater number of chelal teeth in the types (34 in the fixed and 30 in the movable chelal fingers) (Beier 1959) are minor small differences between the types and the examined specimens from Iran. These small differences are not sufficient for introducing a different species and can be considered as intraspecific variations within the species.

Family Geogarypidae Chamberlin, 1930

Genus *Geogarypus* Chamberlin, 1930

Geogarypus shulovi Beier, 1963 (Figs. 2a-g)

Geogarypus shulovi Beier 1963: 193, fig. 7.

Material examined. IRAN: Lorestan province: 3 ♀♀, Boroujerd County, Khorramabad Highway, Dehkord, 33.8388°N, 48.8891°E, 1800 m a.s.l., under stone, 26. Apr. 2017, leg M. Zamani (IAUA).

Carapace. Hardly sclerotized; heavily granulated with star-like hispid granulation (Fig. 2a); slightly wider than length or approximately as long as length, L/W 0.94–1.01; front margin elongated distally, snout-like (Fig. 2a), with 14 setae; anterior margin with 4 setae, 2 short setae situated medially and 2 long setae situated sub-medially (Fig. 2b), all setae simple; posterior margin extended laterally, with 6–10 setae; with 2 pairs of well-developed corneate eyes situated away from anterior margin on small protruding mound, anterior eyes slightly larger than posterior eyes, one short seta situated between eyes; anterior furrow present and curved basally; posterior furrow present but indistinct; setae simple; with 6–8 distinct lyrifissures, first pair situated distal to anterior eyes (lost in one female), second pair at same level as posterior eyes, third pair situated closer to anterior furrow than posterior margin and fourth pair situated near posterior margin.

Tergites. Less sclerotized and granulated than carapace; without median suture line; tergal setae situated regularly in single row (uniserate); tergite XI with 2 long tactile setae situated sub-laterally; anal plates (tergite XI and sternite XII) situated between tergite XI and sternite XI; setae simple; chaetotaxy: 7–9:8:10–12:10–11:12:12–14:11–12:11:8–9:6–7:1T4T1:2.

Sternites. IX and X with 2 long tactile setae situated medially; XI without long tactile setae; anterior trachea larger than posterior trachea; females with 2 elongate lateral cribriform plates situated sparsely and one median circle cribriform plate; anus without circum-anal setae; chaetotaxy: 6–8:(0)2(0):(1)2–3(1):9–11:10–11:11–12:11–12:9–10:4–8:2:0.

Pleural membrane. Longitudinally wrinkled-plicate; with 30–32 simple short setae situated in transverse series on each side.

Chelicera. Galeal seta present and situated sub-distally; galea relatively short, simple and apically acuminate (Fig. 2c); hand with 5 simple setae; rallum with one simple blade (Fig. 2c); serrula exterior with 12–16 blades; serrula interior with 10–12 blades; hand with 2 lyrifissures; fixed finger with 4–6 teeth, terminal tooth smallest; movable finger with one curved and acute terminal lobe and 2 small teeth.

Pedipalps. Heavily granulate with star-like hispid granulations, chelal granulation slightly extended to basal margin of fixed finger, distal to trichobothrium *est*, and lateral margin of movable finger, between trichobothria *st* and *sb* (Fig. 2e); femur and patella without wrinkles; all setae simple and most of them short; coxa with 11–13 setae, monducatory process with two setae; trochanter L/W 1.54–1.65; femur without obvious pedicel, L/W 4.50–4.67; patella with curved and short pedicel, with three lyrifissures, third lyrifissure longest (Fig. 2d), L/W 3.13–3.28; chela with distinct pedicel (Figs. 2e-f); chela (with pedicel) L/W 4.28–4.34; chela (without pedicel) L/W 4.14–4.20; hand (with pedicel) L/W 1.94–1.97; movable finger distinctly longer than hand with pedicel; movable finger 1.18–1.20 times longer than hand with pedicel; fixed finger with eight and movable finger with four trichobothria (Fig. 2e); fixed finger with trichobothrium *it* closer to *et* than to *ist*, *isb* situated slightly distal to middle of the finger, *est* slightly closer to *ib* than *isb*, *ib* situated in basal third of finger, *esb* and *eb* situated distinctly proximal to *ib*; movable finger with trichobothrium *st* situated closer to *t* than to *sb*; most teeth of chelal fingers acute and prominent; fixed finger with 43–47 triangular-shaped teeth (two teeth situated outside of row), two external and 3–5 internal accessory teeth present; distal half of movable finger with 11–20 cusped teeth becoming faded basally, and two external accessory teeth present; nodus ramosus present in both finger, situated slightly at same level as *ib* in fixed and midway between *sb* and *st* in movable finger (Fig. 2e); venom duct elongate in both fingers.

Legs. Granulate; all setae simple; distal margin of retrolateral face of coxae I–II granulate (Fig. 2g); claws symmetrical, stout and short; arolium simple and slightly longer than claws; leg I: each coxa with 4–5 simple setae; femur L/D 3.07–3.33; patella L/D 2.00–2.08; tibia L/D 3.87–4.12; metatarsus L/D 3.33–3.67; tarsus L/D 4.75; leg IV: each coxa of leg IV with 40–43; femur joined widely; femur L/D 1.58–1.73; patella L/D 3.00–3.15; femur + patella L/D 3.60–3.89; tibia L/D 4.64–5.10; metatarsus L/D 3.25–3.57; tarsus L/D 3.67–4.80.

Dimensions (length/width, depth in mm)**.** Body length: 2.10–2.57 mm. Carapace: 0.80–0.81/0.80–0.85. Pedipalp:

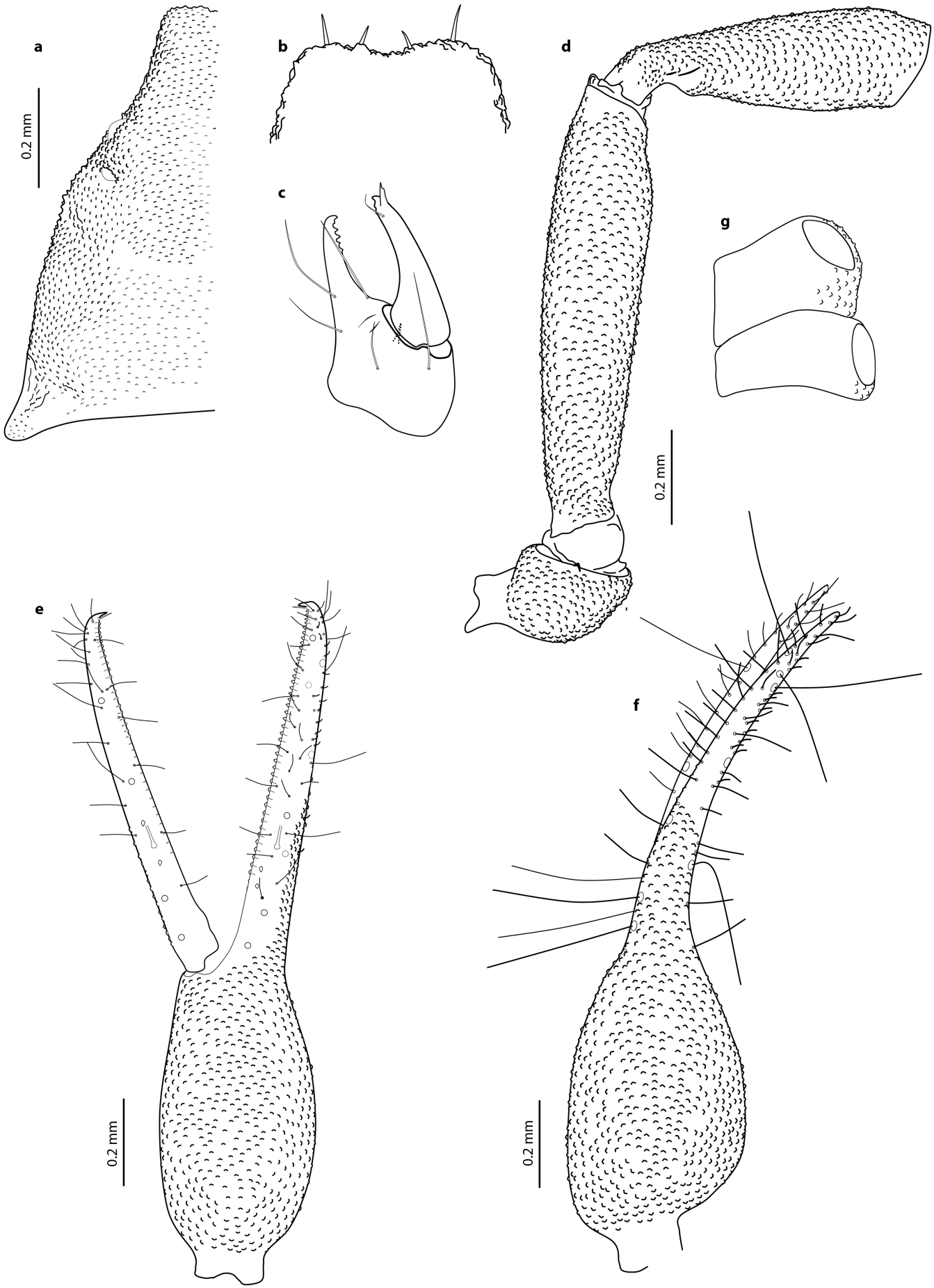

Fig. 2: *geogarypus shulovi* Beier, 1963, ♀: **a.** left half of carapace, dorsal view (setae and lyrifissures omitted); **b.** anterior margin of carapace (showing setae); **c.** chelicera, dorsolateral view (serrula and lamina omitted); **d.** basal segments of pedipalp, dorsal view (setae omitted); **e.** left chela, lateral view (setae on chelal hand omitted); **f.** left chela, dorsal view (setae on chelal hand omitted); **g.** left coxae I–II, ventral view (setae omitted)

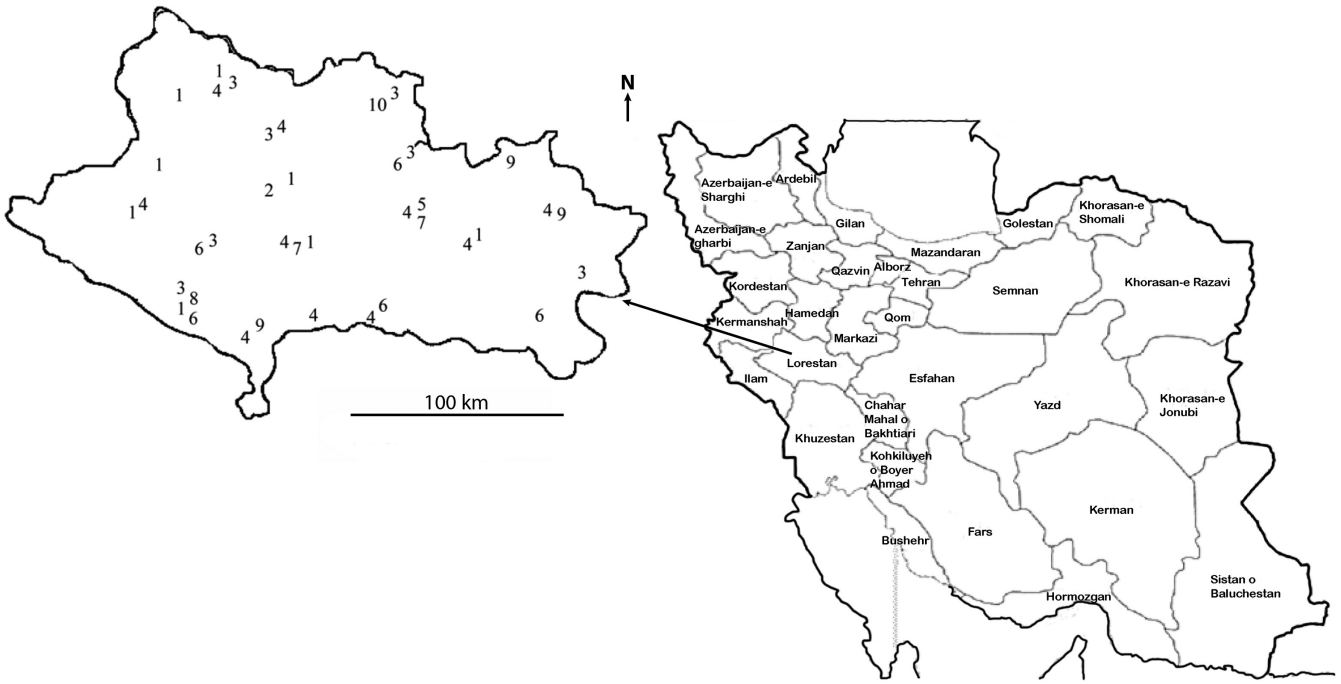

Fig. 3: Geographical distribution of pseudoscorpions of the families Olpiidae, Geogarypidae and Menthidae in Lorestan province-western Iran: 1. *Calocheiridius centralis* (Beier, 1952); 2. *Cardiolpium asiaticum* (Dashdamirov, 1991); 3. *Cardiolpium bisetosum* Nassirkhani, 2015; 4. *Minniza babylonica* Beier, 1931; 5. *Minniza gallagheri* Mahnert, 1991; 6. *Minniza persica* Beier, 1951; 7. *Olpium lindbergi* Beier, 1959; 8. *Paramenthus nanus* Mahnert, 2007; 9. *Geogarypus harveyi* Nassirkhani, 2014; 10. *Geogarypus shulovi* Beier, 1963

trochanter 0.33–0.34/0.20–0.22; femur 0.96–0.99/0.21–0.22; patella 0.69–0.72/0.21–0.22; chela (with pedicel) 1.50–1.52/0.35; chela (without pedicel) L. 1.45–1.47; hand (with pedicel) L.0.68–0.69; movable finger L. 0.80–0.83. Leg I: femur 0.40/0.12–0.13; patella 0.22–0.25/0.11–0.12; tibia 0.31–0.33/0.08; metatarsus 0.20–0.22/0.06; tarsus 0.19/0.04. Leg IV: femur 0.19/0.11–0.12; patella 0.6/0.19–0.2; femur + patella 0.72–0.74; tibia 0.51/0.10–0.11; metatarsus 0.25–0.26/0.07–0.08; tarsus 0.22–0.24/0.05–0.06.

Remarks. The newly discovered females of *Geogarypus shulovi* in western Iran are morphometrically more or less similar to the types from Israel (Beier 1963) and the previously examined specimens from Greece and Turkey (Gardini et al. 2017), e.g. the length of the pedipalpal femur is 0.85–1.00 mm, patella 0.62–0.78 mm, chelal hand (with pedicel) 0.68–0.78 mm, and the movable chelal finger 0.74–0.90 mm (♀). The chela of the females from Iran is slightly longer than that of *G. shulovi*, e.g. in the newly collected specimens from Iran, the chelal (with pedicel) length is 1.50–1.52 mm (♀), while it is 1.40–1.41 mm in *G. shulovi* (♀) (see Gardini et al. 2017). It is significant to note that the pedipalp of the specimens from western Iran is also slightly larger than that of the types from Israel, e.g. in the female type, the pedipalpal femur proportion is 4.80× (0.91/0.19 mm), patella 3.70× (0.68/0.195 mm), and chela (with pedicel) 4.70× (Beier 1963).

Despite this minor morphometric variation, the only other obvious difference is the position of trichobothrium *ib* which is located at the same level as *est* in the female type (see Beier 1963: fig. 7, below), and slightly proximal to *est* in the male type (see Beier 1963: fig. 7, upper), whereas it is situated distinctly proximal to *est* in the females from western Iran. Unfortunately, there are no published descriptions about setal shape located on the anterior margin of the carapace and the intensity of granulation on the fixed chelal finger, so these characters cannot be compared in this contribution.

These small differences are not strong evidence for a different species. On the basis of the carapace colouration (bicoloured, different coloured area less contrasted), the absence of wrinkles on the pedipalpal femur and patella, the pedipalpal shape, and the acuminate shape of the galea in females, the newly collected specimens from western Iran are attributed to *Geogarypus shulovi* which was previously reported from Israel, Iran, Turkey and Turkmenistan (Harvey 2013). Beier (1971) reported this species for the first time from Maku, West Azerbaijan province, north-western Iran (without giving morphometric data), and the presence of *G. shulovi* in Lorestan province (western Iran) is a new provincial record for the species.

Geogarypus shulovi can be easily separated from *G. harveyi* Nassirkhani, 2014, the only other species of the genus reported from southern Iran, by the colouration of the carapace (in *G. harveyi* it is uniformly dark coloured or the posterior half of the carapace uniformly lighter in colour than the anterior half) and the morphometric data [in *G. harveyi*, the pedipalpal femur length is 0.69–0.84 mm and the chelal (with pedicel) length is 1.07–1.32 mm (♀)] (Nassirkhani 2014, 2016c).

Results

Recent collections in Lorestan province resulted in a total of ten species belonging to three families: Olpiidae: *Calocheiridius centralis* (Beier, 1952), *Cardiolpium asiaticum* (Dashdamirov, 1991), *Cardiolpium bisetosum* Nassirkhani, 2015, *Minniza babylonica* Beier, 1931, *Minniza gallagheri* Mahnert, 1991, *Minniza persica* Beier, 1951, *Olpium lindbergi* Beier, 1959 Menthidae: *Paramenthus nanus* Mahnert, 2007; Geogarypidae: *Geogarypus harveyi* Nassirkhani, 2014; *Geogarypus shulovi*

Beier, 1963 (Fig. 1, Tab. 1). All these species are new provincial records. Distribution and habitat data of these species are given in Tab. 1 and the records are mapped in Fig. 3.

Discussion

Members of the family Olpiidae are well represented in the province with seven species. The three species *Calocheiridius centralis*, *Cardiolpium bisetosum,* and *Minniza babylonica* are widely spaced from east to west of the province. The occurrence of *C. centralis* in southwestern parts of Iran has been previously reported by Nassirkhani (2016b). Therefore, this species is widely distributed in western and southern Iran, from Fars province to Lorestan province. *Cardiolpium bisetosum* may be an endemic species which is distributed from central-west (Nassirkhani 2015) to western Iran. *Minniza babylonica* and *Minniza persica*, widely distributed species throughout Iran, can be found in different microhabitats, e.g. under stones, leaf litters and bark pieces (unpublished data).

Cardiolpium asiaticum, *Minniza gallagheri* and *Paramenthus nanus* which were previously recorded for Fars province by Nassirkhani (2016a, 2016d) and Nassirkhani & Vafai Shoushtari (2015), and *Geogarypus harveyi* which was previously reported from Kerman, Fars and Khouzestan provinces by Nassirkhani (2016c), have been rarely found in Lorestan province. It shows that at least these species are expanded from southwestern to western Iran.

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