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The first description of the female of *Heliophanus xerxesi* Logunov, 2009 (Araneae: Salticidae) from Iran

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Abstract: The previously unknown female of the jumping spider *Heliophanus xerxesi* Logunov, 2009 from Iran is described, diagnosed and illustrated. A map showing all the collecting localities of this species is provided.

Keywords: Taxonomy - jumping spiders - unknown sex.

INTRODUCTION

Heliophanus C.L. Koch, 1833 is one of the largest genera in Salticidae, containing 169 valid species (World Spider Catalog, 2019). Wesołowska (1986) divided this genus into three subgenera and many species groups; the largest subgenus, *Heliophanus,* was divided into 12 species groups.

Currently, 14 *Heliophanus* species are known from Iran (Zamani *et al.*, 2019). *Heliophanus xerxesi* Logunov, 2009 was described on the basis of the male holotype collected in Kerman Province, southern Iran. Based on the conformation of the male and female copulatory organs, this species seems to be a member of the "*auratus*" species group (*sensu* Wesołowska, 1986), but differs from other members of this group by the absence of a large protuberance at the embolic base.

The aims of this paper are: (1) to describe the female of *H. xerxesi* for the first time and (2) to map all occurrences of this species.

MATERIAL AND METHODS

The studied specimens are deposited in the following museums (curator names in parentheses): ISEA = Institute of Systematics and Ecology of Animals, Novosibirsk, Russia (G.N. Azarkina); MMUE = The Manchester Museum, University of Manchester, UK (D.V. Logunov). The body coloration refers to alcohol-preserved specimens. All drawings were made with the aid of a reticular eyepiece attached to a MBS-10 stereomicroscope. The epigynes was detached and macerated in 20% KOH solution overnight. Photographs were taken with a Canon EOD 550D camera attached to a Zeiss Stemi 2000-C. Images were stacked with Helicon Focus 6.3 software at the Institute of Systematics and Ecology of Animals. All drawings and photos were edited and assembled in Adobe Photoshop CS5. All measurements are in mm. Legs were measured on the dorsal side and measurements are given in the following manner: total length (femur + patella + tibia + metatarsus + tarsus). For leg spination the method of Ono (1988) is followed. The distribution map was compiled using the online mapping software SimpleMappr (Shorthouse, 2010).

Abbreviations: ALE = anterior lateral eye; AME = anterior median eye; ap = apical; d = dorsal; EW = epigynal wings; Fm = femur; Mt = metatarsus; pr = prolateral; PLE = posterior lateral eye; Pt = patella; rt = retrolateral; Tb = tibia; v = ventral.

RESULTS

Family Salticidae Blackwall, 1841
Subfamily Salticinae Blackwall, 1841
Tribe Chrysillini Simon, 1901
Genus *Heliophanus* C.L. Koch, 1833

Heliophanus xerxesi Logunov, 2009

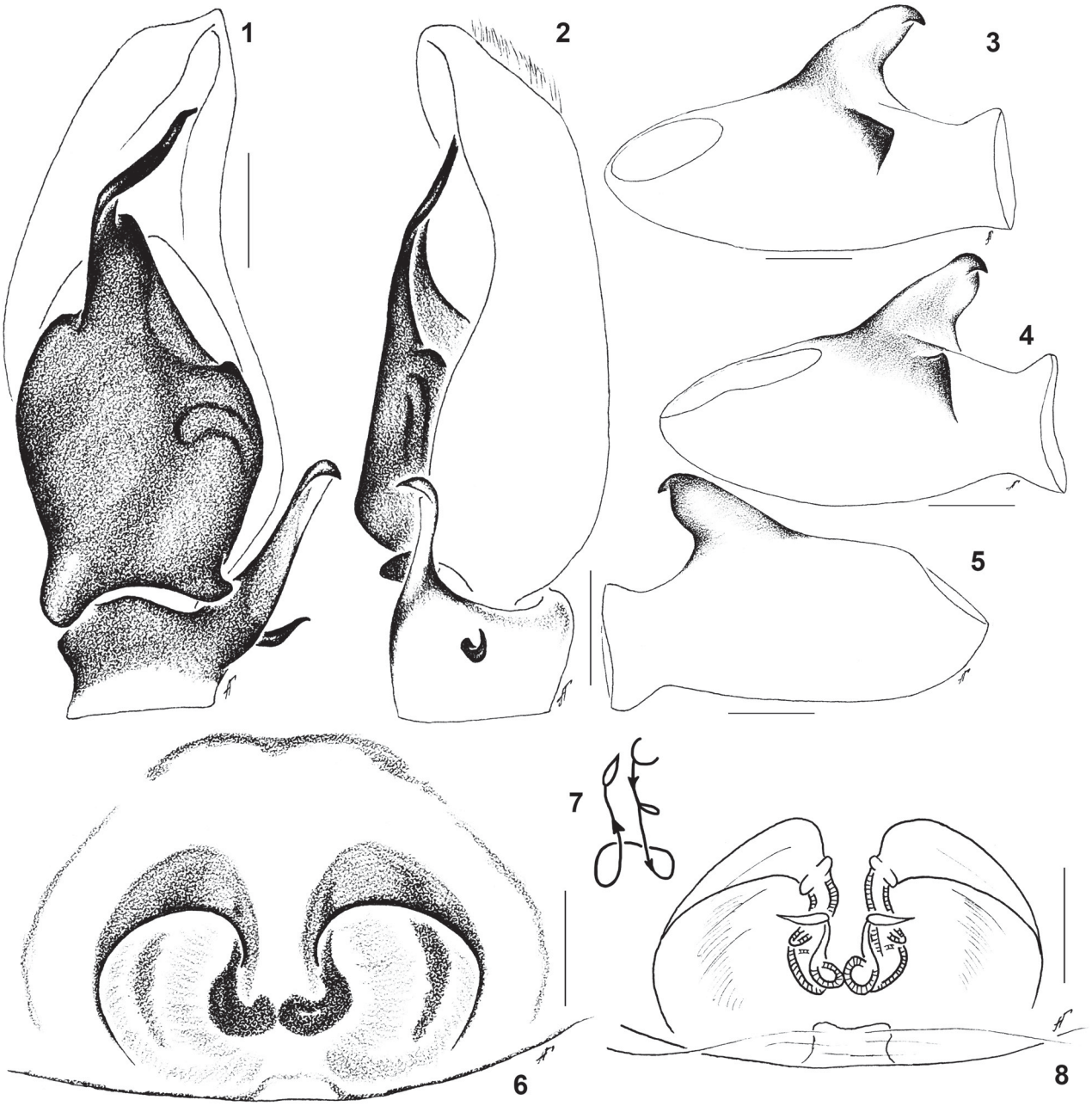
Figs 1-13

Heliophanus xerxesi Logunov, 2009: 905, figs 13-17.

Material examined: MMUE G7635.1; 1 male, 1 female; IRAN, Ilam Province, Darrekh Shank,

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Figs 1-8. *Heliophanus xerxesi* Logunov, 2009. (1-2) Male palp, ventral and retrolateral view. (3-5) Male palpal femur, prolateral (3-4) and retrolateral (5) view. (6) Epigyne, ventral view. (7) Diagrammatic course of insemination ducts. (8) Vulva, dorsal view. (1-3, 5) Specimen from Markazi Province. (4, 6-8) Specimens from Ilam Province. Scale bars 0.1 mm.

Kabirkuh, c. 32°54'N, 47°44'E; III.2015; collector unknown. – ISEA 001.8437; 1 male; IRAN, Markazi Province, Tafresh County, c. 8 km SW of Tafresh, river valley, 34°37'30-37"N, 49°56'46-49"E, 2300-2312 m a.s.l.; 29.V.2017; leg. O.E. Kosterin.

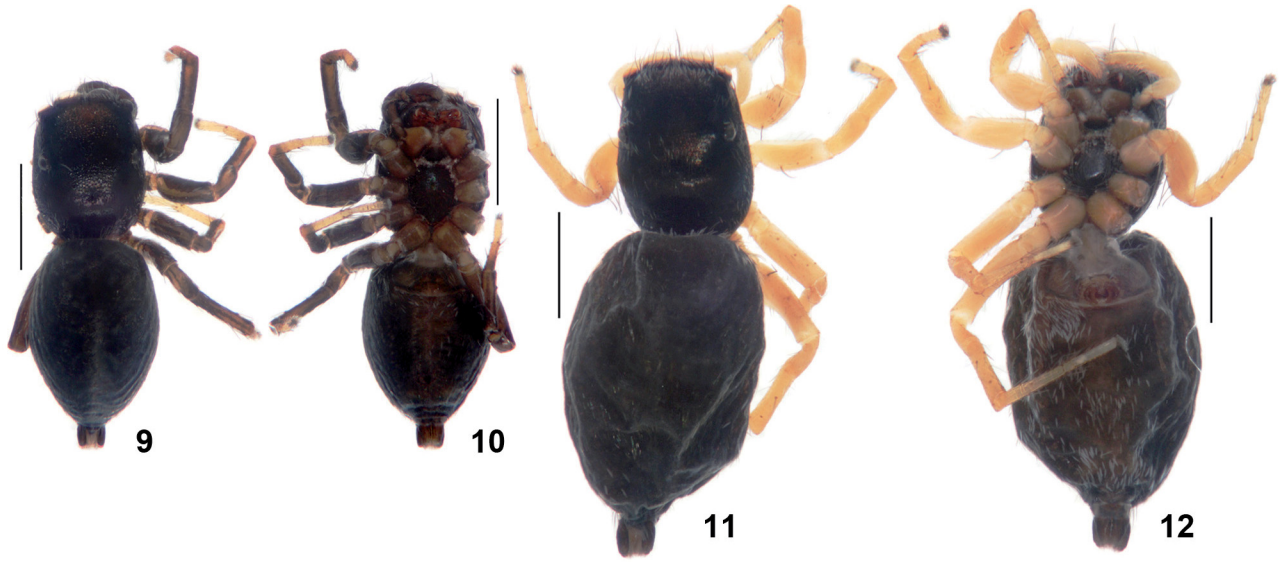
Extended diagnosis: The female copulatory organs of *H. xerxesi* are similar to those of *H. forcipifer* Kulczyński, 1895, but differ in having larger epigynal wings (Fig. 1 cf. Rakov & Logunov, 1997: fig. 81) and markedly smaller spermathecae (Fig. 3 cf. Rakov & Logunov, 1997: figs 82-83). For the diagnosis of the male, see Logunov (2009).

Description:

Male: See Logunov (2009). The studied male is illustrated in Figs 1-5, 9-10.

Female: Carapace 1.70 long, 1.30 wide, 0.75 high at PLE. Ocular area 0.75 long, 1.05 wide anteriorly and 1.05 wide posteriorly. Diameter of AME 0.35. Abdomen 2.70 long, 1.90 wide. Cheliceral length 0.50. Clypeal height 0.05. Length of leg segments: I 2.65 (0.80 +

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Figs 9-12. Habitus of *Heliophanus xerxesi* Logunov, 2009. (9-10) Male from Ilam Province, dorsal and ventral view. (11-12) Female, dorsal and ventral view. Scale bars 1 mm.

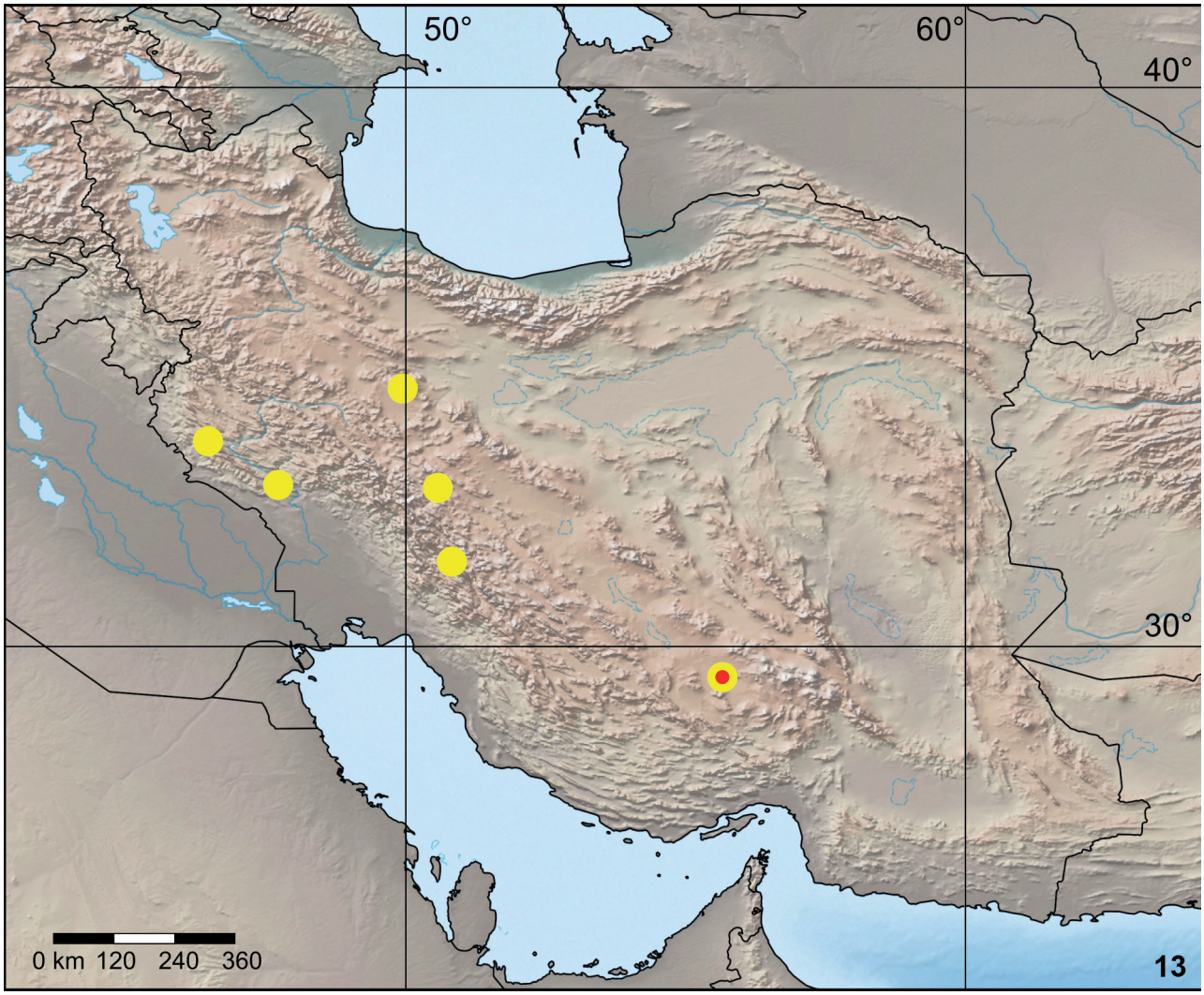


Fig. 13. Collection localities of *Heliophanus xerxesi* Logunov, 2009 in Iran. Type locality marked with red dot.

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0.50 + 0.55 + 0.45 + 0.35); II 2.45 (0.80 + 0.40 + 0.50 + 0.45 + 0.30); III 3.00 (0.90 + 0.50 + 0.55 + 0.65 + 0.40); IV 3.85 (1.15 + 0.55 + 0.85 + 0.80 + 0.50). Leg spination: I: Fm d 1-1-1; Tb pr 0-1, v 2-0; Mt v 2-2 ap. II: Fm d 1-1-1; Tb pr 0-1, v 1-0; Mt v 2-2 ap. III: Fm d 1-1-2; Tb pr and rt 0-1, v 2 ap; Mt pr 2 ap, rt 2 ap, v 2 ap. IV: Fm d 1-1-1; Tb pr and rt 1-1, v 2 ap; Mt pr and rt 1-2 ap, v 1-0-2 ap. Coloration: Carapace dark brown, almost black, shiny, covered with sparse white scales (Fig. 11). Sternum dark brown (Fig. 12). Labium and endites brown, with pale apexes. Chelicerae dark brown. Clypeus and cheeks brown, covered with short white hairs. Abdomen brown ventrally, covered with white scales; dorsum dark brown, covered with white and iridescent scales (Fig. 11). Book-lung covers brown. Spinnerets dark brown. Palps yellow, covered with white hairs. Palpal coxa dark brown, palpal tibia covered with brown hairs. All legs yellow. Coxa IV dark brown retrolaterally. Fm I with four stridulatory hairs. Epigyne and spermathecae as in Figs 6-8: copulatory openings hidden under C-shaped epigynal wings (Fig. 6), spermathecae small, with two short accessory glands (Fig. 8).

Distribution: *Heliophanus xerxesi* is an Iranian endemic, known from Chaharmahal & Bakhtiari, Ilam, Isfahan, Markazi and Kerman provinces, western to southeastern Iran (Fig. 13) (Logunov, 2009; Zamani *et al.*, under review; present data).

DISCUSSION

A total of 14 *Heliophanus* species (see Table 1) have been recorded from Iran (Zamani *et al*., 2019). Two species, *H. cupreus* (Walckenaer, 1802) and *H. flavipes* (Hahn, 1832), are widely distributed in the Palaearctic, from Europe to the South Urals and central Siberia (Logunov & Marusik, 2001). The remaining species are confined to the territory of the "ancient Mediterranean" (*sensu* Kryzhanovsky, 2002), except for *H. edentulus* Simon, 1871 which was also reported from Nigeria (Wesołowska & Edwards, 2012). Two species, *H. iranus* Wesołowska, 1986 and *H. xerxesi*, seem to be endemic to Iran. However, *H. xerxesi*, which was described from southern Iran, has also been recorded from the northwestern part of the country (present data) and therefore its presence in neighbouring countries such as Azerbaijan, Armenia, Iraq and Turkey is possible. For five species, *H. decoratus* L. Koch, 1875, *H. edentulus*, *H. equester* L. Koch, 1867, *H. glaucus* Bösenberg & Lenz, 1895 and *H. verus* Wesołowska, 1986, the corresponding localities in Iran lie at the easternmost limit of their distribution (Logunov *et al.*, 2002; Logunov, 2010). *Heliophanus*

Table 1. Biogeographical data of *Heliophanus* species recorded from Iran. Distribution data are based on the World Spider Catalog (2019) and Logunov & Marusik (2001).

Species	Distribution	Type of range
H. chovdensis Prószyński, 1982	Iran, Kazakhstan, Mongolia	Central Asian subboreal range (Logunov & Marusik, 2001)
H. cupreus (Walckenaer, 1802)	Europe, North Africa, Turkey, Caucasus, Russia (to the South Urals), Iran, China	Palaearctic temperate range (Logunov & Marusik, 2001)
H. curvidens (O. P.-Cambridge, 1872)	Turkey, Israel to China	Near East - Mongolian subboreal range (Logunov & Marusik, 2001)
H. decoratus L. Koch, 1875	Mediterranean to Iran	Mediterranean - Near East subboreal range
H. dunini Rakov & Logunov, 1997	Turkey, Ukraine, Caucasus, Iran, Kazakhstan	East European - Middle Asian subboreal range
H. edentulus Simon, 1871	Mediterranean to Iran, Nigeria	West African - Near East subtropical range
H. equester C.L. Koch, 1867	Italy to Azerbaijan, Iran	Mediterranean - Near East subboreal range
H. flavipes (Hahn, 1832)	Europe, Turkey, Caucasus, Europe (to central Siberia), Iran, Central Asia, China	Trans-Palaearctic temperate range (Logunov & Marusik, 2001)
H. forcipifer Kulczyński, 1895	Central Asia, Iran	Cental Asian subboreal range
H. glaucus Bösenberg & Lenz, 1895	Egypt, Lybia, Iran	Near East subboreal range
H. iranus Wesołowska, 1986	Iran	Iranian endemic
H. mordax (O. P.-Cambridge, 1872)	Greece to Central Asia	Mediterranean - Central Asian subboreal range
H. verus Wesołowska, 1986	Turkey, Iran, Azerbaijan	Near East subboreal range
H. xerxesi Logunov, 2009	Iran	Iranian endemic

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forcipifer has the southernmost limit of its distribution in Iran (Logunov *et al.*, 2002).

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