

## Two new species of *Neobisium (Ommatoblothrus)* Beier from Socotra (Arachnida: Pseudoscorpiones: Neobisiidae)

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**Abstract.** Two new pseudoscorpion species, *Neobisium (Ommatoblothrus) wettereri* Nassirkhani sp. nov. and *Neobisium (Ommatoblothrus) karmanae* Nassirkhani sp. nov., are described from Socotra (Yemen). The family Neobisiidae is reported for the first time from Socotra. Ecological notes on these two new species and a distribution map of all known *Neobisium (Ommatoblothrus)* species are presented.

**Keywords:** Arachnida, endemic species, morphology, taxonomy, Afrotropical region, western Asia

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<http://zoobank.org/References/ca11fcd3-9f51-458e-9caa-833af7e33c36>

The Socotra Archipelago, an isolated island group in the Arabian Sea (Fig. 1A), is well-known for its high level of biotic endemism (Di Micco De Santo & Zandri 2004; Batelka 2012; Sharaf et al. 2017). The Archipelago consists of the main island of Socotra (3,625 km<sup>2</sup>) and three smaller islands, Abd al Kuri (133 km<sup>2</sup>), Samha (41 km<sup>2</sup>) and Darsa (10 km<sup>2</sup>), with a total area of ca. 3700 km<sup>2</sup> (Culek 2013). Abd al Kuri is the nearest island to the African mainland, ca. 90 km from the coast of Somalia (Van Damme & Benfield 2011; Batelka 2012).

The genus *Neobisium* Chamberlin, 1930 is mostly confined to the Palaearctic Region, ranging from Western Europe to Central Asia, with a single record of *N. (Neobisium) carcinooides* (Hermann, 1804) from Kenya (Harvey 2021). The subgenus *Neobisium (Ommatoblothrus)* Beier, 1956 currently includes 28 known species (not including the present study), found mostly in the Mediterranean region, with some records from the Middle East and Caucasia (Fig. 1B) (Nassirkhani & Mumladze 2018; Harvey 2021).

Mahnert (2007) reported 19 species of pseudoscorpions (Pseudoscorpiones) from Socotra, describing 17 of them as new to science. Here, we describe two new pseudoscorpion species that appear to be endemic to Socotra: *Neobisium (Ommatoblothrus) wettereri* Nassirkhani sp. nov. and *Neobisium (Ommatoblothrus) karmanae* Nassirkhani sp. nov., which represent the first members of the family Neobisiidae known from Socotra.

Species assigned to the subgenus *Neobisium (Ommatoblothrus)* are commonly cave-dwelling pseudoscorpions (Nassirkhani & Mumladze 2018; Harvey 2021), however, Beier (1963) mentioned that *N. (O.) staudacheri* Hadži, 1933 was collected from humus near the Biokovo mountains in Croatia. In this study, *N. (O.) wettereri* was collected from leaf litter in a xeric landscape and *N. (O.) karmanae* from a wetland in Socotra Archipelago, which are rare macrohabitats for species of *N. (Ommatoblothrus)*. With the presence of vast unexplored regions of Yemen, it is likely more new records and new species are awaiting discovery.

## METHODS

From 19–27 April 2014, the second author, M. Sharaf, collected invertebrates in the Socotra Archipelago at 27 diverse sites (Figs. 2A, B). Pseudoscorpion specimens were mounted on slides in Swan's fluid (Swan 1936), examined with an Olympus CH-2 compound microscope, illustrated with a drawing tube attached to the microscope, and measured with an ocular graticule. Photographs were made using a digital camera (Canon PCI468). The specimens are deposited in the collection of the Acarology Laboratory, Islamic Azad University, Arak branch, Iran (IAUA) and the King Saud University Museum of Arthropods, King Saud University, Riyadh, Saudi Arabia (KSMA).

Nomenclature of trichobothria and appendages, as well as the measurements, follow Chamberlin (1931), Harvey (1992), and Judson (2007). The use of the terms prolateral and retrolateral follows Harvey et al. (2012). Terminology of the chelal lyrifissures follows Zaragoza (2017). The given ratios are length/width for individual articles, length/depth for legs, and distance from the base of the fixed chelal finger to center of the bothrium/the fixed chelal finger length in dorsal view for the position of trichobothrium *ist.* Also, intraspecific variations within the species are mentioned in square brackets.

Abbreviations: Trichobothriotaxy, as in Chamberlin (1931); D: depth; *fa*: retrolateral lyrifissure of fixed chelal finger; *fb*: dorso-retrolateral lyrifissure of fixed chelal finger; *fd*: dorso-distal lyrifissure of fixed chelal finger; L: length; *ma*<sub>1</sub>, *ma*<sub>2</sub>, *ma*<sub>3</sub>: retrolateral lyrifissures of movable chelal finger; T: tactile seta; W: width.

## TAXONOMY

**Family Neobisiidae** Chamberlin, 1930  
**Subfamily Neobisiinae** Chamberlin, 1930  
**Genus *Neobisium*** Chamberlin, 1930  
**Subgenus *Neobisium (Ommatoblothrus)*** Beier, 1956

*Neobisium (Ommatoblothrus)* Beier 1956b: 131–132.



Figure 1.—A. Geographical location of Socotra; B. Geographical distribution of the *Neobisium (Ommatoblothrus)* species including the present study (Nassirkhani & Mumladze 2018; Harvey 2021).

**Type species.**—*Neobisium (Ommatoblothrus) sardoum* Beier, 1956, by original designation

**Remarks.**—The genus *Neobisium* Chamberlin, 1930 includes six subgenera which are primarily differentiated by the presence and development of eyes and eyespots, the granulation pattern of the pedipalps, the structure of the cheliceral rallum, and the trichobothriotaxy (eg., Beier 1963; Callaini 1981). Although Čurčić (1984) questioned whether the subgenera *N. (Blothrus)* Schiödte, 1847, *N. (Ommatoblothrus)* Beier, 1956, and *N. (Heoblothrus)* Beier, 1963 were monophyletic groups, the subgenera of *Neobisium* continue to be used by taxonomists. Resolution of this issue will rely on a comprehensive phylogenetic study of *Neobisium* species.

Based on current concepts of the subgenera of *Neobisium*, the newly collected specimens from Socotra can be attributed to *N. (Ommatoblothrus)* based on the following combination of characters: eyes reduced, especially the posterior ones which

are entirely absent or reduced to eyespots; pedipalpal segments smooth; cheliceral rallum with two distal dentate blades located on a high hyaline membrane; and trichobothrium *t* located distally on the movable chelal finger.

***Neobisium (Ommatoblothrus) wettereri*** Nassirkhani, sp. nov.  
<http://zoobank.org/NomenclaturalActs/urn:lsid:zoobank.org:act:0132099E-054E-4973-8773-112B8643A125>  
 (Figs. 3A–J)

**Type material.**—*Holotype female* YEMEN: *Socotra*: Lehano, 12°34'33"N, 54°02'54"E, 931 m a.s.l., 22 April 2014, M. Sharaf (KSMA).

*Paratypes*: 2 ♀, same data as holotype (IAUA).

**Etymology.**—The species epithet honors Prof. James K. Wetterer, Wilkes Honors College, Florida Atlantic University, Florida, USA.

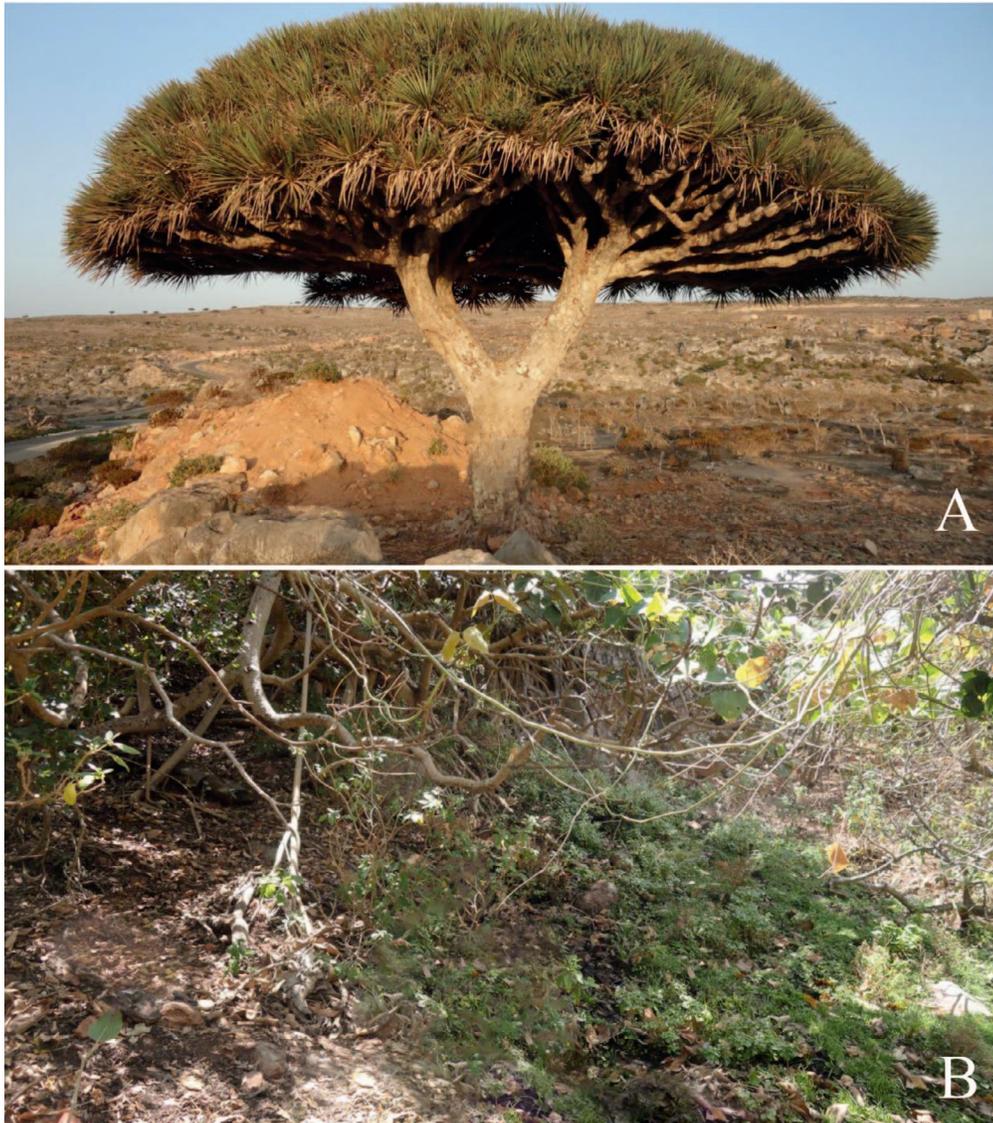


Figure 2.—Type localities: A. Xeric habitat in Lehnano; B. Wetland in Wadi Ayhif. (M. Sharaf photos).

**Diagnosis.**—*Neobisium* (*Ommatoblothrus*) *wettereri* sp. nov. differs from all other species of the subgenus by the following combination of characters: anterior eyes with strong lens, and posterior ones absent (Figs. 3A–C); epistome prominent and apically rounded (Fig. 3C); carapace without preocular microsetae, and posterior margin with 7–8 setae; tergite I with 6–7 and tergite II with 8–9 setae (Fig. 3A); the position of trichobothrium *ist* in the fixed chelal finger (*ist* = 0.56; Fig. 3H); the shape of anterolateral process of the pedal coxa I (long and pointed; Fig. 3I); the morphometric characters, e.g., length of pedipalpal femur 1.53–1.77 mm and chela (with pedicel) 2.30–2.87 mm; the length of movable chelal finger (slightly longer than chelal hand (with pedicel) and distinctly shorter than pedipalpal femur); and the movable chelal finger with 62–80 and fixed finger with 65–89 contiguous and almost similar teeth.

**Description (females).**—*Coloration*: carapace brown, posterior border not sclerotized and pale; pedipalpal segments uniformly colored, slightly lighter in color than carapace;

tergites and sternites yellowish brown surrounded with whitish yellow membranes; chelicerae lighter in color than carapace; legs darker in color than tergites, and distinctly lighter in color than carapace and pedipalps

*Carapace* (Figs. 3A–C): entirely smooth; slightly wider than long, widest at the middle, 0.94–0.96 × longer than broad; with two corneate eyes, lenses of anterior eyes not flattened and with distinct convexity (Fig. 3B), posterior eyes absent, diameter of anterior eyes 0.067–0.075 mm, distance of anterior eyes from anterior margin 0.100–0.155 mm; with 22–24 setae, anterior margin with 3–4 and posterior margin with 7–8 setae (Figs. 3A, C), microsetae absent, most setae long and acute, chaetotaxy: 3–4: 6: 6: 7–8; transverse furrows absent; epistome prominent, relatively large, distinctly wider than long, with isosceles triangle shape, and apically rounded, length 0.037–0.040 mm, width 0.050–0.057 mm; glandular pores present, 2–3 on each side in ocular zone (Fig. 3A) [in one paratype, 2 glandular pores located on left and 3 on the right side in ocular zone, and also, 2 microglandular

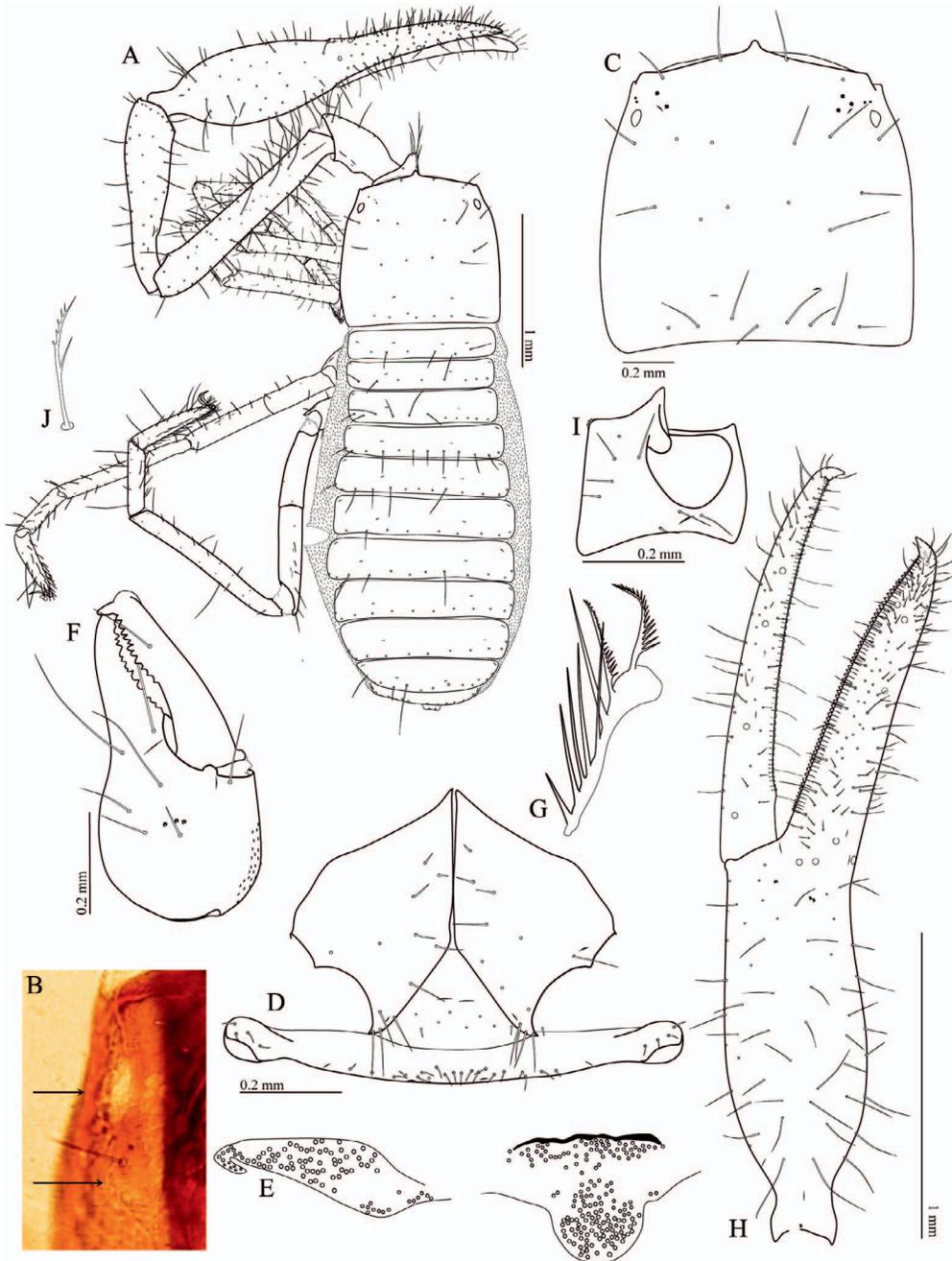


Figure 3.—*Neobisium (Ommatoblothrus) wettereri* Nassirkhani, sp. nov.: A,B,D–J, holotype female; C, paratype female: A, whole body, dorsal view (right pedipalp, right legs and both chelicerae omitted); B, ocular zone (microscope picture), in part (form of eyes shown by arrows); C, carapace, dorsal view; D, coxae IV and sternites II–III, ventral view; E, cribriform plates, ventral view (left lateral cribriform plate omitted); F, right chelicera, dorsal view (serrulae omitted); G, rallum; H, left chela, retrolateral view; I, left coxa, ventral view; J, sub-terminal seta.

pores located in front of each eye (Fig. 3C)]; anterolateral corners without protuberances; with 4 lyrifissures, 1 pair situated in ocular zone and close to eyes, 1 pair located distal to posterior margin.

**Tergites:** smooth, weakly sclerotized; all setae simple, acute, uniseriate; all tergites with four lyrifissures [in holotype, tergites I–IV, VI–VIII, and X–XI with 4 lyrifissures, tergite V with 5 and tergite IX with 3 lyrifissures (Fig. 3A)]; tergite X with 2 and tergite XI with 4 tactile setae (most setae lost,

judgment based on setal areoles); chaetotaxy: 6–7: 8–9: 11: 12: 12–13: 9–12: 12: 12: 11: 4T2T4–4T2T5: T2T2T2T: 2.

**Sternites:** entirely smooth, weakly sclerotized; all setae simple and acute; sternites III–XI uniseriate; sternites II–V with 2 median and VI–X with 2 median and 2 lateral, and sternite XI with 2 lateral lyrifissures; anterior operculum with 9–10 scattered tiny microsetae, posterior operculum with 20 short setae in one row on posterior border (Fig. 3D); with a median and 1 lateral cribriform plate located on each side

(Fig. 3E); sternites X–XI with 2 tactile setae; chaetotaxy: 9–10: (3–4) 20 (3–4): (3–4)11–12(3): 16: 16: 16: 15–16: 15: 5T2T5–5T2T6: T2T–T3T: 2.

*Pleural membrane*: granulate, without setae.

*Chelicera*: hand with 7 acuminate setae (Fig. 3F); subgaleal seta situated distal to middle (0.69–0.75); galea knob-like, pronounced, with a distinctly hyaline convexity (Fig. 3F) [in one paratype, galea very short with indistinctly hyaline convexity]; proximal half of retrolateral side of hand finely granulate (Fig. 3F); hand with 3 glandular pores and 2 lyrifissures in dorsal view; fixed finger with 13–16 close-set teeth reaching to base; movable finger with 11–12 teeth reaching very close to middle of the segment, without median large tooth (Fig. 3F); serrula interior with 18–23 and exterior with 27–31 blades; rallum with 8 blades, two distal blades denticulate, most proximal blade shortest, and two dentate blades located on high hyaline base (Fig. 3G).

*Pedipalps* (Figs. 3A, H): entirely smooth, coxa including manducatory process with 14 setae, manducatory process with 5 acuminate setae, median seta longest; trochanter with a very small dorsal tubercle, without stout and short setae, L/W 2.48–2.68 ×; femur without distinguishable pedicel, loss of marginal tubercles, one glandular pore located dorso-distally, 8 microglandular pores located along the middle of retrolateral face of the segment, L/W 6.10–6.45 ×; patella with elongated pedicel (L = 0.40–0.46 mm); patella distinctly shorter than femur, with 3 lyrifissures situated basally and 2 lyrifissures located distally on retrolateral face of the segment, glandular pores absent, notch on the median side of patella not reaching to the distal fourth of the patellar club length, ratio of diameter of distal opening to inner margin of patella (X/Y) 0.34–35 ×, L/W 4.28–4.53 ×. Chela with pedicel L/W 4.86–5.00 ×, without pedicel L/W 4.47–4.60 ×; movable finger slightly longer than hand with pedicel and distinctly longer than hand without pedicel; movable finger 1.03–1.08 × longer than hand with pedicel and 1.22–1.26 × longer than hand without pedicel; movable finger distinctly shorter than femur; hand with pedicel L/W 2.54–2.72 ×; hand without pedicel L/W 2.15–2.33 ×; chelal hand long ovate in dorsal view (Fig. 3A); 4–5 microsetae located between trichobothria *eb-esb* and trichobothrium *isb* on retrolateral face of fixed finger (Fig. 3H); 3 glandular pores located below trichobothria *eb-esb* on prolateral face and 2–3 glandular pores located on retrolateral face of distal third of chelal hand; fixed finger with 4 lyrifissures: one located at the same level as *ib*, one slightly distal to *isb*, one close to base in retrolateral view and one slightly distal to *et* in dorsal view (Figs. 3A, H); movable finger with 3 lyrifissures in retrolateral view (Fig. 3H): *ma*<sub>2</sub> and *ma*<sub>1</sub> located between trichobothria *sb* and *st*, and *ma*<sub>3</sub> located slightly distal to *st*; chelal hand with 2 proximal lyrifissures in retrolateral view (Fig. 3H), either located slightly distal to pedicel, close to lateral margin of hand and either located on top of the pedicel; chelal pedicel with 2 microglandular pores; one sensillum located between trichobothria *sb* and *st*, closer to *st* than to *sb* in retrolateral face; fixed finger with 65–89 contiguous, retroconical, cusped and blunt teeth approximately reaching to trichobothrium *isb*, 5–6 most distal and 3–4 most proximal teeth smallest, other teeth almost with same size, all teeth with dental canal; movable finger with 62–80 contiguous, rounded and cusped teeth slightly reduced in size

from tip of the finger to its base, not reaching to the level of trichobothrium *b*, all teeth with dental canal; venom duct in fixed chelal finger short and nodus ramosus situated distinctly distal to *et*.

*Trichobothriotaxy*: fixed finger with 8 and movable finger with 4 trichobothria (Fig. 3H); fixed finger with trichobothrium *it* located almost at the same level as *et*, trichobothria *it*, *et*, and *est* making a group in almost distal quarter of the finger, *ist* situated distinctly distal to middle of the finger, far of the trichobothrial group (*ist* = 0.56), *isb* located on retrolateral face (*isb* = 0.11), *ib* situated basally, *eb* and *esb* located slightly proximal to *ib*; movable finger with trichobothrium *st* situated distinctly closer to *t* than to *sb*, trichobothrium *sb* slightly closer to *b* than to *st*, distance *b-sb* distinctly longer than distance *st-t*.

*Legs*: entirely smooth; coxa I with long, triangular, sclerotized and apically pointed anterolateral process, medio-lateral face with finely denticulate membranous layer (Fig. 3I); coxal chaetotaxy: 7–8: 8–10: 5–6: 12–14; sub-terminal setae bifid, longer ramus denticulate, basal ramus smooth (Fig. 3J); claws smooth; arolia simple and shorter than claws. Leg I: femur 5.35–5.64 ×; patella 4.50–4.91 ×; femur 1.44–1.46 × longer than patella; tibia 6.10–6.27 ×; metatarsus 4.62–4.66 ×; tarsus 5.00 ×; tarsus 1.19–1.22 × longer than metatarsus. Leg IV: femur 2.60–3.31 ×; patella 3.40–3.50 ×; femur + patella 5.90–6.25 ×; tibia with a long tactile seta situated proximal to middle (T = 0.35–0.41), 7.33–9.61 ×; metatarsus with 2 long tactile setae, second one slightly shorter than the other (Fig. 3A), either located basally (T = 0.15–0.20) and the other located distally (T = 0.72–0.75), 4.42 ×; tarsus with a long tactile seta situated slightly proximal to middle (T = 0.39–0.43), 5.91 ×.

*Measurements (mm)*: holotype ♀ (paratypes ♀♀), body length: 3.53 (3.55–3.75). Carapace: 0.94/1.00 (1.00–1.17/1.05–1.22). Pedipalp: trochanter 0.67/0.27 (0.67–0.83/0.27–0.31); femur 1.53/0.24 (1.55–1.77/0.24–0.29); patella 1.26/0.28 (1.27–1.50/0.28–0.35); chela (with pedicel) 2.33/0.46 (2.30–2.87/0.46–0.59); chela (without pedicel) L. 2.15 (2.12–2.64); hand (with pedicel) L. 1.25 (1.25–1.50); hand (without pedicel) L. 1.07 (1.07–1.27); movable finger L. 1.35 (1.32–1.55); fixed finger L. 1.15 (1.13–1.47). Leg I: femur 0.79/0.14 (0.79–0.91/0.14–0.17); patella 0.54/0.11 (0.54–0.63/0.11–0.14); tibia 0.61/0.10 (0.61–0.69/0.10–0.11); metatarsus 0.37/0.08 (0.37–0.42/0.08–0.09); tarsus 0.45/0.09 (0.45–0.50/0.09–0.10). Leg IV: femur 0.63/0.19 (0.60–0.65/0.20–0.25); patella 0.70/0.20 (0.70–0.85/0.20–0.25); femur + patella 1.25 (1.25–1.47); tibia 1.25/0.13 (1.18–1.32/0.12–0.18); metatarsus 0.53/0.12 (0.53–0.60/0.12–0.15); tarsus 0.60/0.11 (0.60–0.71/0.11–0.12).

**Remarks.**—This species may be separated from all other species of this subgenus based on the presence of only two well-developed corneate eyes and loss of posterior eyes/eyespot (Figs 3A–C), whereas the other known species of this subgenus bear at least two eyespot, especially as posteriors. Nonetheless, according to the presence of 7–8 setae on the posterior margin of the carapace (Table 1), and the morphometric characteristics, e.g., the length of the movable chelal finger (slightly longer than the chelal hand (with pedicel)) (Table 2), and the pedipalpal femur length (less than 2.00 mm) (Table 3), this new species is very similar to *N. (O.) pangaeum* Gardini, 1985 from Greece, and *N. (O.)*

Table 1.—Setal numbers on the posterior margin of the carapace in the *Neobisium (Ommatoblothrus)* species, not including the present study (Hadži 1933a,b; Beier 1953, 1955, 1956a,b, 1963, 1966; Mahnert 1973, 1977, 1980b, 1982; Heurtault 1979; Gardini 1982, 1985; Schawaller 1985; Gardini & Rizzerio 1986; Callaini 1987; Carabajal et al. 2000, 2001, 2011; Henderickx 2000; Henderickx & Vets 2000; Nassirkhani & Mumladze 2018).

Carapacal chaetotaxy: setal numbers on posterior margin		
4	6-9	10-16
<i>N. (O.) achaemenidum</i> Nassirkhani and Mumladze, 2018	<i>N. (O.) battonii</i> Beier, 1966	<i>N. (O.) baenai</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011
<i>N. (O.) bessoni</i> Heurtault, 1979	<i>N. (O.) cerrutii</i> Beier, 1955	<i>N. (O.) espinoi</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011
<i>N. (O.) gomezi</i> Heurtault, 1979	<i>N. (O.) epirense</i> Henderickx and Vets, 2000	<i>N. (O.) paucedentatum</i> Mahnert, 1982
<i>N. (O.) gracile</i> Heurtault, 1979	<i>N. (O.) gaditanum</i> Mahnert, 1977	<i>N. (O.) piquerae</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2001
<i>N. (O.) henroti</i> Beier, 1956	<i>N. (O.) lulense</i> Gardini, 1982	<i>N. (O.) tinauti</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011
<i>N. (O.) patrizii</i> Beier, 1953	<i>N. (O.) lense</i> Gardini, 1982	
<i>N. (O.) patrizii romanum</i> Mahnert, 1980	<i>N. (O.) oenotricum</i> Callaini, 1987	
<i>N. (O.) phaeacum</i> Mahnert, 1973	<i>N. (O.) pangaeum</i> Gardini, 1985	
<i>N. (O.) sammiticum</i> Mahnert, 1980	<i>N. (O.) perezi</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	
<i>N. (O.) zoiai</i> Gardini and Rizzerio, 1986	<i>N. (O.) piquerae</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2001	
	<i>N. (O.) rodrigoii</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2000	
	<i>N. (O.) sardoum</i> Beier, 1956	
	<i>N. (O.) schawalleri</i> Henderickx, 2000	
	<i>N. (O.) spilianum</i> Schawaller, 1985	
	<i>N. (O.) staudacheri</i> Hadži, 1933	

Table 2.—Proportions of the movable chelal finger length versus the chelal hand (with pedicel) length in the *Neobisium (Ommatoblothrus)* species, not including the present study. See caption of Table 1 for references.

Length of the movable chelal finger versus length of the chelal hand (with pedicel)	
1.3-1.8 × longer than chelal hand (with pedicel)	0.9-1.2 × longer than chelal hand (with pedicel)
<i>N. (O.) achaemenidum</i> Nassirkhani and Mumladze, 2018	<i>N. (O.) bessoni</i> Heurtault, 1979
<i>N. (O.) baenai</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	<i>N. (O.) gaditanum</i> Mahnert, 1977
<i>N. (O.) battonii</i> Beier, 1966	<i>N. (O.) lulense</i> Gardini, 1982
<i>N. (O.) cerrutii</i> Beier, 1955	<i>N. (O.) pangaeum</i> Gardini, 1985
<i>N. (O.) epirense</i> Henderickx and Vets, 2000	<i>N. (O.) paucedentatum</i> Mahnert, 1982
<i>N. (O.) espinoi</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	<i>N. (O.) piquerae</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2001
<i>N. (O.) gomezi</i> Heurtault, 1979	<i>N. (O.) staudacheri</i> Hadži, 1933
<i>N. (O.) gracile</i> Heurtault, 1979	
<i>N. (O.) henroti</i> Beier, 1956	
<i>N. (O.) oenotricum</i> Callaini, 1987	
<i>N. (O.) patrizii</i> Beier, 1953	
<i>N. (O.) patrizii romanum</i> Mahnert, 1980	
<i>N. (O.) phaeacum</i> Mahnert, 1973	
<i>N. (O.) perezi</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	
<i>N. (O.) rodrigoii</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2000	
<i>N. (O.) sammiticum</i> Mahnert, 1980	
<i>N. (O.) sardoum</i> Beier, 1956	
<i>N. (O.) schawalleri</i> Henderickx, 2000	
<i>N. (O.) spilianum</i> Schawaller, 1985	
<i>N. (O.) tinauti</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	
<i>N. (O.) zoiai</i> Gardini and Rizzerio, 1986	

Table 3.—The pedipalpal femur length and its proportions for the *Neobisium* (*Ommatoblothrus*) species, not including the present study. See caption of Table 1 for references.

Species	Pedipalpal femur length (in mm)	Ratio
<i>N. (O.) achaemenidum</i> Nassirkhani and Mumladze, 2018	(♂) 1.76	6.5×
<i>N. (O.) baenai</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	(♀) 2.03	6.7×
<i>N. (O.) battonii</i> Beier, 1966	(♀) 1.53	6.7×
<i>N. (O.) bessoni</i> Heurtault, 1979	(♀) 2.45	8.1×
<i>N. (O.) cerrutii</i> Beier, 1955	(♀) 1.78	7.1×
<i>N. (O.) epirensis</i> Henderickx and Vets, 2000	(♀) 2.05	6.6×
<i>N. (O.) espinoi</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	(♂) 1.67	6.2×
<i>N. (O.) gaditanum</i> Mahnert, 1977	(♀) 2.51	8.23×
<i>N. (O.) gomezi</i> Heurtault, 1979	(♂) 1.77	7.8×
<i>N. (O.) gracile</i> Heurtault, 1979	(♀) 2.15	8.0×
<i>N. (O.) henroti</i> Beier, 1956	(♀) 2.00	7.0×
<i>N. (O.) lulense</i> Gardini, 1982	(♀) 4.5	11.5×
<i>N. (O.) oenotricum</i> Callaini, 1987	(♀ ♂) 1.53-1.56	6.1-6.2×
<i>N. (O.) pangaeum</i> Gardini, 1985	(♂) 1.64	6.0×
<i>N. (O.) patrizii</i> Beier, 1953	(♀ ♂) 2.12-2.41	7.8-9.6×
<i>N. (O.) patrizii romanum</i> Mahnert, 1980	(♀) 2.41	9.6×
<i>N. (O.) paucedentatum</i> Mahnert, 1982	(♀ ♂) 1.50-1.68	6.0-6.9×
<i>N. (O.) perezi</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	(♂) 1.76	6.5×
<i>N. (O.) phaeacum</i> Mahnert, 1973	(♂) 3.65	8.8×
<i>N. (O.) piquerae</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2001	(♂) 3.45-4.00	11.5-13.3×
<i>N. (O.) rodrigo</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2000	(♀ ♂) 1.50-1.55	5.0-5.7×
<i>N. (O.) sammiticum</i> Mahnert, 1980	(♀ ♂) 1.99-2.01	7.5-7.6×
<i>N. (O.) sardoum</i> Beier, 1956	(♀ ♂) 2.36	7.4×
<i>N. (O.) schawalleri</i> Henderickx, 2000	(♀) 1.85	5.7×
<i>N. (O.) spiltanum</i> Schawaller, 1985	(♂) 1.55	6.0×
<i>N. (O.) staudacheri</i> Hadži, 1933	(♀ ♂) 1.82-1.95	5.2-5.7×
<i>N. (O.) tinauti</i> Carabajal Márquez, García Carrillo and Rodríguez Fernández, 2011	(♀) 3.10	9.2×
<i>N. (O.) zoi</i> Gardini and Rizzerio, 1986	(♀) 2.46	8.4×

*staudacheri* Hadži, 1933 from Croatia. The new species differs from both of them by the presence of a long anterolateral process of the pedal coxa I [short in *N. (O.) pangaeum* (see Gardini 1985: fig. 5), and in *N. (O.) staudacheri* (see Hadži 1933b: fig. 17c)].

**Habitat.**—The type locality (Fig 2A) of *N. (O.) wettereri* is a large and high plateau dominated by the dragon blood tree, *Dracaena cinnabari* Balf.f. (Asparagaceae). The specimens were collected by sifting dry litter under a dragon blood tree.

***Neobisium (Ommatoblothrus) karmanae*** Nassirkhani, sp. nov.  
<http://zoobank.org/NomenclaturalActs/urn:lsid:zoobank.org:act:661279A9-2068-48BC-B8CC-ECE071A83926>  
 (Figs. 4A–K)

**Type material.**—*Holotype female* YEMEN: *Socotra*: Wadi Ayhif, 12°37'09"N, 53°56'24"E, 38 m a.s.l., 20.IV.2014, M. Sharaf (K SMA).

**Etymology.**—This species is named in honor of Tawakkol Abdel-Salam Khalid Karman, a Yemeni Nobel Laureate, journalist, politician, and human rights activist

**Diagnosis.**—*Neobisium (Ommatoblothrus) karmanae* sp. nov. differs from all other species of the subgenus by the following combination of characters: anterior eyes with somewhat flat lens, definitely visible, and posterior ones reduced to eyespots (Figs. 4A,B); epistome prominent and apically pointed (Fig. 4A); carapace without preocular microsetae, posterior margin with 9 setae; tergite I with 6 and tergite II with 7 setae; the position of trichobothrium *ist* in the fixed

chela finger (*ist* = 0.59; Figs. 4F, G); the shape of anterolateral process (short and pointed) and mediolateral face (with smooth membranous layer) of pedal coxa I (Fig. 4H); the morphometric characters, e.g., length of pedipalpal femur 2.17 mm and chela (with pedicel) 3.50 mm; the length of movable chela finger (as long as chela hand (with pedicel) and distinctly shorter than pedipalpal femur); movable chela finger with 108 and fixed finger with 109 contiguous and almost similar shape teeth.

**Description (female).**—*Coloration*: carapace and pedipalpal reddish brown; posterior border of carapace not sclerotized and pale; pedipalpal segments uniformly colored; tergites and sternites light brown surrounded with yellowish brown membranous; chelicerae lighter in color than carapace; legs slightly darker in color than tergites, and distinctly lighter in color than carapace and pedipalpal

*Carapace* (Fig. 4A): entirely smooth; slightly wider than long, widest at the middle, 0.94 × longer than broad; with two anterior eyes and two posterior eyespots, lenses of anterior eyes somewhat flattened, visible (Fig. 4B), diameter of anterior eyes 0.125 mm, distance of anterior eyes from anterior margin of carapace 0.175 mm, distance between anterior eyes and posterior eyespots 0.062 mm; with 25 setae, anterior margin with 4 and posterior margin with 9 setae (Fig. 4A), microsetae absent, most setae long and acute, chaetotaxy: 4: 6: 6: 9; transverse furrows absent; epistome prominent, large, longer than broad, with isosceles triangle shaped, and apically pointed, length 0.065 mm, width 0.062 mm; glandular pores

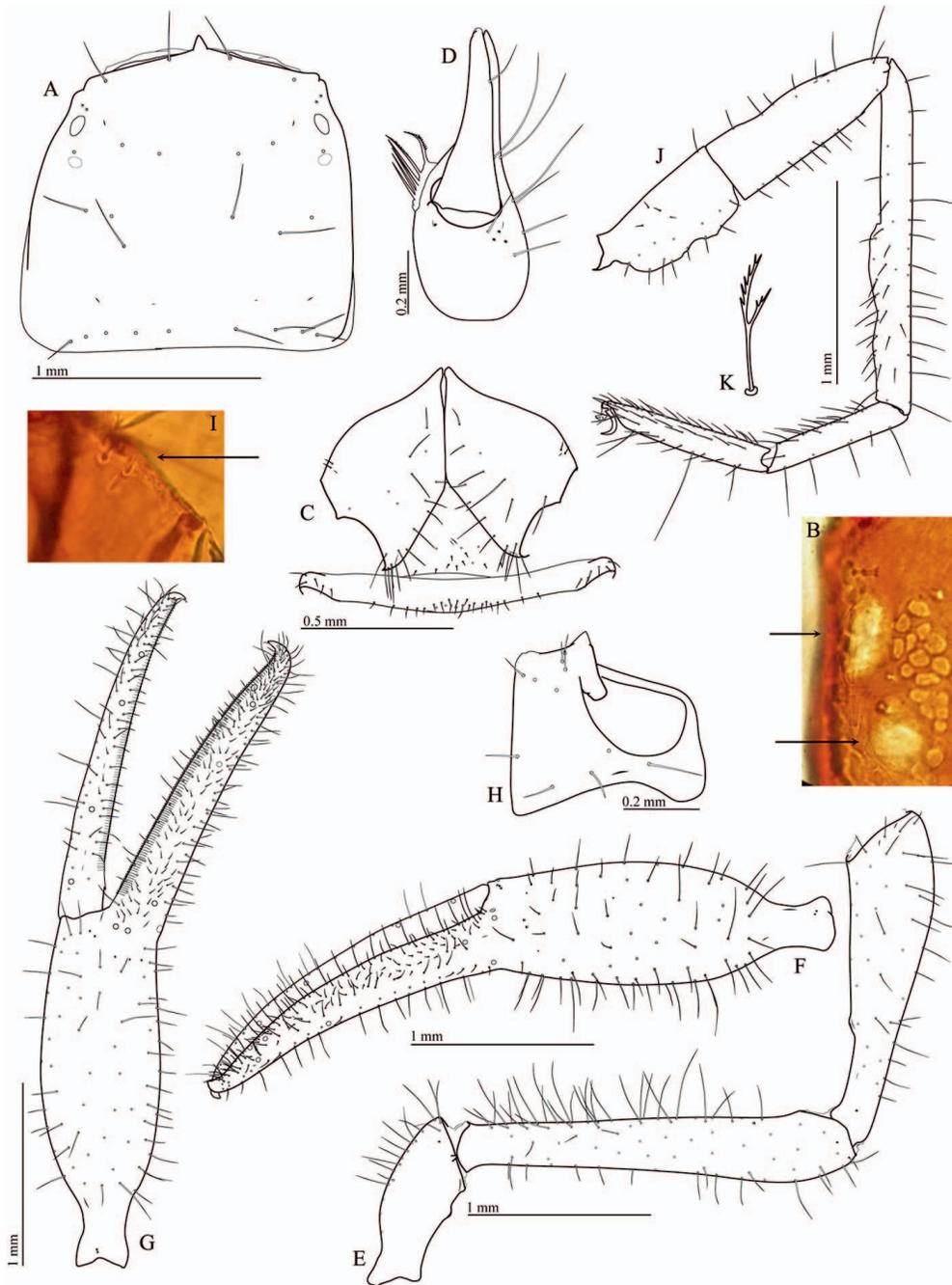


Figure 4.—*Neobisium (Ommatoblothrus) karmanae* Nassirkhani, sp. nov., holotype female: A, carapace, dorsal view; B, ocular zone (microscope picture), in part (form of eyes shown by arrows); C, coxae IV and sternites II–III, ventral view; D, right chelicera, retrolateral view (serrulae omitted, first two rallar blades broken); E, right pedipalp, dorsal view (coxa and chela omitted); F, right chela, dorsal view; G, left chela, retrolateral view; H, left coxa I, ventral view; I, antrolateral corner of left coxa IV (microscope picture), in part (microsetae shown by arrow); J, right leg IV, dorsal view (trochanter omitted, femur, patella and tibia damaged); K, sub-terminal seta.

present, 2 on each side in front of each eyes (Fig. 4A); anterolateral corners without protuberances; with 6 lyrifissures, 1 pair situated in ocular zone and close to eyes, 2 pairs located distal to posterior margin.

*Tergites*: smooth, weakly sclerotized; all setae simple, acute, uniseriate; tergite I with 4, tergites II and VII with 2, tergites III, V and X with 3, tergites IV, VI, VIII and IX with 4, and tergite XI with 5 lyrifissures; tergites X–XI with 4 tactile setae

(setae lost, judgment based on setal areoles); chaetotaxy: 6: 7: 9: 10: 11: 12: 12: 12: 11: 1T1T2T1T2: T2T3T2T: 2.

*Sternites*: entirely smooth, weakly sclerotized; all setae simple and acute; sternites III–XI uniseriate; sternites II–V with 2 median and sternites VI–X with 2 median and 2 lateral, and sternite XI with 2 lateral lyrifissures; anterior operculum with 13 scattered tiny microsetae, posterior operculum with 24 short setae in one row on posterior border (Fig. 4C); with a

median and 1 lateral cribriform plate located on each side; sternite X with 4 and XI with 2 tactile setae (setae lost, judgment based on setal areoles); chaetotaxy: 13: (5) 24 (6): (4) 14 (5): 15: 14: 16: 16: 15: 6T1T6: T2T: 2.

*Pleural membrane*: granulate, without setae.

*Chelicera*: hand with 7 acuminate setae (Fig. 4D); subgaleal seta situated distal to middle (0.77); galea knob-like, pronounced, with somewhat distinct hyaline convexity; entirely smooth; hand with 3 glandular pores and 2 lyrifissures in dorsal face; fixed finger with 18 close-set teeth reaching to base; movable finger with 8 teeth, not reaching to middle of the segment, with two median large teeth; serrula interior with 30 and exterior with 35 blades; rallum with 8 blades, two distal blades denticulate, most proximal blade shortest, and two dentate blades located on high hyaline base (Fig. 4D).

*Pedipalps* (Figs. 4E–G): entirely smooth, coxa including manducatory process with 16 setae, manducatory process with 5 acuminate setae, median seta longest; trochanter with a very small dorsal tubercle, without stout and short setae, L/W 2.60 ×; femur without distinguishable pedicel, loss of marginal tubercles, one glandular and one microglandular pores located dorso-distally (Fig. 4E), L/W 6.20 ×; patella with elongated pedicel (L = 0.63 mm); patella distinctly shorter than femur, with 3 lyrifissures situated basally and 2 lyrifissures located distally on retrolateral face of the segment, one glandular pore located on proximal half of pedicel, notch on the median side of patella not reaching to the distal third of the patellar club length, ratio of diameter of distal opening to inner margin of patella (X/Y) 0.32 ×, L/W 4.09 ×. Chela with pedicel L/W 5.38 ×, without pedicel L/W 4.87 ×; movable finger as long as chelal hand with pedicel and longer than hand without pedicel; movable finger 1.00 × longer than hand with pedicel and 1.21 × longer than hand without pedicel; movable finger distinctly shorter than femur; hand with pedicel L/W 2.87 ×; hand without pedicel L/W 2.37 ×; chelal hand long ovate in dorsal view (Fig. 4F); 10 microsetae located between trichobothria *eb-esb* and trichobothrium *isb* on retrolateral face of fixed finger in retrolateral view (Fig. 4G); 3 glandular pores located below trichobothria *eb-esb* on prolateral face and 5 glandular pores located on retrolateral face of distal third of chelal hand (Fig. 4G); fixed finger with 3 lyrifissures: one (*fb*) located at the same level as *ib*, one (*fa*) close to base in retrolateral view and one (*fd*) distal to *et* in dorsal view; movable finger with 3 lyrifissures in retrolateral view: *ma<sub>2</sub>* and *ma<sub>1</sub>* located between trichobothria *b* and *sb*, both of them closer to *b* than to *sb*, and *ma<sub>3</sub>* located slightly distal to *sb*, distinctly closer to *sb* than to *st*; chelal hand with 2 proximal lyrifissures in dorsal view (Fig. 4F), either located on pedicel, and either located on proximal fourth of hand; chelal pedicel with 2 microglandular pores; one sensillum located in the midway between trichobothria *sb* and *st* in retrolateral face; fixed finger with 108 contiguous, retroconical, cusped and blunt teeth somewhat crossing from trichobothrium *isb*, 4 most distal and 4 most proximal teeth smallest, other teeth almost with same size (32<sup>nd</sup> tooth completely absent but dental canal present), all teeth with dental canal; movable finger with 109 contiguous, rounded and cusped teeth slightly reduced in size from tip of the finger to its base, not reaching to the level of trichobothrium *b*, all teeth with dental canal; venom duct in fixed chelal finger short and nodus ramosus situated distinctly distal to *et*.

*Trichobothriotaxy*: fixed finger with 8 and movable finger with 4 trichobothria (Figs. 4F, G); fixed finger with trichobothrium *it* located almost at the same level as *et*, trichobothria *it*, *et*, and *est* making a group in almost distal fifth of the finger, *ist* situated distinctly distal to middle of the finger, far of the trichobothrial group (*ist* = 0.59), *isb* located on retrolateral face (*isb* = 0.10), *ib* situated basally, *eb* and *esb* located proximal to *ib*; movable finger with trichobothrium *st* situated distinctly closer to *t* than to *sb*, trichobothrium *sb* distinctly closer to *b* than to *st*, distance *b-sb* distinctly longer than distance *st-t*.

*Legs*: entirely smooth; coxa I with short, triangular, sclerotized and apically pointed anterolateral process, medio-lateral face with smooth membranous layer (Fig. 4H); coxa IV with 2 microsetae located on anterolateral corner of the segment (Figs. 4C, I); coxal chaetotaxy: right coxae 11: 10: 8: 18 + 2ms, left coxae 9: 10: 8: 17 + 2ms; sub-terminal setae bifid, both rami denticulate (Fig. 4K); claws smooth; arolia simple and shorter than claws. Leg I: femur 6.11 ×; patella 4.35 ×; femur 1.48 × longer than patella; tibia 7.00 ×; metatarsus 6.33 ×; tarsus 6.89 ×; tarsus 1.09 × longer than metatarsus. Leg IV (damaged; Fig. 4J): femur, patella, and femur + patella not measured; tibia with a long tactile seta situated proximal to middle (T = 0.39), 10.93 × metatarsus with 2 long tactile setae, either located basally (T = 0.12) and the other located distally (T = 0.89), 5.61 ×; tarsus with a long tactile seta situated slightly proximal to middle (T = 0.45), 6.07 ×.

*Measurements (mm)*: holotype ♀, body length: 5.17. Carapace: 1.32/1.40. Pedipalp: trochanter 0.99/0.38; femur 2.17/0.35; patella 1.80/0.44; chela (with pedicel) 3.50/0.65; chela (without pedicel) 3.17; hand (with pedicel) L. 1.87; hand (without pedicel) L. 1.54; movable finger L. 1.87; fixed finger L. 1.80. Leg I: femur 1.10/0.18; patella 0.74/0.17; tibia 0.91/0.13; metatarsus 0.57/0.09; tarsus 0.62/0.09. Leg IV: femur 0.80; patella 0.96; femur + patella 1.73; tibia 1.75/0.16; metatarsus 0.73/0.13; tarsus 0.85/0.14.

**Remarks.**—Based on the presence of 9 setae on the posterior margin of the carapace (Table 1), and the morphometric characteristics, eg., the length of the movable chelal finger (as long as the chelal hand with pedicel) (Table 2), and the pedipalpal femur length ( $2.0 \leq L \leq 2.5$  mm) (Table 3), *N. (O.) karmanae* from Socotra is similar to *N. (O.) gaditanum* Mahnert, 1977 from Spain, and *N. (O.) staudacheri* Hadži, 1933 from Croatia.

The new species can be distinguished from both of these species based on the shape of the pedal coxa I, in *N. (O.) gaditanum* and *N. (O.) staudacheri*, coxa I bears a dentate membranous layer on its mediolateral face (see Hadži 1933b: fig. 17a; Mahnert 1977: fig. 37), the position of trichobothrium *ist* (in *N. (O.) gaditanum* and *N. (O.) staudacheri*, it is located distinctly distal to middle of the finger, close to the trichobothrial group containing *et*, *est*, and *it* (see Hadži 1933b: fig. 16a; Mahnert 1977: fig. 39), and the shape of the chelal hand in dorsal view (see Hadži 1933b: fig. 15; Mahnert 1977: fig. 39).

Apart from the form of the eyes, and due attention to the shape of the pedipalpal patella (elongated with somewhat long pedicel and compressed club), the length of the movable chelal finger (1.0–1.1 × longer than chelal hand (with pedicel)), almost similar shape and size of chelal teeth in distal half of the fixed

Table 4.—Reported distribution of pseudoscorpion species on the Arabian Peninsula (Harvey 2021).

Species	Distribution in the Arabian Peninsula
Atemnidae Kishida, 1929	
<i>Atemnus letourneuxi</i> (Simon, 1881)	Yemen
Cheiridiidae Hansen, 1894	
<i>Cheiridium perreti</i> Mahnert, 1982	United Arab Emirates
Cheliferidae Risso, 1827	
<i>Dactylochelifer arabicus</i> Mahnert, 1991	Saudi Arabia
<i>Ellingsenius fulleri</i> (Hewitt and Godfrey, 1929)	Oman
<i>Lophochernes persulcatus</i> (Simon, 1890)	Yemen
<i>Rhacochelifer barkhamae</i> Mahnert, 1980	Saudi Arabia
<i>Rhacochelifer longeuuiculatus</i> Beier, 1963	Oman, Saudi Arabia, United Arab Emirates
<i>Rhacochelifer sonyae</i> Mahnert, 1991	Saudi Arabia
<i>Stenochelifer socotrensis</i> (With, 1905)	Yemen
<i>Strobilochelifer spinipalpis</i> (Redikorzev, 1918)	Oman, Saudi Arabia, United Arab Emirates
Chernetidae Menge, 1855	
<i>Allochernes brevipilosus</i> Beier, 1967	United Arab Emirates
<i>Allochernes peregrinans</i> Mahnert, 2009	United Arab Emirates
<i>Lamprochernes muscivorus</i> Redikorzev, 1949	United Arab Emirates
<i>Lamprochernes savignyi</i> (Simon, 1881)	United Arab Emirates
Chthoniidae Daday, 1888	
<i>Lagynochthonius insulanus</i> Mahnert, 2007	Yemen
Garypidae Simon, 1879	
<i>Elattogarypus cicatricosus</i> Mahnert, 2007	Yemen
<i>Garypus darsahensis</i> Mahnert, 2007	Yemen
<i>Garypus maldivensis</i> Pocock, 1904	Oman
Garypinidae Daday, 1888	
<i>Serianus biimpressus</i> (Simon, 1890)	Yemen
<i>Serianus validus</i> (Beier, 1971)	Oman
Geogarypidae Chamberlin, 1930	
<i>Geogarypus quadrimaculatus</i> Mahnert, 2007	Yemen
Ideoroncidae Chamberlin, 1930	
<i>Shravana pohli</i> (Mahnert, 2007)	Yemen
<i>Shravana socotraensis</i> (Mahnert, 2007)	Yemen
<i>Shravana taitii</i> (Mahnert, 2007)	Yemen
Menthidae Chamberlin, 1930	
<i>Paramenthus nanus</i> Mahnert, 2007	Yemen
<i>Pseudomenthus spinifer</i> Mahnert, 2007	Yemen
<i>Pseudomenthus uniseriatus</i> Mahnert, 2007	Yemen
Olpiidae Bank, 1895	
<i>Beierolpium vanharteni</i> Mahnert, 2007	Yemen
<i>Calocheirus atopos</i> Chamberlin, 1930	Saudi Arabia
<i>Calocheirus gracilis</i> Mahnert, 1991	Saudi Arabia
<i>Halominniza taitii</i> Mahnert, 2007	Yemen
<i>Minniza antonii</i> Mahnert, 2009	United Arab Emirates
<i>Minniza babylonica</i> Beier, 1931	Oman, Saudi Arabia, United Arab Emirates, Yemen
<i>Minniza barkhamae</i> Mahnert, 1991	Saudi Arabia
<i>Minniza elegans</i> Mahnert, 1991	Oman, United Arab Emirates
<i>Minniza gallagheri</i> Mahnert, 1991	Oman
<i>Minniza levisetosa</i> Mahnert, 1991	Saudi Arabia
<i>Minniza monticola</i> Mahnert, 1991	Saudi Arabia
<i>Minniza nigrimanus</i> Mahnert, 1991	Oman
<i>Minniza persica</i> Beier, 1951	Kuwait, Oman, Saudi Arabia, United Arab Emirates
<i>Minniza rubida</i> (Simon, 1882)	Yemen
<i>Olpium arabicum</i> Simon, 1890	Yemen
<i>Olpium flavum</i> Mahnert, 2007	Yemen
<i>Olpium kuriense</i> Mahnert, 2007	Yemen

Table 4.—Continued.

Species	Distribution in the Arabian Peninsula
<i>Olpium milneri</i> Mahnert, 2007	Yemen
<i>Olpium minnizioides</i> Vachon, 1966	Oman
<i>Olpium omanense</i> Mahnert, 1991	Oman
<i>Olpium socotraense</i> Mahnert, 2007	Yemen
<i>Olpium vanharteni</i> Mahnert, 2007	Yemen
<i>Parolpium gracile</i> (Beier, 1930)	Saudi Arabia
Withiidae Chamberlin, 1931	
<i>Nannowithius buettikeri</i> (Mahnert, 1980)	Oman, Saudi Arabia, United Arab Emirates
<i>Nannowithius paradoxus</i> (Mahnert, 1980)	Yemen
<i>Pseudochernes arabicus</i> Mahnert, 1991	Saudi Arabia
<i>Withius arabicus</i> Mahnert, 1980	Saudi Arabia
<i>Withius congicus</i> (Beier, 1932)	Yemen

chelal finger, the distal position of trichobothrium *ist* in the movable chelal finger, and the presence of entirely smooth pedipalp, the female from Socotra resembles *Neobisium* (*Neobisium*) *nivale* (Beier, 1929) from Spain, and *Neobisium* (*N.*) *labinskyi* Beier, 1937 from Georgia (Beier 1929, 1963; see Schawaller 1983: fig. 11). These species can be separated from *N. (O.) karmanae* on the basis of the morphometric characters (both species are smaller than *N. (O.) karmanae*, e.g., the pedipalpal femur length of *N. (N.) nivale* is 1.73 mm and is 1.40–2.00 mm for *N. (N.) labinskyi*), and the shape of the pedal coxa I (in both species, anterolateral process is long and mediolateral membranous is dentate) (e.g., in Beier 1963; Nassirkhani et al. 2020).

**Habitat.**—The specimen of *N. (O.) karmanae* was found in leaf litter where the soil had a high degree of humidity and was rich in organic material (Fig. 2B).

## DISCUSSION

The Socotra Archipelago is located near the intersection of the Afrotropical, Palaearctic, and Oriental biogeographic regions, and shares faunal elements of these three realms (Van Damme & Benfield 2011; Sharaf et al. 2017), but with a dominance of the Afrotropical faunal elements (e.g., Mendes 2004; Rheims et al. 2004; Van Damme & Benfield 2011, Fikáček et al. 2012; Culek 2013; Holt et al. 2013). Mahnert (2007) wrote: “The pseudoscorpion fauna of Socotra shows affinities with the fauna of East Africa and the Arabian Peninsula, but affinities with the Oriental fauna are less pronounced.”

Our knowledge of the Arabian pseudoscorpion fauna is far from complete with only 55 species belonging to 12 families (Harvey 2021; Table 4). The fauna of some Arabian countries is still completely unknown (e.g., Bahrain and Qatar), whereas only a single species, *Minniza persica* Beier, 1951, has been reported from Kuwait (Table 4). Among the countries of the Arabian Peninsula, Yemen includes the most diverse pseudoscorpion fauna with 26 described species (28 species and subspecies) belonging to 17 genera and ten families (Harvey 2021). The first pseudoscorpion record from Yemen, *Chelifer socotrensis*, which was described by With (1905) from Socotra, is currently placed in the genus *Stenochelifer* Beier, 1967. The

pseudoscorpion fauna of the Socotra Archipelago has been treated by Mahnert (1980a, 2007).

The updated checklist of Arabian pseudoscorpion fauna includes 12 families with following number of species (Harvey 2021; Table 4): Atemnidae Kishida, 1929 (1), Cheiridiidae Hansen, 1894 (1), Cheliferidae Risso, 1827 (8), Chernetidae Menge, 1855 (4), Chthoniidae Daday, 1888 (1), Garypidae Simon, 1879 (3), Garypinidae Daday, 1888 (2), Geogarypidae Chamberlin, 1930 (1), Ideoroncidae Chamberlin, 1930 (3), Menthiidae Chamberlin, 1930 (3), Olpiidae Bank, 1895 (23), and Withiidae Chamberlin, 1931 (5). Among them, the highest number of the genera in the area belongs to the family Olpiidae. Moreover, two species, *Minniza babylonica* Beier, 1931 and *M. persica* Beier, 1951 are likely to be collected from all Arabian countries as they are rather widely distributed in xeric habitats in the Middle East. Notably, there is no evidence for the existence of the genus *Neobisium* or the family Neobisiidae in the Arabian Peninsula. Therefore, these new species described from Socotra are most southwestern most records of this genus from Asia.

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#### LITERATURE CITED

- Batelka J. 2012. Socotra Archipelago—a lifeboat in the sea of changes: advancement in Socotran insect biodiversity survey. In *Insect Biodiversity of Socotra Archipelago*, (Hájek J, Bezděk J (eds.)), *Acta Entomologica Musei Nationalis Pragae* 52:1–26.
- Beier M. 1929. Die Pseudoscorpione des Wiener Naturhistorischen Museums. II. Panctenodactyli. *Annalen des Naturhistorischen Museums in Wien* 43:341–367.
- Beier M. 1953. *Neobisium* (*Blothrus*) *patrizii*, ein neuer Höhlen-Pseudoscorpion aus Mittelitalien. *Bollettino della Società Entomologica Italiana* 83:139–140.
- Beier M. 1955. *Neobisium* (*Blothrus*) *cerrutii*, ein weiterer neuer Höhlen-Pseudoscorpion aus Lazio. *Fragmenta Entomologica* 2:25–28.
- Beier M. 1956a. Ein neuer *Blothrus* (Pseudoscorp.) aus Sardinien, und ueber zwei Pseudoscorpione des westmediterranen Litorals. *Fragmenta Entomologica* 2:55–63.
- Beier M. 1956b. Weiteres zur Kenntnis der Höhlenpseudoscorpione Sardiens. *Fragmenta Entomologica* 2:131–135.
- Beier M. 1963. Ordnung Pseudoscorpionidea (Afterscorpione). Berlin: Bestimmungsbücher zur Bodenfauna Europas vi.
- Beier M. 1966. Ein neuer Höhlen-Pseudoscorpion aus den Abruzzen. *Bollettino della Società Entomologica Italiana* 96:35–36.
- Callaini G. 1981. Notulae Chernetologicae VIII. *Neocccitanobisium ligusticum* n. gen. n. sp. della Liguria occidentale (Arachn. Pseudoscorp. Neobisiidae). *Annali del Museo Civico di Storia Naturale di Genova* 83:523–538.
- Callaini G. 1987. Pseudoscorpioni della Grotta di Trecchina (Italia meridionale) (Notulae Chernetologicae. XX). *Bollettino del Museo Civico di Storia Naturale, Verona* 13:69–79.
- Carabajal Márquez E, Garcia Camillo, J, Rodriguez Fernández F. 2000. Descripción de dos nuevas especies de Pseudoscorpiones cavernícolas de la provincia de Cádiz (Arachnida, Pseudoscorpionida, Chthoniidae, Neobisiidae). *Graellsia* 56:27–33.
- Carabajal Márquez E, Garcia Camillo, J, Rodriguez Fernández F. 2001. *Neobisium* (*Ommatoblothrus*) *piqueri* sp. n., un nuevo pseudoscorpion cavernícola de Andalucía (Arachnida, Pseudoscorpionida, Neobisiidae). *Revista Ibérica de Aracnología* 4:3–7.
- Carabajal Márquez E, Garcia Camillo, J, Rodriguez Fernández F. 2011. Aportaciones al catálogo de los pseudoscorpiones de Andalucía (España) (I) (Arachnida, Pseudoscorpiones). *Boletín de la Sociedad Entomológica Aragonesa* 48:115–128.
- Chamberlin JC. 1931. The arachnid order Chelonethida. *Stanford University Publications, Biological Sciences* 7(1):1–284.
- Culek M. 2013. Geological and morphological evolution of the Socotra Archipelago (Yemen) from the biogeographical view. *Journal of Landscape Ecology* 6:84–108.
- Čurčić BPM. 1984. The genus *Neobisium* Chamberlin, 1930 (Neobisiidae, Pseudoscorpiones, Arachnida): on new species from the USSR and the taxonomy of its subgenera. *Glasnik Muzeja Srpske Zemlje, Beograd* (B) 39:124–153.
- Di Micco De Santo T, Zandri E. 2004. Main features of the Socotra Archipelago and ongoing conservation efforts. *Fauna of Arabia* 20:1–20.
- Fikáček M, Delgado JA, Gentili E. 2012. The hydrophiloid beetles of Socotra Island (Coleoptera: Georissidae, Hydrophilidae). *Acta Entomologica Musei Nationalis Pragae* 52:107–130.
- Gardini G. 1982. Pseudoscorpioni cavernicoli Sardi. II. Neobisiidae e Chernetidae, con considerazioni sui Neobisiinae cavernicoli. (Pseudoscorpioni d'Italia XII). *Fragmenta Entomologica* 16:89–115.
- Gardini G. 1985. Su alcuni Pseudoscorpioni cavernicoli di Grecia (Pseudoscorpionida, Neobisiidae). *Bollettino del Museo Regionale di Scienze Naturali, Torino* 3:53–64.
- Gardini G, Rizzerio R. 1986. *Neobisium* (*O.*) *zoiai* n. sp. delle Alpi Liguri e note su *Roncus ligusticus* Beier, 1930 (Pseudoscorpionida Neobisiidae). *Bollettino della Società Entomologica Italiana* 118:5–16.
- Hadži J. 1933a. Beitrag zur Kenntnis der Pseudoscorpionen-Fauna des Küstenlandes. *Bulletin International de l'Académie Yugoslave des Sciences et des Beaux-arts* 27:173–199.
- Hadži J. 1933b. Prinos poznavanju pseudoskorpjijske faune Primorja. *Prirodoslovna Istraživanja Kraljevine Jugoslavije* 18:125–192.
- Harvey MS. 1992. The phylogeny and classification of the Pseudoscorpionida (Chelicerata: Arachnida). *Invertebrate Taxonomy* 6:1373–1435.
- Harvey MS. 2021. World Pseudoscorpiones Catalogue. Natural History Museum Bern. Online at <https://wac.nmbe.ch/order/pseudoscorpiones/3> [accessed on October 19, 2021].
- Harvey MS, Ratnaweera PB, Udagama PV, Wijesinghe MR. 2012. A new species of the pseudoscorpion genus *Megachernes* (Pseudoscorpiones: Chernetidae) associated with a threatened Sri Lankan rainforest rodent, with a review of host associations of *Megachernes*. *Journal of Natural History* 46:2519–2535.
- Henderickx H. 2000. *Neobisium* (*Ommatoblothrus*) *schawalleri* sp. nov., a new troglobitic pseudoscorpion from Crete (Arachnida: Pseudoscorpiones: Neobisiidae). *Phegea* 28:75–80.
- Henderickx H, Vets V. 2000. *Neobisium* (*Ommatoblothrus*) *epirensis* sp. nov., a new troglobiotic pseudoscorpion from Epirus (Arachnida: Pseudoscorpiones: Neobisiidae). *Phegea* 28:83–86.
- Heurtault J. 1979. Le sous-genre *Ommatoblothrus* en France (Pseudoscorpions, Neobisiidae). *Revue Arachnologique* 2:231–238.
- Holt BG, Lessard J, Borregaard MK, Fritz SA, Araújo MB, Dimitrov D, et al. 2013. An update of Wallace's zoogeographic regions of the world. *Science* 339:74–78.
- Judson MLI. 2007. A new and endangered species of the pseudoscorpion genus *Lagynochthonius* from a cave in Vietnam, with notes on chelal morphology and the composition of the Tyrannochthoniini (Arachnida, Chelonethi, Chthoniidae). *Zootaxa* 1627:53–68.

- Mahnert V. 1973. Über griechische Pseudoskorpione II: Höhlenpseudoskorpione (Pseudoscorpionides, Neobisiidae) von Korfu. *Revue Suisse de Zoologie* 80:207–220.
- Mahnert V. 1977. Spanische Höhlenpseudoskorpione. *Miscelanea Zoologica Barcelona* 4:61–104.
- Mahnert V. 1980a. Arachnids of Saudi Arabia, Pseudoscorpiones. *Fauna of Saudi Arabia* 2:32–48.
- Mahnert V. 1980b. Pseudoskorpione (Arachnida) aus Höhlen Italiens, mit Bemerkungen zur Gattung Pseudoblothrus. *Le Grotte d'Italia* 8(4a):21–38.
- Mahner V. 1982. Neue höhlenbewohnende Pseudoskorpione aus Spanien, Malta und Griechenland (Arachnida, Pseudoscorpiones). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 57:297–304.
- Mahnert V. 2007. Pseudoscorpions (Arachnida: Pseudoscorpiones) of the Socotra Archipelago, Yemen. *Fauna of Arabia* 23:271–307.
- Mendes LF. 2004. Zygentoma (Insecta) from the Socotra archipelago. *Fauna of Arabia* 20:357–398.
- Nassirkhani M, Mumladze L. 2018. A new cave pseudoscorpion (Pseudoscorpiones: Neobisiidae) from western Georgia. *Arachnology* 17:496–500.
- Nassirkhani M, Zaragoza JA, Snegovaya N, Chumachenko YA. 2020. Description of two new *Neobisium* (*Neobisium*) species and redescription of *Neobisium* (*N.*) *speleophilum* from Caucasian Russia, with a key to the *Neobisium* (*Neobisium*) species (Arachnida: Pseudoscorpiones) recorded from Russia. *Arachnology* 18:449–461.
- Rheims CA, Brescovit AD, van Harten A. 2004. Hersiliidae (Araneae) from Yemen, with description of a new species of *Hersilia* Audouin, 1826 from Socotra Island. *Fauna of Arabia* 20:335–347.
- Sharaf MR, Fisher BL, Collingwood CA, Aldawood SA. 2017. Ant fauna (Hymenoptera: Formicidae) of the Socotra Archipelago (Yemen): zoogeography, distribution and description of a new species. *Journal of Natural History* 51:317–378.
- Schawaller W. 1983. Pseudoskorpione aus dem Kaukasus (Arachnida). *Stuttgarter Beiträge zur Naturkunde (A)* 362:1–24.
- Schawaller W. 1985. Liste griechischer Neobisiidae mit neuen Höhlenfunden in Epirus, auf Samos und Kreta (Arachnida: Pseudoscorpiones). *Stuttgarter Beiträge zur Naturkunde (A)* 386:1–8.
- Swan DC. 1936. Berlese's fluid: remarks upon its preparation and use as a mounting medium. *Bulletin of Entomological Research* 27:389–391.
- Van Damme K, Benfield L. 2011. Past and present human impact on the biodiversity of Socotra Island (Yemen): implication for future conservation. In Biodiversity and Conservation in the Arabian Peninsula. (Knight M, Mallon D, Seddon P, eds.) *Zoology in the Middle East-Special Issue* 3:1–208.
- With CJ. 1905. On Chelonethi, chiefly from the Australian region, in the collection of the British Museum, with observations on the “coxal sac” and on some cases of abnormal segmentation. *Annals and Magazine of Natural History* 15:94–143, 328.
- Zaragoza JA. 2017. Revision of the *Ephippiochthonius* complex (Pseudoscorpiones, Chthoniidae) in the Iberian Peninsula, Balearic Islands and Macaronesia, with proposed changes to the status of the *Chthonius* subgenera. *Zootaxa* 4246:1–221.

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