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A contribution to the knowledge of spiders in wheat fields of Khorasan-e-Razavi Province, Iran

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Abstract: The spider fauna of Iran is poorly known, particularly in the eastern parts of Iran, where there are still several areas that are not well known. As a result of the study of spider fauna in organic and conventional wheat fields of Khorasan-e-Razavi Province during 2011–2012, a total of 10 families, 18 genera, and 19 species were recorded. Among the specimens, *Gnaphosa lucifuga* (Walckenaer, 1802) and *Uroctea limbata* (C.L. Koch, 1843) were new for the Iranian spider fauna.

Key words: Araneae, spider fauna, wheat fields, Khorasan-e-Razavi

1. Introduction

Spiders, as biological control agents of insects, have a wide host range, and in terms of diversity rank seventh after 5 insect orders and Acarina (Coddington and Levi, 1991). The world spider fauna comprises more than 44,000 described species that are classified into 112 families (Platnick, 2013). Because of various zoogeographical elements, a wide diversity of spiders is to be expected in different parts of Iran and therefore, in previous years, many faunistic studies have been conducted by many researchers. Most of these studies were restricted to special groups or specific regions of Iran (Roewer, 1955, 1959; Levi, 1959; Brignoli, 1970, 1972, 1980, 1981; Senglet, 1974; Levy and Amitai, 1982; Kraus and Kraus, 1989; Wunderlich, 1995; Saaristo et al., 1996; Logunov, 1999, 2001, 2004; Logunov et al., 1999, 2002; Mozaffarian et al., 2000; Ghahari and Marusik, 2009). In 2001, Mozaffarian and Marusik revised a checklist and reported 141 species belonging to 25 families from Iran. Later, a checklist of Iranian spiders was updated by Ghavami (2006), who reported 244 species from 33 families. To date, the total number of species of Araneae recorded from Iran is almost 394 species in 126 genera and 36 families (Ghavami et al., 2007a, 2007b; Moradmand and Jäger, 2011). The aim of this study was to contribute to the knowledge of the spider fauna of organic and conventional wheat fields of Khorasan-e-Razavi, in northeastern Iran.

2. Materials and methods

The specimens were collected in different wheat fields in Khorasan-e-Razavi Province in 2011 and 2012 (Figure 1). Various sampling methods such as hand catching, pitfall trapping, or sweeping were used. Specimens were preserved in 70% ethanol and transferred to the laboratory. The identification of spider specimens was made according to Levi and Levi (1962), Levi (1959), Kaston (1970), Levy and Amitai (1982), Roberts (1985), and Davies (1989). The material was deposited in the Zoological Museum of the Biology Department at Ferdowsi University of Mashhad (ZMFUM).

3. Results

Family Gnaphosidae Pocock, 1898

Genus *Drassodes* Chamberlin, 1922

Drassodes lapidosus (Walckenaer, 1802)

Material examined: 3♀ (ZMFUM), Khorasan-e-Razavi Prov., Shirvan (37°23'48"N, 57°55'46"E), 15.VI.2011, M. Hosseini; 2♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 5.VI.2012, M. Hosseini.

Distribution in Iran: Guilan, East and West Azerbaijan, Kerman (Roewer, 1955).

General distribution: Palearctic (Platnick, 2013).

Diagnosis: Carapace yellowish-brown, eye region darker; chelicerae with 3 promarginal and 2 retromarginal denticles; palpal femur with 3 (males) and 3–4 (females) dorsodistal and 1 dorsomedial spines. This species can be distinguished from 2 similar species, i.e. *D. chybyndensis*

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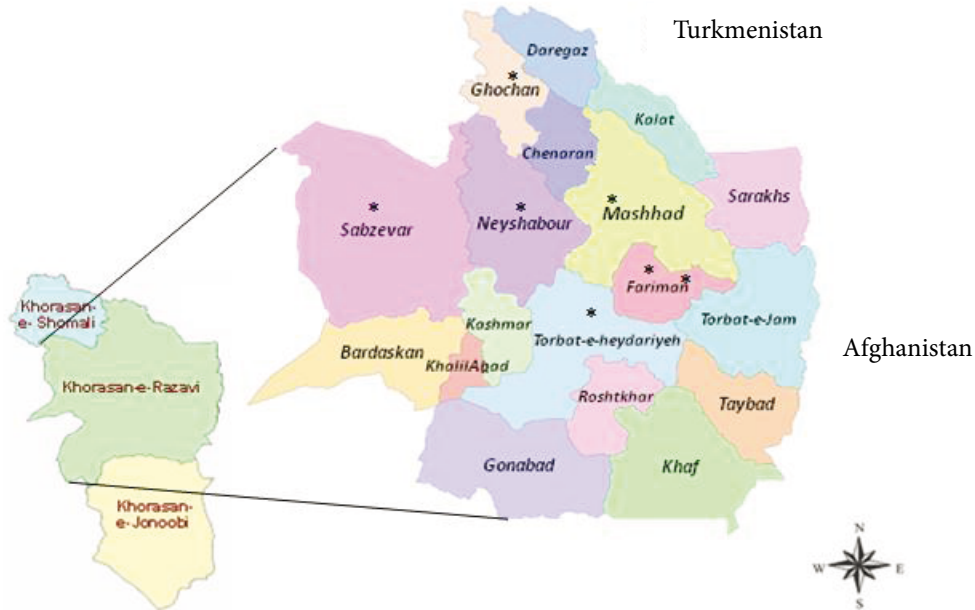


Figure 1. Map of sampling locations in Khorasan-e-Razavi Province.

and *D. natali*, by longer and non-dented tibial apophysis (males) and shape of the epigynum (females) (Esyunin et al., 2001).

Genus *Gnaphosa* Latreille, 1804

*Gnaphosa lucifuga** (Walckenaer, 1802) (Figures 2–4)

Material examined; 9♂, 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 10.V.2011, M. Hosseini.

General distribution: Palearctic (Platnick, 2013).

Diagnosis: Body length 10–15 mm in males and 12–19 mm in females; body color dark brown to almost black, the femora of the legs are a little brighter, male palps lighter than body color, prosoma dark red-brown to black-brown, eye region darker, chelicerae darker than prosoma, opisthosoma dark red-brown to black-brown; embolus robust; epigyne with broad scapus that touches protrusions of lateral epigynal margins (Ovtsharenko et al., 1992).

Genus *Haplodrassus* Chamberlin, 1922

Haplodrassus dalmatensis (L. Koch, 1866)

Material examined: 2♀ (ZMFUM), Khorasan-e-Razavi Prov., Fariman (35°42'N, 59°50'E), 10.V.2012, M. Hosseini; 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Gochan (37°06'22"N, 58°30'34"E), 15.IV.2012, M. Hosseini.

General distribution: West and Central Palaeartic: North Africa, Europe, South Urals,

Caucasus, Anatolia, Near East, Kazakhstan, Western Turkmenistan, South Siberia (Mikhailov, 2000; Tuneva and Esyunin, 2003; Levy, 2004; Helsdingen, 2010; Platnick, 2013).

Diagnosis: Males: the terminal apophysis with 2 tooth-like apical processes, the embolus with strong tooth; metatarsus I without ventral spines. Females: the epigynal fovea wider than spermathecae and with a peculiar medial septum; metatarsus IV with 3 spines (Kovblyuk et al., 2012).

Genus *Nomisia* Dalmas, 1921

Nomisia ripariensis (O. Pickard-Cambridge, 1872)

Material examined: 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 10.V.2011, M. Hosseini.

Distribution in Iran: Mazandaran, Kerman (Ghavami, 2006; Kashefi et al., 2013).

General distribution: Bulgaria, Greece to Azerbaijan (Platnick, 2013).

Diagnosis: Body length 4–8 mm in males and 5.5–9 mm in females; embolus broad with a transparent membrane; ventral tibial apophysis vestigial or completely reduced massive retrolateral apophysis with pointed lateral process (Nentwig et al., 2013).

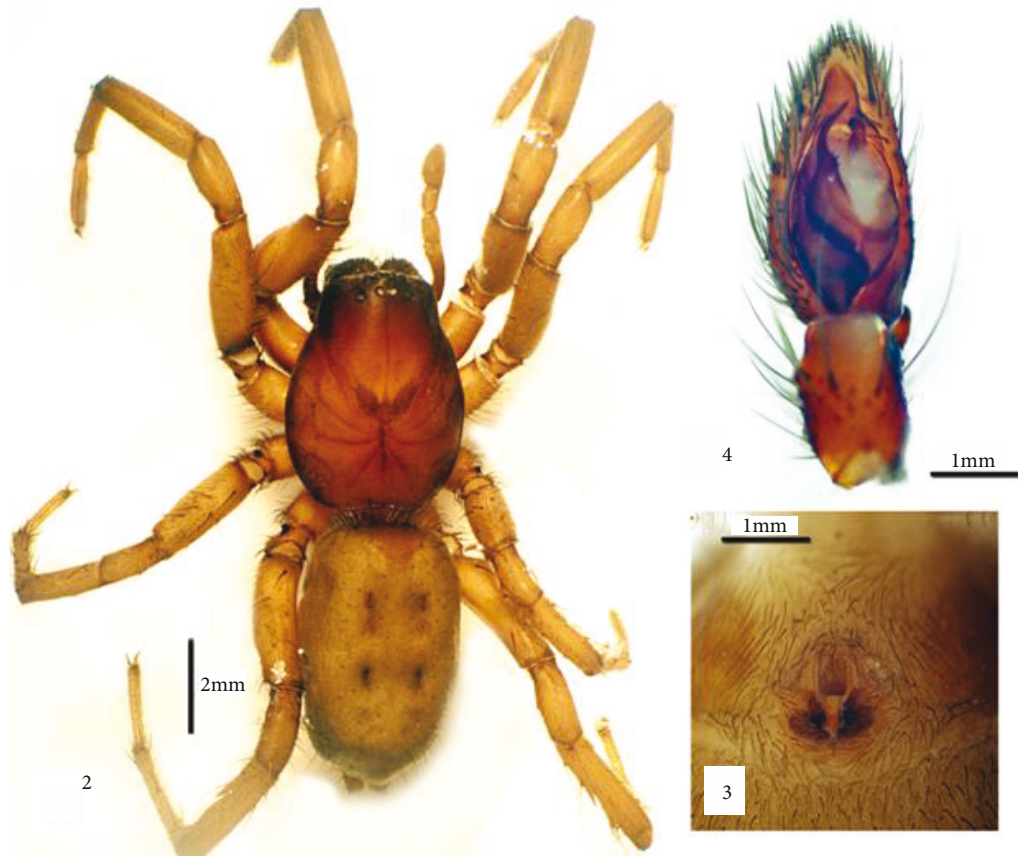
Genus *Zelotes* Gistel, 1848

Zelotes sp.

Material examined: 2♂, 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 10.V.2011, M. Hosseini; 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Neyshabour (36.2133°N, 58.7958°E), 15.V.2011, M. Hosseini.

General distribution: Palearctic (Platnick, 2013).

Diagnosis: Tarsi of legs III and IV with a dense cluster of hairs on distal part; distance between posterior median eyes almost as long as their diameter.



Figures 2–4. *Gnaphosa lucifuga*. 2) Dorsal habitus of male; 3) Ventral view of epigynum; 4) Ventral view of male palp

Family Lycosidae Sundevall, 1833

Genus *Arctosa* C.L. Koch, 1847

Arctosa sp.

Material examined: 5 subadults (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 10.V.2011, M. Hosseini.

Diagnosis: Body color dark brown; tarsus I with a long bristle proximally; terminal apophysis prominent and usually in 2 parts.

Genus *Hogna* Simon, 1885

Hogna radiata (Latreille, 1817)

Material examined: 1♂, 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 25.VI.2011, M. Hosseini; 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Fariman (35°42'N, 59°50'E), 10.V.2012, M. Hosseini.

Distribution in Iran: Fars, Golestan, Mazandaran (Ghahari and Marusik, 2009).

General distribution: Central Europe to Central Asia, Central Africa (Platnick, 2013). Diagnosis: Body length 9–18 mm in males and 12–25 mm in females; carapace with 1 clear central band and 2 lateral brown bands which are cut with radiating light bands; dorsal side of abdomen

with a dark brown cardiac mark, ventral side of abdomen usually black.

Genus *Pardosa* C.L. Koch, 1847

Pardosa pontica (Thorell, 1875)

Material examined: 91♂, 2439♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 2.VI.2011, R. Kashfi; 50♂, 6♀ (ZUFUM), Khorasan-e-Razavi Prov., Fariman-Torbat-e Jam road, (35°23'07"N, 60°13'53"E), 7.V.2011, M. Hosseini; 29♂, 7♀ (ZMFUM), Khorasan-e-Razavi Prov., Torbat-e Heydarieh, (35°46'54"N, 59°22'25"E), 3.V.2012, M. Hosseini; 21♂, 2♀ (ZMFUM), Khorasan-e-Razavi Prov., Neishabour (36.2133°N, 58.7958°E), 3.V.2012, M. Hosseini.

Distribution in Iran: Hitherto has been recorded from Golestan and Tehran provinces (Marusik et al., 2012).

General distribution: Eastern Europe to Central Asia (Platnick, 2013).

Diagnosis: In males, carapace brown, with yellowish-brown median and lateral bands, tarsus I with black tip, metatarsus of palp with thick black hairs on the dorsal side; abdomen dorsally dark brown with a yellow cardiac mark followed by spots of the same color, ventral side

of abdomen dark with 2 lighter longitudinal bands; in females, carapace brown with a yellowish median strip and lateral bands of the same color; abdomen dorsally dark brown with 4–5 reddish-brown spots and a cardiac mark of the same color, ventral side of abdomen yellow with 2 lighter longitudinal bands.

Pardosa palustris (Linnaeus, 1758)

Material examined: 2♂, 19♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 2.VI.2011, R. Kashefi.

Distribution in Iran: Golestan (Ghavami, 2006).

Distribution: Holarctic (Platnick, 2013).

Diagnosis: Body length 5–6 mm in males and 6–7 mm in females; prosoma with lateral bands, legs yellow, dorsal part of femur with dark spots; terminal apophysis of palps in males large and pointed; epigyne often wrinkled and protruding with lateral septum process (Nentwig et al., 2013).

Genus *Trochosa* C. L. Koch, 1847

Trochosa urbana (O. Pickard-Cambridge, 1876)

Material examined: 2♂, 3♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 2.VI.2011, R. Kashefi, 2♀ (ZMFUM), Khorasan-e-Razavi Prov., Gochan (37°06'22"N, 58°30'34"E), 15.IV.2012, M. Hosseini.

Distribution in Iran: Fars, Mazandaran, Kerman (Ghavami, 2006).

General distribution: from Africa to India (Plantick, 2013).

Diagnosis: Body length 7–18 mm; median light stripe on carapace anteriorly with 2 longitudinal dark stripes.

Family Oecobiidae Blackwall, 1862

Genus *Uroctea* Dufour, 1820

*Uroctea limbata** (C.L. Koch, 1843) (Figures 5–7)

Material examined: 2♂ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 10.V.2011, M. Hosseini, 1♀ (ZMFUM), Khorasan-e-Razavi Prov., vicinity of Espharayen (36°18'N, 59°36'E), 10.V.2011, E. Jamili.

General distribution: Palearctic (Platnick, 2013).

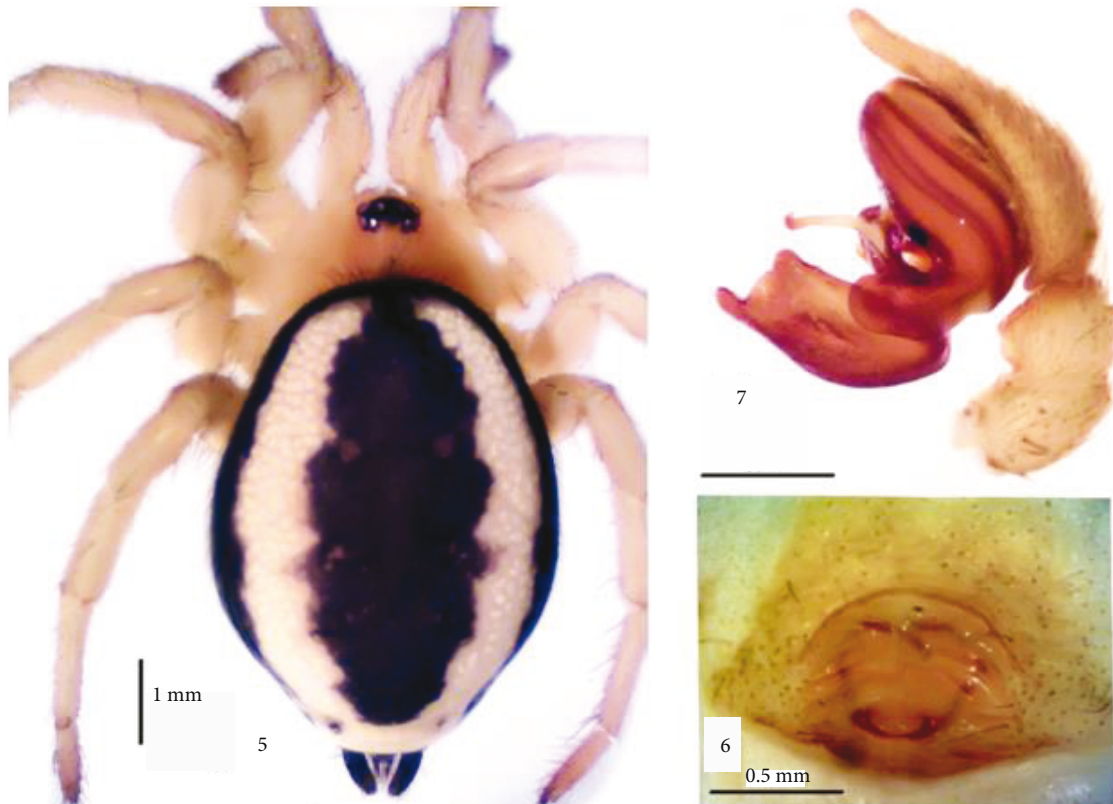
Diagnosis: Medium-sized spiders, prosoma yellow, opisthosoma black with 2 longitudinal cream-colored bands; legs, pedipalps, and sternum yellow without markings, venter yellowish brown; eye borders black; spinnerets dark brown; epigynum and male copulatory organ as illustrated in Figures 6 and 7.

Family Oxyopidae Thorell, 1870

Genus *Oxyopes* Latreille, 1804

Oxyopes lineatus Latreille, 1806

Material examined: 3♂ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 10.V.2011, M. Hosseini.



Figures 5–7. *Uroctea limbata*. 5) Dorsal habitus of male; 6) Ventral view of epigynum; 7) Retrolateral view of palp.

Distribution in Iran: East or West Azerbaijan, Tehran, Golestan, Fars (Ghavami, 2006).

General distribution: Palearctic (Platnick, 2013).

Diagnosis: Body color yellow to light brown with white patterns; male pedipalp ventrally with distinct projecting tibial apophysis and lateral tibial apophysis; epigyne backwardly projecting scapus-like.

Family Salticidae Blackwall, 1841

Genus *Pellenes* Simon, 1876

Pellenes brevis (Simon, 1868)

Material examined: 2♂, 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 10.V.2011, M. Hosseini; 1♂, 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Torbate Heydarieh, (35°46'54"N, 59°22'25"E), 3.V.2012, M. Hosseini.

Distribution in Iran: Tehran (Ghavami, 2006).

General distribution: Spain, France, Germany, Macedonia, Rhodes (Platnick, 2013).

Diagnosis: Carapace dark brown, clypeus light yellow with dense white hairs; abdomen yellowish brown, dorsal side of abdomen with a central yellowish-white stripe; spinnerets in males brownish and in females yellow.

Genus *Heliophanus* C.L. Koch, 1833

Heliophanus flavipes Huhn, 1831

Material examined: 3♂ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 6.V.2011, M. Hosseini; 2♂ (ZMFUM), Khorasan-e-Razavi Prov., Gochan (37°06'22"N, 58°30'34"E), 25.V.2012, M. Hosseini.

Distribution in Iran: East Azerbaijan, Tehran, Mazandaran, Golestan (Ghavami, 2006).

General distribution: Palearctic (Platnick, 2013).

Diagnosis: Body length 3–6 mm; prosoma grayish-black with white hairs, legs yellow, femur IV black, abdomen black with golden hairs; embolus long and bent; epigyne with transverse oval groove (Nentwig et al., 2013).

Family Philodromidae Thorell, 1870

Genus *Thanatus* C.L. Koch, 1837

Thanatus vulgaris Simon, 1870

Material examined: 9♂, 4♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 10.V.2011, M. Hosseini; 7♂, 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Gochan (37°06'22"N, 58°30'34"E), 17.V.2011, M. Hosseini.

Distribution in Iran: Tehran, Eilam, Khorasan (Ghavami, 2006).

General distribution: Holarctic (Platnick, 2013).

Diagnosis: Body length 3.7–5.8 mm in males and 6.1–9.1 mm in females; carapace and abdomen yellowish and spotted; apophysis of male palps large and pointed.

Family Titanoecidae Lehtinen, 1967

This family includes only 5 genera and a little over 46 species worldwide. The family is fairly widespread in the New World and Eurasia.

Genus *Nurscia* Simon, 1874

Nurscia albomaculata Lucas, 1846

Material examined: 7♂, 3♀ (ZMFUM), Khorasan-e-Razavi Prov., Torbate Heydarieh, (35°46'54"N 59°22'25"E), 3.V.2012, M. Hosseini; 5♂, 2♀ (ZMFUM), Khorasan-e-Razavi Prov., Neishabour (36.2133°N, 58.7958°E), 3.V.2012, M. Hosseini.

Distribution in Iran: Tehran (Ghavami, 2006; Kashefi et al., 2013).

General distribution: Europe, Egypt to Central Asia (Platnick, 2013).

Diagnosis: Body length 10–11 mm in males and 6–11 mm in females; epigyne strongly sclerotized with visible copulatory openings; carapace red-brown to black-brown; legs red-brown; abdomen black-brownish red, dorsally with 4–6 pairs of small, white spots.

Family Theridiidae Sundevall, 1833

In order to key species of Theridiids to genus, specimens of both sexes are necessary (Levi and Levi, 1962).

Genus *Enoplognatha* Pavesi, 1880

Diagnosis: In this genus, median apophysis large, paracymbium on cymbium margin; chelicera of male enlarged, sclerotized; usually dark in color and abdomen with a dorsal pattern (Levi and Levi, 1962).

Enoplognatha sp.

Material examined: 2♀ (ZMFUM), Khorasan-e-Razavi Prov., Torbat-e Heydarieh, (35°46'54"N, 59°22'25"E), 3.V.2012, M. Hosseini.

Family Thomisidae Sundevall, 1833

Genus *Xysticus* C.L. Koch, 1835

Xysticus rectilineus (O.P.-Cambridge, 1872)

Material examined: 2♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 30.IV.2011, M. Hosseini.

Distribution in Iran: Previously recorded from Khorasan Province (Mirshamsi, 2005).

General distribution: Syria, Lebanon, Israel (Platnick, 2013).

Diagnosis: Ventral part of tibia I at least with 4 pairs of spines; opisthosoma mostly with distinct dark pattern.

Family Zodariidae Thorell, 1881

Genus *Parazodarion* Ovtchinnikov, Ahmad & Gurko, 2009

Parazodarion raddei (Simon, 1889)

Material examined: 3♂, 1♀ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 12.V.2012, R. Kashefi; 2♂ (ZMFUM), Khorasan-e-Razavi Prov., Mashhad (36°18'N, 59°36'E), 12.V.2012, M. Hosseini; Neishabour (36.2133°N, 58.7958°E), 14.V.2011, M. Hosseini.

Distribution in Iran: Qom, West Azerbaijan, and Yazd provinces (Ovtchinnikov et al., 2009).

General distribution: Central Asia (Platnick, 2013).

Diagnosis: Carapace and cephalic area dark; femora nearly brown; tibia, metatarsi and tarsi almost yellowish-gray; dorsal part of abdomen black, ventral part dark reddish-brown; epigyne with 2 wide semicircular openings.

4. Discussion

Spiders of Iran have been improperly studied both faunistically and taxonomically. As the findings of this study show, collecting spiders from different agricultural habitats has brought new species to the Iranian fauna. With regard to various geographical elements and climate variability in Iran, and concerning the number of recorded spider species in our smaller neighboring countries with less geographical diversification (Mikhailov, 1997; Marusik and Guseinov, 2003; Bolu et al., 2008), it is quite likely that in different parts of Iran more new species of spiders exist that are waiting to be discovered and described.

According to Mirshamsi (2005), a total of 26 families, 63 genera, and 95 species have been recorded from Khorasan Province. Gnaphosidae is one of the largest families of spiders in terms of the number of genera and species. In

our study, most of our samples belonged to this family, and Lycosidae ranked second. In this survey, among the identified specimens, *Gnaphosoma lucifuga* and *Uroctea limbata* were newly recorded from Iran. These species are distributed in the Palaearctic region (Plantick, 2013), and their presence in Iran is not unexpected. Furthermore, *Haplodrassus dalmatensis* (L. Koch, 1866), *Parazodarion raddei* (Simon, 1889), *Pardosa pontica* (Thorell, 1875), *Hogna radiata* (Latreille, 1817), and *Oxyopes lineatus* Latreille 1806 were new for Khorasan-e-Razavi Province.

The current study and similar previous studies in Khorasan-e-Razavi Province have shown that there is high species diversity in the spider fauna of this province. This research is a preliminary attempt to enhance our knowledge of spiders in northeastern Iran. Further studies in other regions are needed to allow a comparison of the wheat-field spider fauna.

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