A new pseudoscorpion species of the genus Geogarypus
(Arachnida: Pseudoscorpiones) from Iran

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Abstract — A new species, Geogarypus harveyi, which was collected from leaf litter habitats in the Khabr National Park is reported and described from Iran.

Key words — Arachnida, Pseudoscorpions, Geogarypidae, Iran

Introduction

The pseudoscorpion fauna of Iran is currently represented by 42 species in 23 genera and nine families (Harvey 2013; Christophoryvová et al. 2013; Nassirkhani and Takkaloo zade 2013a, 2013b). The first pseudoscorpion to be reported from Iran was Chelifer spinipalpis Redikorzev 1918, now is placed in the genus Strobiloclifera (family Cheliferidae) which was described from Bazman, in south-eastern Iran (Redikorzev 1918). Recent collecting in Iran has revealed some species not previously recorded from the country: Gobichelifera chelanops (Redikorzev 1922) (Nassirkhani & Takkaloo zade 2013a), Dactyloclifera spasskyi Reditkorzev 1949 (Nassirkhani & Takkaloo zade 2013b) and Megachelifer pavlovskyi Redikorzev 1949 (Mirmoayed, Sharifi & Hemmati 2000; Christophoryvová et al. 2013).

I have collected pseudoscorpion specimens from six protected areas and one national park in Iran during spring and summer in 2013. Amongst these collections, I found an undescribed species of Geogarypus, which will be described here as new.

Material and methods

The specimens used in this study were collected from leaf litter in the Khabr National Park, south-eastern Iran. The specimens were collected directly by sieving leaf litter and extracted by using a thin needle from a hypodermic syringe.

All specimens were preserved in 70% ethanol and were prepared for study as follows. The pedipalps, chelicera, first and fourth legs were removed from the body, cleared with 60% lactic acid, and mounted on dished glass microscope slides in Hoyer’s medium (a mixture of distilled water, chloral hydrate, Arabic gum and glycerin). The duration of the clearing phase was dependent on the degree of sclerotization of the body. The specimens were examined and illustrated with an Olympus BH-2 compound microscope and drawing tube attachment. The specimens are lodged in Collection of the Acratology Laboratory, Islamic Azad University of Arak (IAUA), Iran.

Morphological terminology follows Chamberlin (1931), Harvey (1992), Judson (2007) and Harvey et al. (2012). The following trichobothrial abbreviations were employed: eb = external basal; esb = external sub-basal; ib = internal basal; isb = internal sub-basal; ist = internal sub-terminal; est = external sub-terminal; it = internal terminal; et = external terminal; t = terminal; sb = sub-basal; st = sub-terminal. In addition, the following abbreviations are used: mm = millimeter; L = length; W = width; H = height.

Family Geogarypidae Chamberlin 1930
Genus Geogarypus Chamberlin 1930
Geogarypus harveyi sp. nov.
(Figs. 1–2)

Material examined. IRAN: Kerman Province: holotype male, allotype female, Baft, Khabr National Park, leaf litter, beside pond [28°52’45”N, 56°23’56”E], July 2013, M. Nassirkhani (IAUA); Paratypes: 5 males, 3 females, collected with the holotype (IAUA).

Diagnosis. Geogarypus harveyi differs from the other species of the genus by the following combination of characters: unicolored carapace; simple setae with different sizes on the anterior margin of carapace; size of pedipalp (e.g. chela of males 0.95–1.02 mm in length and 022–0.24 mm in width).

Description. Adults (Figs. 1–2). Body length: 1.66–1.78 mm for males and 1.60–1.87 mm for females.
Carapace: uniformly dark brown, lateral margins darker; hardly sclerotized; heavily granulate; distinctly wider than long, L/W 0.74–0.90 for both sexes; front margin elongated
Fig. 1. Geogarypus harveyi sp. nov., male holotype (except, d: one of male paratypes). a, chelal fingers, lateral; b, left chela, lateral; c, dorsal aspect of right chela; d, fixed finger showing teeth arrangement, dorsal; e, right pedipalp, except chela; f, dorsal side of body; g, right chelicera; h, serrula exterior.
distally, snout-like (Fig. 1f), with 10–12 setae; anterior margin with 4 setae, 2 short setae situated medially and 2 long setae situated sub-medially (Fig. 1f); posterior margin extended laterally, with 8–10 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 posteriorly; posterior furrow present but indistinct, curved anteriorly; setae simple, narrow and acute; with 8 distinct lyrifissures, first pair situated distal to anterior eyes, second pair slightly posterior to eyes, third pair situated closer to anterior furrow than posterior margin and fourth pair situated near posterior margin.


**Sternites:** brown, lighter in color than tergites; sclerotized; not granulate; sternites III–VII with median suture line; sternite XIII–X without median suture line; sternites IV–X with regular setae in one row; sternites IX and X with 2 long tactile setae situated medially; anterior trachea larger than posterior trachea; lateral genital sacs very long with huge terminal (Fig. 3e) and two pairs of glandular setae; females with 2 elongate cribriiform plates situated sparsely (Fig. 3d); anus without circum-anal setae; sternites with setae arranged: 9–11: (0)4–8(0): (1)4–6(1): 8–10: 9–12: 10–11: 9–11: 6–8: 6–8: 0 for males and 6–7: (0)2–4(0): (1)2(1): 8–10–11: 10–11: 10–11: 9–10: 6–7: 4–6: 0.

**Pleural membrane:** roughly striate; with 11–12 simple setae on each side.

**Chelicerae:** light brown; galeal setae present and situated sub-distally; galea simple, short and stout with one terminal and one sub-terminal rami; hand with 5 simple setae (Fig. 1g); raleum with one simple blade (Fig. 1g); serrula exterior with 12–14 blades (Fig. 1h); palm of hand with 5 lyrifissures; fixed finger with 5 teeth, two terminal teeth smallest; movable finger with one curved and acute terminal lobe and two small teeth.

**Pedicipalps:** dark brown, chela darker in color than femur and patella; chelal fingers brown; heavily granulate, chelal granulation slightly extended to basal margin of fixed finger (Fig. 1a); most setae simple and short; trochanter L/W 1.66–1.78 for males and 1.80–1.87 for females; femur without obvious pedicel, retrolateral margin straight and prolateral margin slightly curved distally (Fig. 1e), L/W 4.33–4.64 for males and 4.17–4.37 for females; patella with curved and short pedicel, prolateral margin slightly curved distally, with 3 lyrifissures, third lyrifissure longest (Fig. 1e), L/W 3.00–3.21 for both sexes; chela with short pedicel and distinctly dorsal projection (Figs. 1b, 1c); chela (with pedicel) L/W 4.32–4.54 for males and 4.07–4.28 for females; chela (without pedicel) L/W 4.18–4.36 for males and 3.89–4.08 for females; hand (with pedicel) L/W 1.79–1.95 for both sexes; movable finger distinctly longer than hand with pedicel; movable finger 1.34–1.45 longer than hand with pedicel for both sexes; fixed finger with 8 and movable finger with 4 trichobothria (Fig. 1a); fixed finger with trichobothrium it closer to est than et, ist situated medially, est slightly closer to ib than isb, ib situated in basal third of finger, isb situated distinctly anterior to ib, esb and eb situated distinctly posterior to ib; movable finger with trichobothrium st situated medially in equal distance to t and sb; most teeth of chelal fingers acute and prominent; fixed finger with 35–38 triangular-shaped teeth (3 teeth situated outside of row (Fig. 1d)), 4–5 small teeth situated basally and 4 accessory teeth present; movable finger with 7–10 triangular-shaped, 13–15 blunt and 3–4 semi-circle weakly sparse teeth, 3–4 small teeth situated basally and 3 accessory teeth present; nodus ramosus present in both finger, situated slightly posterior to ib in fixed finger and basal third of movable finger; venom duct exinate in both finger.

**Legs:** light brown; lighter in color than abdomen; granulate; all setae simple and acute; claws symmetrical, stout and short; arolium simple and slightly longer than claws (Figs. 2b, 2c); leg I: each coxa with 4–5 simple and acute setae; tibia L/W 3.66–3.83 for males and 3.28–3.57 for females; metatarsus L/W 3.00–3.20 for males and 3.40 for females; tarsus L/W 3.75–5.00 for males and 4.25 for females; leg IV: each coxa of leg IV with 16–18 setae for males and 32–24 setae for females; femur joined widely, femur + patella L/W 3.53–3.70 for males and 3.60–4.07 for females; tibia L/W 4.50–5.28 for both sexes; metatarsus L/W 3.40–3.80 for males and 3.66–3.80 for females; tarsus L/W 4.50–4.75 for males and 4.66–5.00 for females.

**Dimensions** (L/W, in mm). Males: Carapace: 0.55–0.60/0.60–0.75. Pedipalp: trochanter 0.25–0.26/0.14–0.15; femur 0.62–0.68/0.14–0.16; patella 0.42–0.47/0.14–0.15; chela (with pedicel) 0.95–1.02/0.22–0.24; chela (without pedicel) L. 0.92–0.98; hand L. 0.41–0.43; movable finger L. 0.55–0.61. Leg I: tibia 0.22–0.23/0.06–0.07; metatarsus 0.15–0.16/0.05–0.04; tarsus 0.15–0.16/0.03–0.04. Leg IV: femur + patella 0.48–0.53/0.13–0.15; tibia 0.35–0.37/0.07–0.08; metatarsus 0.18–0.19/0.04–0.05; tarsus 0.18–0.19/0.04. Females: Carapace: 0.63–0.66/0.62–0.79. Pedipalp: trochanter 0.27–0.30/0.16–0.17; femur 0.69–0.71/0.16–0.17; patella 0.50–0.51/0.16–0.17; chela (with pedicel) 1.07–1.10/0.25–0.27; chela (without pedicel) L. 1.02–1.05; hand L. 0.43–0.47; movable finger L. 0.63–0.64. Leg IV: tibia 0.23–0.25/0.07; metatarsus 0.17/0.05; tarsus 0.17/0.04. Leg IV: femur + patella 0.54–0.57/0.14–0.15; tibia 0.38–0.41/0.08–0.09; metatarsus 0.19–0.22/0.05–0.06; tarsus
Fig. 2. *Geogarypus harveyi* sp. nov. (a–c, e: male holotype; d: female allotype). a, coxae, ventral; b, metatarsus and tarsus I; c, metatarsus and tarsus IV; d–e, genitalia.
0.20–0.21/0.04–0.05.

**Remarks.** Only a few species of *Geogarypus* have been recorded from the Middle East and adjacent regions such as Central Asia, North Africa and Europe: *G. azerbaidzhanicus* Dashdamirov, *G. continentalis* (Redikorzev), *G. hungaricus* (Tömösváry), *G. minor* (L. Koch), *G. nigrimanus* (Simon), *G. pulcher* Beier, *G. mirei* Heurtault and *G. shulovi* Beier. The original and only description of *G. hungaricus* is insufficient to recognize it (Tömösváry 1882). *Geogarypus harveyi* is compared to the other species as follows.

*Geogarypus shulovi* was originally described from Israel (Beier 1963a) and later recorded from under stones in Maku, Iran (Beier 1971). The chela (without pedicel) of *G. shulovi* is distinctly stouter and shorter than that of *G. harveyi* (Beier 1963a): 4.7 × (1.50/0.32 mm for males) in *G. shulovi* and 4.18–4.36 × (0.92–0.98/0.22–0.24 mm) for males and 3.89–4.08 × (1.02–1.05/0.25–0.27 mm) for females in *G. harveyi*. In addition, the pedipalp femur is clearly longer in *G. shulovi* (0.91/0.19 mm for males and 1.00/0.21 mm for females) than in *G. harveyi* (0.62–0.68/0.14–0.16 mm for males and 0.69–0.71/0.16–0.17 mm for females).

*Geogarypus pulcher* from Israel (Beier 1963a) is easily distinguished from *G. harveyi* by the stouter pedipalps, for example the femur L/W of *G. pulcher* is 0.78–0.85/0.20–0.22 mm and the chela (without pedicel) L/W 1.29/0.36 mm for females. In addition, the carapace of *G. pulcher* has pale patches, whereas that of *G. harveyi* is uniformly dark brown.

*Geogarypus continentalis* from Kazakhstan, Kirghizia and Pakistan (Dashdamirov & Schawaller 1993a, b, Dashdamirov 2004) is easily separated from *G. harveyi* by the presence of denticuloclavate setae on the anterior margin of the carapace (Dashdamirov 2004). All setae on the anterior margin of the carapace are simple in *G. harveyi* which resembles that of *G. azerbaidzhanicus*. In *G. azerbaidzhanicus*, all four setae are simple but equal in length while the two median setae on anterior margin of *G. harveyi* are shorter than the two sub-medial setae.

*Geogarypus mirei* was described from Chad (Heurtault 1970) and resembles *G. harveyi* in the unicolored carapace. It differs, however, in pedipalp size; for example the femur of *G. mirei* is distinctly longer and slightly stouter (0.75–0.82/0.16–0.17 mm for females) than that of *G. harveyi*. Also, the pedipalp chela (without pedicel) of *G. mirei* is distinctly longer and stouter (1.22–1.27/0.33–0.35 mm for females) than that of *G. harveyi* (1.02–1.05/0.25–0.27 mm for females).

*Geogarypus minor* and *G. nigrimanus* can be separated from the new species by the position of trichobothrium est which is located much closer to *ib* than *isb* and the chelal ratio which is less than 4.00/ (Beier 1963b).

**Etymology.** This species is named in honor of Mark S. Harvey for his contributions to the study of pseudoscorpions.

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**References**


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