Redescription of the widely distributed species in the Middle East and central Asia, *Calocheiridius centralis* (Beier) (Pseudoscorpiones: Olpiidae)

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**Abstract**

Recent collections of pseudoscorpions in central and southern parts of Iran resulted a number of *Calocheiridius centralis* (Beier, 1952), which is widely distributed throughout the Palearctic and Oriental regions. The species is completely redescribed, and also its new wide morphometric range, chaetatoxis variations, and well-illustrations are provided here on the basis of the several specimens recently collected from various parts of Iran.

**Keywords:** Pseudoscorpion, Morphometry, Trichobothriotaxy, Chaetotaxis variations

**1. Introduction**

Four species of *Calocheiridius*, *C. centralis* (Beier, 1952), *C. libanoticus* Beier, 1955, *C. antushi* Krumpál, 1983, and *C. iranicus* Nassirkhani, 2014 have been reported from the Middle East and Central Asia [6, 9]. *Calocheiridius centralis* was originally described from Afghanistan by Beier [1], and subsequently, reported from Iran, Azerbaijan, India, Pakistan, Turkmenistan and Uzbekistan [6]. This species was previously found under stones in Shiraz and Abadan cities, southern Iran [2]. Because Beier [1] only briefly described the female type, and the specimens from Central Asia were not described by Dashdamirov & Schawaller [4], *C. centralis* is here redescribed from the new Iranian material.

**2. Material and Methods**

The specimens were preserved in 70% ethanol and prepared for study as the follows: the pedipalps, chelicera, first and fourth legs were dissected, cleared with 60% lactic acid, and mounted on glass microscope slides in Swan’s fluid. The specimens were examined and illustrated with an Olympus BH-2 compound microscope and drawing with a tube attachment. The specimens are lodged in Collection of the Acarology Laboratory, Islamic Azad University of Arak (IAUA), Iran. Morphological terminology and mensuration follow Chamberlin [3], Harvey [5], Harvey et al. [7] and Judson [8].
The following abbreviations are used: 

\[\begin{align*}
&L = \text{length}; \quad W = \text{width}; \quad D = \text{depth}; \\
&eb = \text{external basal}; \quad esb = \text{external sub-basal}; \\
&ib = \text{internal basal}; \quad isb = \text{internal sub-basal}; \\
&ist = \text{internal sub-terminal}; \quad est = \text{external sub-terminal}; \\
&it = \text{internal terminal}; \quad et = \text{external terminal}; \\
&t = \text{terminal}; \quad b = \text{basal}; \quad sb = \text{sub-basal}; \quad st = \text{sub-terminal}.
\end{align*}\]

Family Olpiidae Banks, 1895  
Subfamily Olpiinae Banks, 1895  
Genus \textit{Calocheiridius} Beier & Turk, 1952  
\textit{Calocheiridius centralis} (Beier, 1952)  
\textit{Minniza centralis} Beier, 1952: 247-248, fig. 2.

\textbf{Figs 1-4}: \textit{Calocheiridius centralis} (Beier, 1952), \(♂\) from Kolah Ghazi National Park, Fars Province: 1. carapace, dorsal aspect (showing the presence of four seta on the posterior margin of carapace and two setae on tergite I); 2. left chela, lateral aspect; 3. tip of fixed finger (showing venom apparatus and a number of sensory setae); 4. basal segments of pedipalp, dorsal aspect.
Fig 5-8: Calocheiridius centralis (Beier, 1952), ♂ from Seyyedan, Fars Province: 5. carapace, dorsal aspect (showing the presence of four setae on posterior margin of the carapace and tergite I); 6. left coxa, ventral aspect; 7. leg I (trochanter omitted); 8. leg IV (trochanter omitted).
Fig 9-14: Calocheiridius centralis (Beier, 1952), ♂ from Seyyedan, Fars Province: 9. right chela, lateral aspect; 10. right chela, dorsal aspect; 11. tip of fixed chelal finger (showing venom apparatus and a number of sensory setae); 12. tip of movable chelal finger (showing venom apparatus); 13. basal segments of patella, dorsal aspect; 14. chelicera (serrula exterior omitted), dorsal aspect.
Fig 15: Collecting localities of Calocheiridius centralis (Beier, 1952) in central and southern Iran.

3. Material examined
IRAN: Fars Province: 2♂, 2♀, Stahban [29°12′66″N, 54°04′22″E, altitude 1676 m], dry leaf litter, mountain habitat, July 6 2014, M. Nassirkhani (IAUA), 7♂, Seyyedan [29°N, 53°E, altitude 1560 m], Marvdasht, soil and litter, July 8 2014, M. Nassirkhani (IAUA), 5♂, Persepolis [29°N, 53°E, altitude 1770 m], Marvdasht, soil and litter, July 8 2014, leg. M. Nassirkhani (IAUA). Isfahan Province: 2♂, 1♀, Kolah Ghazi National Park [32°21′07″N, 51°54′17″E, altitude 1800 m], Isfahan, leaf litter, July 10 2014, leg. M. Nassirkhani (IAUA).

4. Description:
Males (Females)
Body length: 2.55-2.77 mm (♀3.00-3.52 mm).
Carapace: reddish brown, 1.17-1.40 times longer than width (♀1.36-1.42); with two pairs of corneate eyes; chaetotaxy: 4:6:4:2:4 (in 1♂; 4:6:4:0:4:2; in 1♀2♂; 4:6:4:2:4:4); all setae simple and acute; with 10 lyrifissures (figs 1, 5).


Sternites: pale; poorly sclerotized; IX with one slightly seta situated lateromedially; X with four tactile and two slightly long setae; XI with four tactile and four slightly long setae; chaetotaxy: 7-8:(0)4(0):(1)4-6(1):4-6:4:4:4:4:6:8-10:2 (in 2♂7-10:(0)4(0):(0)6(0):6:4:4:4:4:6:6-7:9-10:2). Pleural membrane: longitudinally striate.

Chelicera: brown; galea with 3 rami (2 apical and 1 sub-apical rami); hand with 5 setae (fig. 14); rallum with 3 blades, distal blade largest; serrula exterior with 16-18 blades; fixed finger with 6 teeth; movable finger
with one curved apical lobe and two pointed sub-apical teeth.

**Pedipalps**: reddish brown, chela darker in colour than other segments; trochanter, femur and patella entirely smooth, chela distinctly granulated mediodistally (figs 2, 10); trochanter with a small dorsal hump; femur with 2 long setae situated on dorsal face, one seta situated basally and other situated in distal half of the segment (figs 4, 13), L/W 2.50-2.88 (♀2.61-2.63); patella with 4 lyrifissures situated basally, L/W 2.08-2.52 (♀2.27-2.29); hand with 1-2 long setae situated laterobasally (Figs 18, 24, 27); chela (with pedicel) L/W 2.90-3.56 (♀2.83-2.87); chela (without pedicel) L/W 2.70-3.25 (♀2.61-2.65); hand (with pedicel) L/W 1.67-2.04 (♀1.66-1.67); movable finger distinctly shorter than hand (with pedicel); hand (with pedicel) 1.18-1.79 times longer than movable finger; fixed finger with 8 and movable finger with 4 trichobothria (figs 2, 9, 10); fixed finger with 8-8 sensory setae situated close to trichobothrium et and fingertip (figs 3, 11); fixed finger with 20-27 cusped teeth which followed by 5-6 indistinct teeth; movable finger with 20-26 cusped teeth which followed by 6 indistinct teeth; nodus ramosus located distinctly distal to / in the distal third of movable finger (fig. 12) and clearly proximal to et in fixed finger (Figs 3, 11).

**Legs**: light brown; all setae simple and acute; coxal setae arranged (fig. 6): 4:4-5:4-6:6-7 (♀4:5:5-6:7-8:11-12); claws symmetrical, stout and short; arolium simple and longer than claws (figs 7, 8); Leg I (fig. 7): femur L/D 1.80-2.11 (♀2.18-2.27); patella L/D 1.36-1.80 (♀1.81-1.82); femur L/ patella L 1.05-1.27 (♀1.20-1.25); tibia L/D 2.50-3.43 (♀3.50); metatarsus L/D 1.80-2.00 (♀2.00); tarsus L/D 2.70-3.25 (♀2.60-2.80). Leg IV (fig. 8): femur L/D 1.33-1.70 (♀1.43-1.58); patella L/D 2.10-2.47 (♀2.27-2.45); tibia with a slightly long seta situated basally, L/D 3.25-3.60 (♀3.07-3.50); metatarsus with a long tactile seta situated basally, L/D 2.14-2.50 (♀2.12-2.43); tarsus L/D 2.83-3.40 (♀3.00-3.16).

**Dimensions** in mm: Carapace: 0.62-0.70/0.42-0.53. Pedipalp: trochanter 0.29-0.35/0.14-0.19; femur 0.47-0.56/0.17-0.21; patella 0.47-0.56/0.19-0.25; chela (with pedicel) 0.86-1.02/0.25-0.32; chela (without pedicel) L. 0.79-0.95; hand (with pedicel) L.0.48-0.60; movable finger L. 0.39-0.50. Leg I: femur 0.18-0.21/0.09-0.11; patella 0.15-0.18/0.09-0.15; tibia 0.20-0.26/0.07-0.09; metatarsus 0.09-0.11/0.05; tarsus 0.11-0.13/0.04. Leg IV: femur 0.16-0.18/0.10-0.12; patella 0.40-0.47/0.17-0.20; femur + patella 0.50-0.56; tibia 0.34-0.39/0.10-0.12; metatarsus 0.10-0.15/0.05-0.07; tarsus 0.16-0.17/0.05-0.06. Carapace: 0.76-0.81/0.57. Pedipalp: trochanter 0.37-0.38/0.18-0.19; femur 0.58-0.60/0.22-0.23; patella 0.59-0.62/0.26-0.27; chela (with pedicel) 1.05-1.12/0.37-0.39; chela (without pedicel) L. 0.98-1.02; hand (with pedicel) L.0.62-0.65; movable finger L. 0.50-0.52. Leg I: trochanter 0.14-0.19/0.07-0.12; femur 0.24-0.25/0.11; patella 0.20/0.11; tibia 0.28/0.08; metatarsus 0.12/0.06; tarsus 0.13-0.14/0.05. Leg IV: trochanter 0.24-0.25/0.15; femur 0.19-0.20/0.12-0.14; patella 0.50-0.54/0.22; femur + patella 0.61-0.63; tibia 0.42-0.43/0.12-0.14; metatarsus 0.17/0.07-0.08; tarsus 0.18-0.19/0.06.

**5. Result and Conclusion**

General characters of the *Calocheiridius* Beier & Turk, 1952 species are rather vague but often the chaetotaxy of the carapace and tergite I, the shape of the pedipalp, and the trichobothrial pattern are considered for recognizing the species. On the basis of the setal numbers on the posterior margin of carapace and tergite I, the genus *Calocheiridius* has been divided to four species groups based on the original descriptions [9]. Many specimens collected recently from Iran can be placed in the *C. centralis* group which is identified by the presence of four seta on the posterior margin of carapace and two setae on tergite I (fig. 1).

Variation of setal number in the posterior row of the carapace and on tergite I in *C. centralis* was previously reported by Dashdamirov & Schawaller [8]. They recorded two setae on the posterior margin of the carapace and tergite I of *C. centralis* which has only been observed for one male of the newly collected specimen from Iran. This setal arrangement which is rarely occurred can be regarded as an abnormal character for the species.

Additionally, one male and five females of the newly collected specimens from Iran bear four setae on their tergite I (fig. 5). Since there are six specimens (approximately 32%) with four setae on tergite I, it would be reasonably assumed that this reflects the normal range of variation in the species. Therefore, the groups proposed by Nassirkhani [9] are probably artificial and unreliable because the chaetotaxy of the posterior row of the carapace and tergite I show variation within a species. Nonetheless, many of the types and also more specimens collected from a variety of locations belonging to the genus *Calocheiridius* must be re-examined to assess the levels of intra-specific variation.

Based on the shape of the pedipalps and the trichobothrial pattern, the present materials collected from central and southern Iran (fig. 15) are more similar to the type than to the specimens reported from central Asia, e.g. *trichobothrium it* is located at the same level as *est*, as in the type (judging from Beier [10]: fig. 2), while it is located distal to *est* in the fixed chelal
finger of the specimens from central Asia (judging from Dashdamirov & Schawaller [4]: figs 6-8).

6. Conflict of interest statement
The author declares that he has no competing interests and has not a financial relationship with the organization that sponsored the research.

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8. References


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