

# Contribution to the distribution of spiders with significant medical importance (Araneae: *Loxosceles* and *Latrodectus*) in Iran, with a new record for the country

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A faunistic review is given on the Iranian medically important spiders of two genera *Loxosceles* and *Latrodectus*. *Latrodectus cinctus* Blackwall, 1865 is reported for the first time from Iran (and for the second time from Asia) and is replaced with the previous erroneous reports of *L. basseltii* Thorell, 1870. The following species are reported for the first time from the listed provinces: *Loxosceles rufescens* (Dufour, 1820) (Fars and Hormozgan Provinces), *Latrodectus dahlī* Levi, 1959 (Hormozgan Province), *L. pallidus* O.P.-Cambridge, 1872 (Alborz and Semnan Provinces) and *L. tredecimguttatus* (Rossi, 1790) (Alborz, Qom, Semnan and Tehran Provinces). These data, together with *L. geometricus* C.L. Koch, 1841, already recorded from Khorasan-e-Razavi Province, raise the number of *Latrodectus* species present in Iran to five.

**Key words:** cytotoxicity, envenomation, fauna, neurotoxicity, recluse spider, widow spider

## INTRODUCTION

With the exception of the species belonging to the families Uloboridae and Holarchaeidae, which lack venom glands, nearly all other spiders should be considered as venomous, at least in regards to their usual preys (Maretić, 1987). Based upon different reasons including the harmlessness nature of the venom, the small quantity of the injected venom, the small size of the chelicerae and the behaviour and lifestyle of the spiders, the majority of them are not considered as dangerous to humans (Maretić, 1987). Species of *Loxosceles* Heineken and Lowe, 1832, from the family Sicariidae Keyserling, 1880, commonly known as recluse, violin or fiddle-back spiders are equipped with necrotic venom, which is able to cause severe skin lesions and occasionally, death in humans (Schenone & Suarez, 1978). Of about 117 described species worldwide, only *L. rufescens* (Dufour, 1820) is known from Iran (Zamani & Rafinejad, 2014; Mirshamsi et al., 2013). Species of *Latrodectus* Walckenaer, 1805, from the family Theridiidae Sundevall, 1833, commonly known as widow spiders, are also present in Iran. Their venom is neurotoxic and affects the neuromuscular endplates and

synapses in the central nervous system (Foelix, 2010). Thirty one valid species are present globally (Platnick, 2014), from those, five have been reported from Iran: *Latrodectus dabli* Levi, 1959, *L. geometricus* C.L. Koch, 1841, *L. pallidus* O.P.-Cambridge, 1872, *L. tredecimguttatus* (Rossi, 1790) and *L. hasseltii* Thorell, 1870. The aim of this study was to increase the knowledge on the geographical distribution of these spiders in Iran, and by providing data on *L. cinctus* Blackwall, 1865 as a new record, correct the previous erroneous reports of *L. hasseltii*.

#### MATERIAL AND METHODS

Specimens were collected by hand, preserved in 75% ethanol and photographed using either a Nikon SMZ 1000 stereo-microscope/Canon EOS-1Ds Mark III camera, or Olympus SZH-10 stereo-microscope/Olympus DP-71 camera. Female genital organs were removed and immersed in either KOH or lactic acid for clearing and cleaning.

**Abbreviations used in the text:** ALE = Anterior Lateral Eyes, AME = Anterior Median Eyes, PLE = Posterior Lateral Eyes. **Depositories:** JAZM = Jalal Afshar Zoological Museum of University of Tehran, ZMFUM = Zoological Museum of Ferdowsi University of Mashhad, ZMMU = Zoological Museum of the Moscow State University.

#### RESULTS

##### Family Sicariidae Keyserling, 1880

##### Genus *Loxosceles* Heineken and Lowe, 1832

**Diagnosis:** Medium-sized, ecribellate, araneomorph and haplogyne; no remarkable size variation between sexes; prosoma flat, longer than wide and sometimes with violin-shaped patterns; thoracic wider than cephalic; opisthosoma oval; fovea longitudinal; six eyes are present (the AME are missing) and grouped in three diads, forming a strong recurved position; chelicerae fused basally and with lamina and teeth; legs latigrade; tarsi two-clawed; females lack sclerotized epigyne; males have simple palpal organs.

##### *Loxosceles rufescens* (Dufour, 1820) (Fig. 1)

**Material examined:** 1♀ (JAZM), IRAN, Hormozgan Province, Kish Island, 26°32'N, 54°01'E, Sep, 1993, leg. A. Savoji; 1♀ 2 juveniles (ZMMU), IRAN, Fars Province, Shiraz, 29°45'N, 52°45'E, May, 2000, leg. Y.M. Marusik; 1♀ 1♂ 2 juveniles (JAZM), IRAN, Hormozgan Province, Bandar Abbas, 27°10'N, 56°17'E, Feb, 2012, leg. M. Shahi; 1♀ (JAZM), IRAN, Hormozgan Province, Hormuz Island, 27°04'N, 56°28'E, Jan, 2014, leg. A. Zamani; 1♀ (JAZM), IRAN, Hormozgan Province, Qeshm Island, 26°55'N, 56°08'E, Jan, 2014, leg. A. Zamani.

**Diagnosis:** Somatic characters corresponding to those of the genus; size between 7-7.5 mm; tibia of male pedipalp short and thick with a narrowed base; embolus about as long as the width of the globular bulb (Fig. 1A); spermathecae of female dimpled, its parts near each other at midline, each with a large, rounded lobe (Fig. 1B).

**Habitat:** Mostly urban; this spider can be found from under rocks and fallen logs, in the leaf litter and inside human dwellings (non-obligatory synanthropic). Also, they might occupy the entrance of caves.

**Global Distribution:** Cosmopolitan (Platnick, 2014).

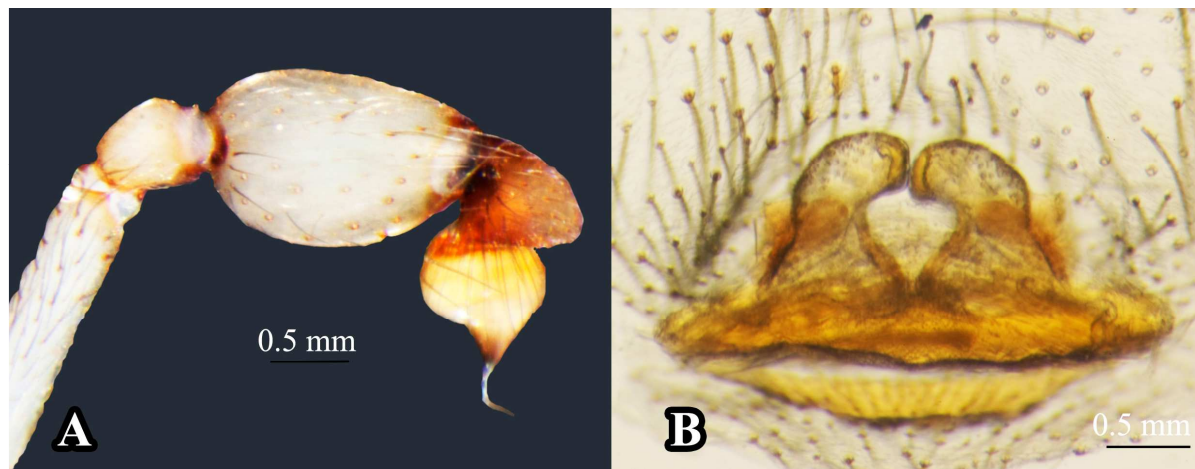


FIGURE 1. *Loxosceles rufescens*. A) Male palp, prolateral view, B) Female vulva, ventral view.

### Family Theridiidae Sundevall, 1833

#### Genus *Latrodectus* Walckenaer, 1805

**Diagnosis:** Medium-sized, ecribellate, araneomorph and entelegyne; remarkable size variation between sexes resulting in smaller size of males; opisthosoma globular in females and slender in males; eight eyes are present and grouped in two lines, ALE and PLE of each side closing near each other; prosoma longer than wide and much smaller than opisthosoma; thoracic wider than cephalic; chelicerae toothless; fourth tarsi bear tarsal combs; genitalia of females have a pair of bell-shaped spermathecae with coiled ducts; emboli of males long and looped.

#### *Latrodectus cinctus* Blackwall, 1865 (Figs. 2D, 3D, 4D)

**Material examined:** 1♀ (ZMFUM), IRAN, Hormozgan Province, Kish Island, 26°32'N, 54°01'E, Oct, 1999, leg. A. Savoji; 2♂ (ZMFUM), IRAN, Hormozgan Province, Bandar Abbas, Feb, 2012, leg. M. Shahi; 1♀ (ZMFUM), IRAN, Hormozgan Province, Bandar Abbas, July, 2012, leg. A. Hosseinic; 1♀ (JAZM), IRAN, Hormozgan Province, Qeshm Island, 26°55'N, 56°08'E, Jan, 2014, leg. A. Zamani.

**Diagnosis:** Size between 3-3.5 mm in males, and 7.5-12.5 mm in females; coloration can vary dramatically in different specimens; coloration of opisthosoma in adult females from dark-brown/black without patterns to brown/black with different longitudinal/transversal red/orange stripes, some specimens strongly resembling *L. hasseltii* and *L. renivulvatus* Dahl, 1902 (Fig. 4D); these three species can be diagnosed by the pattern of their abdominal setae and minor differences in genital organs. Embolus of male pedipalp with three retrolateral loops (Fig. 2D) (Lotz, 1994). Spermathecal ducts of female vulva with three loops (Fig. 3D) (Knoflach & Van Harten, 2002).

**Habitat:** Steppe and urban habitats.

**Global Distribution:** Cape Verde Is., Africa, Kuwait (Platnick, 2014), Iran (new record).

#### *Latrodectus dahli* Levi, 1959 (Figs. 2A, 3A, 4B)

**Material examined:** 1♀ (JAZM), IRAN, Hormozgan Province, Bandar Abbas, 27°10'N, 56°17'E, Apr, 2011, leg. M. Shahi; 1♀ 1♂ (JAZM), IRAN, Bushehr Province, Jam, 27°58'N, 51°54'E, Jan, 2012, leg. Z. Mirzaee; 4♀ (ZMFUM), IRAN, Khorasan-e-Razavi Province, Gonabad, Jul, 2012, leg. H. Sheibani.

**Diagnosis:** Size between 2.5-3 mm in males, and 10-13 mm in females; coloration of adult females usually black, sometimes with white patches on opisthosoma (Fig. 4B); legs can be lighter in colour in some specimens; general coloration of adult males usually brown, with several longitudinal white lines on opisthosoma (Knoflach & Van Harten, 2002); embolus of males with two loops (Fig. 2A); spermathecal ducts of females with one coil (Fig. 3A).

**Habitat:** Steppe habitats of semi desert areas.

**Global Distribution:** Morocco to Central Asia (Platnick, 2014).

***Latrodectus geometricus* C.L. Koch, 1841**

**Material examined:** 1♀ (ZMFUM), IRAN, Khorasan-e-Razavi Province, Mashhad, 36°18'N, 59°36'E, June, 1995, leg. O. Mirshamsi.

**Diagnosis:** Size between 3-3.5 mm in males, and 6-10 mm in females; general body colour of adult females usually light to dark brown, black in some specimens; in adult males cephalothorax either completely brown, or brown with black margins, and several white spots and dark lines present on dorsal side of opisthosoma; a venter red hour glass mark usually present (Knoflach & Van Harten, 2002); emboli of male pedipalp and spermathecal ducts of females form four loops; seminal receptacles of female parallel to each other. Unfortunately, the vulva of our single female specimen was accidentally lost before photographing

**Habitat:** Steppes of semi desert areas, and also urban habitats.

**Global Distribution:** Cosmopolitan (Platnick, 2014).

***Latrodectus pallidus* O.P.-Cambridge, 1872** (Figs. 2C, 3C, 4E)

**Material examined:** 4♀ 2♂ (ZMFUM), IRAN, Khorasan-e-Razavi, Gonabad, Sep, 1995, leg. O. Mirshamsi; 1♀ (JAZM), IRAN, Alborz Province, Karaj, 35°44'N, 50°35'E, Aug, 2011, leg. A. Zamani; 1♀ (JAZM), IRAN, Semnan Province, Shahrud, 35°30'N, 55°30'E, Aug, 2013, leg. anonymous; 4♀ (ZMFUM), IRAN, Khorasan-e-Razavi Province, Mashhad, 36°28'N, 59°17'E, June, 2013, leg. O. Mirshamsi.

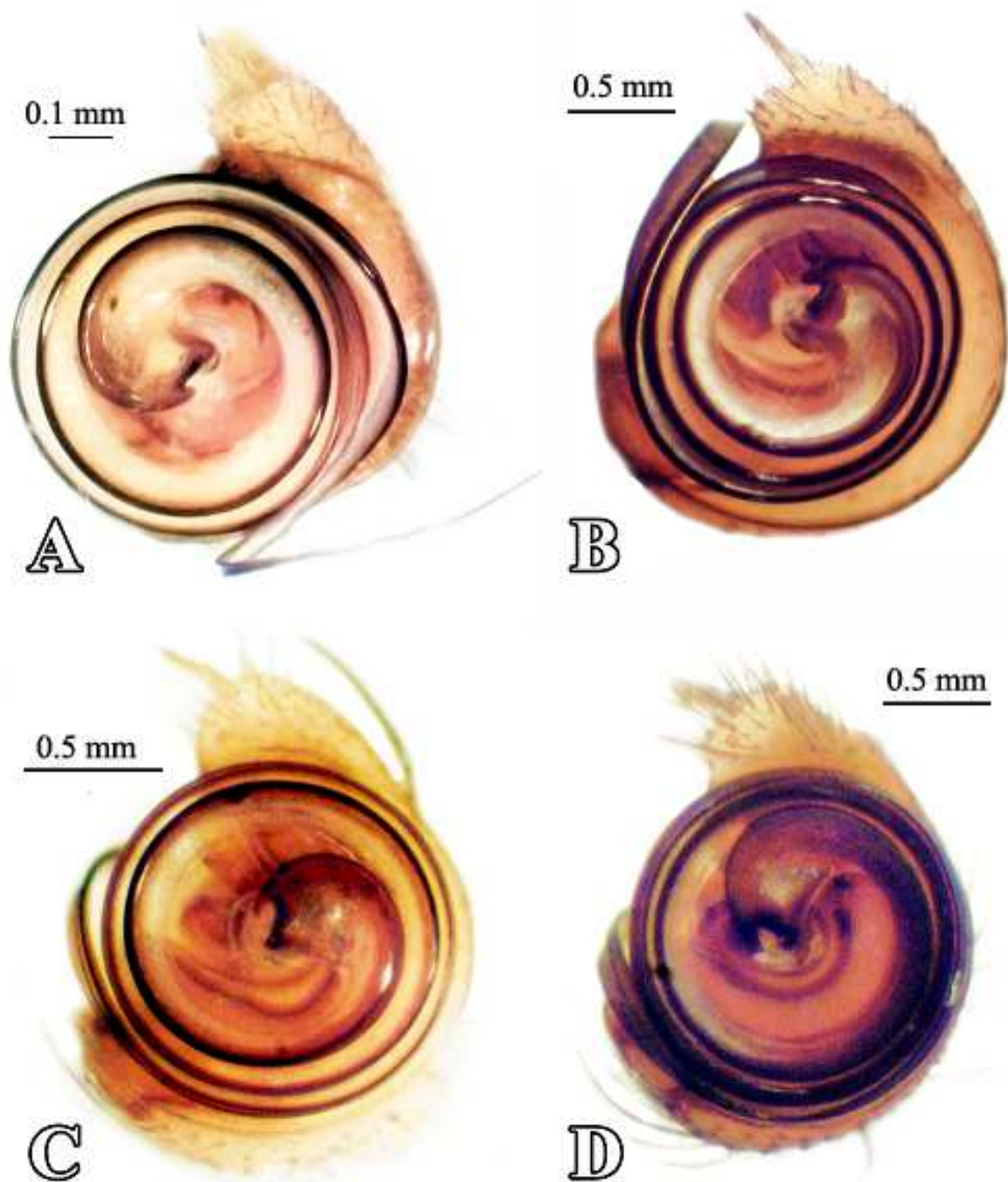
**Diagnosis:** Size between 3.5-5.5 mm in males, and 11-13 mm in females; opisthosoma pale/cream to white, with several dark dots on dorsal side, making it easily distinguishable from other widow spiders (Fig. 4E); prosoma and legs usually light brown; spermathecal ducts of female genitalia and embolus of male pedipalp with three loops (Fig. 2C, 3C) (Mirshamsi, 2005).

**Habitat:** Steppe habitats of semi-desert areas.

**Global Distribution:** Cape Verde Islands, Libya to Central Asia (Platnick, 2014).

***Latrodectus tredecimguttatus* (Rossi, 1790)** (Figs. 2B, 3B, 4C)

**Material Examined:** 10♀ 3♂ (ZMFUM), IRAN, Khorasan-e-Razavi Province, Mashhad, Sep, 1995, leg. O. Mirshamsi; 1♂ (ZMFUM), IRAN, Khorasan-e-Razavi Province, Mashhad, 36°18'N, 59°36'E, June, 2012, leg. O. Mirshamsi; 1♂ 1♀ (ZMFUM), Northern Khorasan Province, Espharaen, 37°03'N, 57°31'E, May, 2010, leg. E. Jamili; 1♀ (JAZM), IRAN, Hormozgan Province, Bandar Abbas, 27°10'N, 56°17'E, Apr, 2011, leg. M. Shahi; 1♀ (JAZM), IRAN, Alborz Province, Karaj, 35°44'N, 50°35'E, Aug, 2011, leg. A. Zamani; 1♀ (JAZM), IRAN, Qom Province, Salafchegan, 34°28'N, 50°27'E, Apr, 2013, leg. A. Zamani; 5♀ (ZMFUM), IRAN, Khorasan-e-Razavi Province, Mashhad, 36°28'N, 59°17'E, June, 2013, leg. O. Mirshamsi; 1♀ (JAZM), IRAN, Semnan Province, Shahrud, 35°25'N, 55°8'E, Aug, 2013, leg. Anonymous; 1♀ (ZMFUM), IRAN, Tehran Province, Tehran, April, 2014, leg. S. Sami.

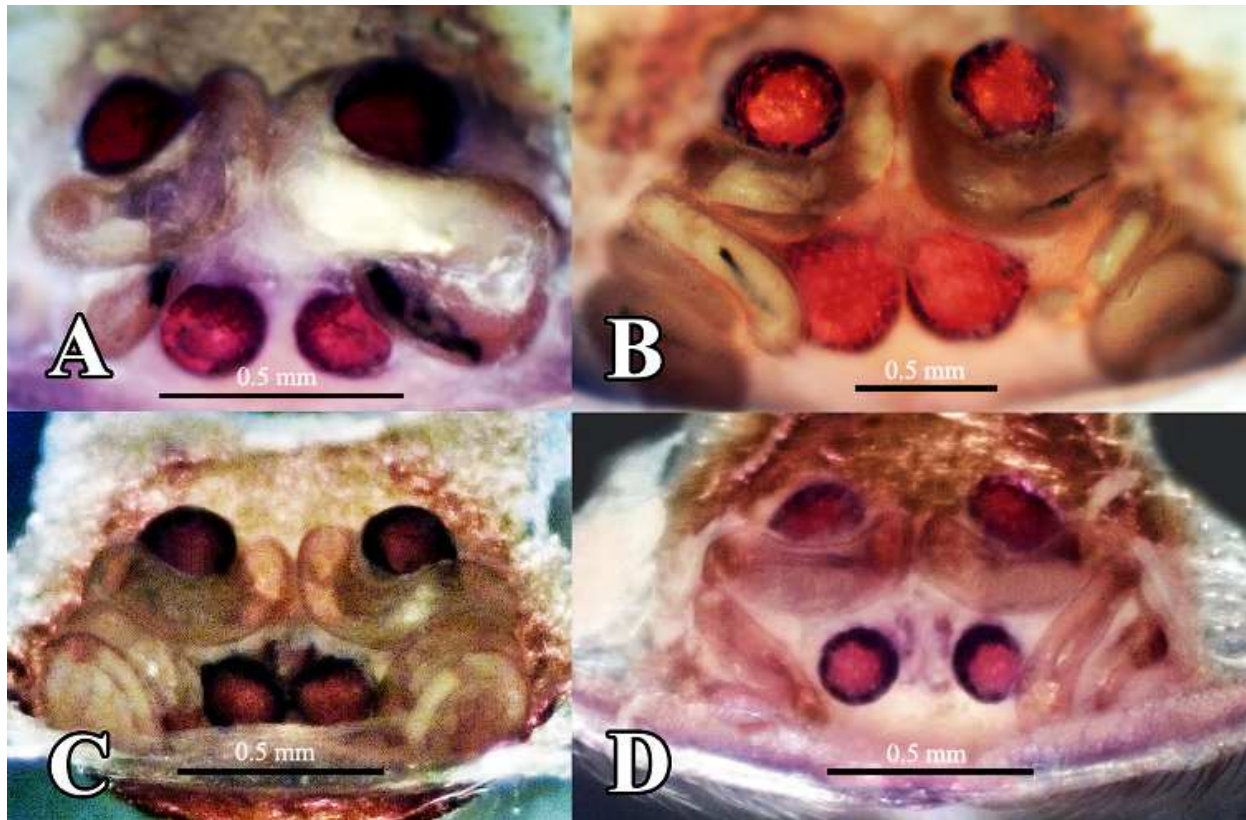


**FIGURE 2.** Tarsi of male pedipalps of *Latrodectus* spp (ventral view). A) *L. dahlī*; B) *L. tredecimguttatus*; C) *L. pallidus*; D) *L. cinctus*.

**Diagnosis:** Size between 3-6 mm in males, and 9-17 mm in females; coloration of female opisthosoma usually black with several red spots, though the Iranian populations mostly uniformly black (Fig. 4C); emboli of male palps with three loops (Fig. 2B); spermathecal ducts of female vulva with four loops (Fig. 3B).

**Habitat:** Steppe habitats of semi-desert areas.

**Global Distribution:** Mediterranean to China (Platnick, 2014).



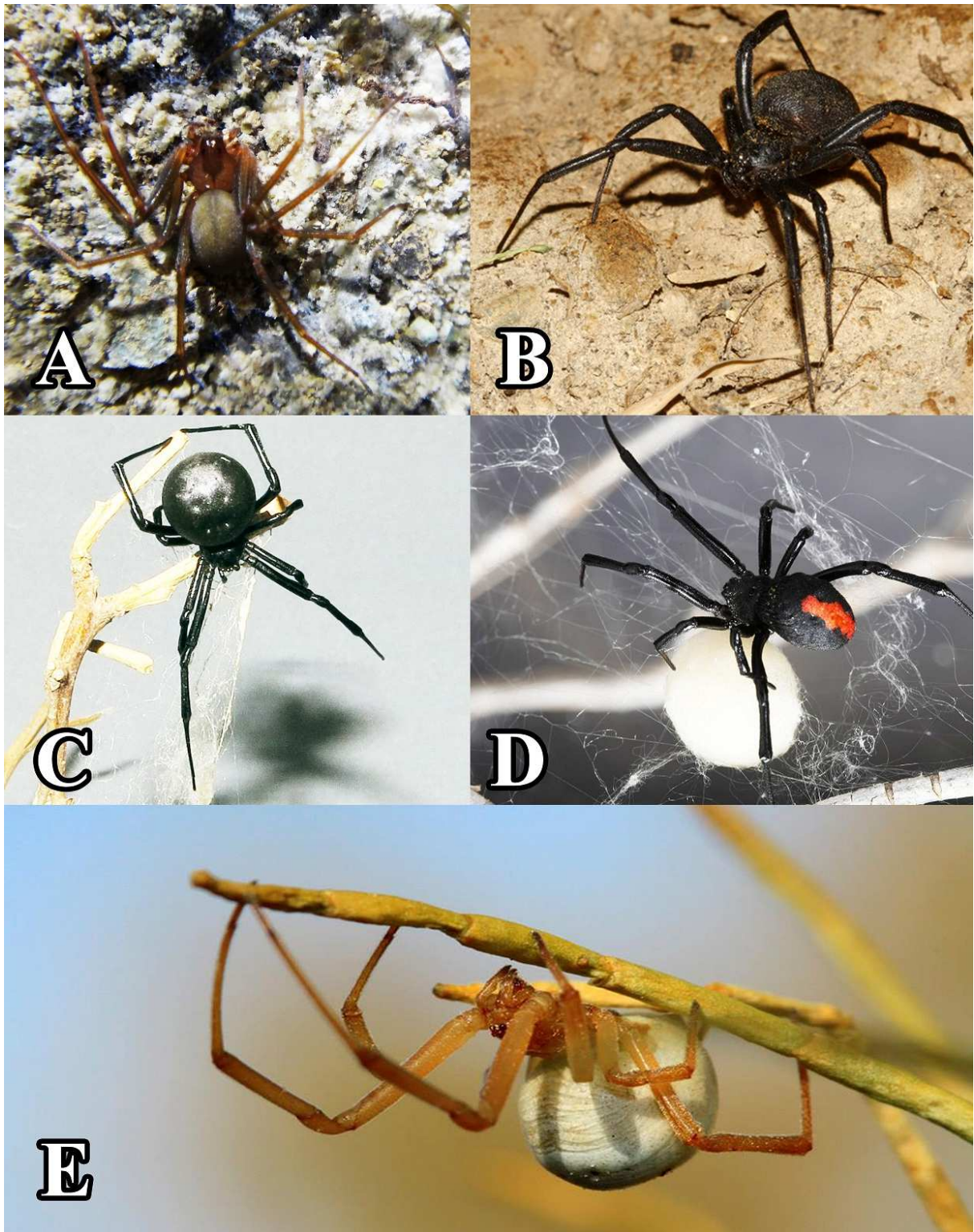
**FIGURE 3.** Vulvae of *Latrodectus* spp (dorsal view). A) *L. dabli*; B) *L. tredecimguttatus*; C) *L. pallidus*; D) *L. cinctus*.

## DISCUSSION

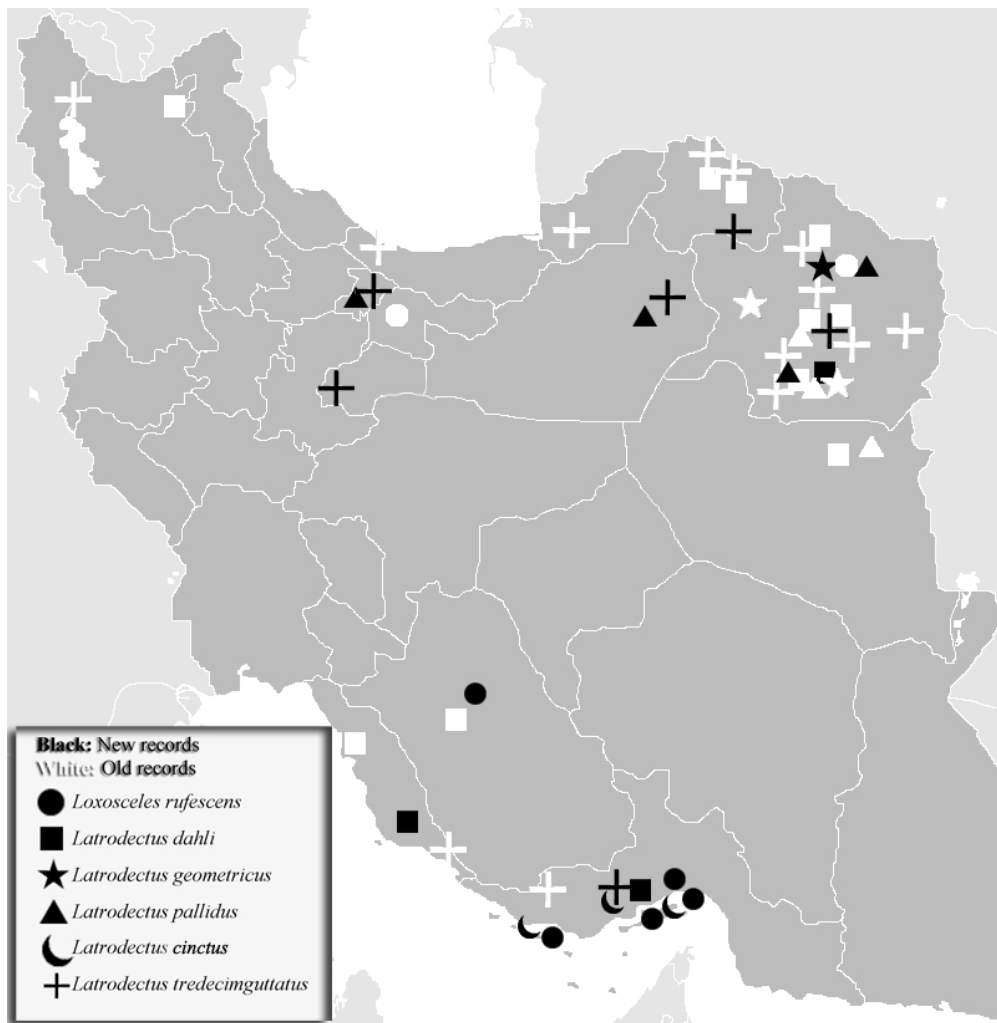
The first presence of *Loxosceles rufescens* in Iran was recorded from Tehran Province (north central Iran) by Zamani and Rafinejad (2014), and later, Mirshamsi et al. (2013) reported this species and its bite from Khorasan Province (north eastern Iran). In this study, we report its presence from Hormozgan and Fars Provinces for the first time. Hormozgan Province is the southernmost report for this species in Iran, suggesting a wide distribution over the country (Fig. 5). Due to its urban distribution, the medical importance degree of this species in Iran is probably high. But for reasons such as the misidentification of the bites with wounds caused by other native (and infamous) arachnids (e.g. *Hemiscorpius lepturus* Peters, 1861), the definite degree of their medical importance needs further research.

Previous reports of *Latrodectus dabli* from Iran were related to Bushehr (Levi, 1959), Khorasan (Mirshamsi, 2005; Rafinejad et al., 2007), Fars (Jäger & Gromov, 2011) and East Azarbayjan (Rahmani et al., 2014) Provinces. In this study we report its distribution from Hormozgan Province as well. Determining the medical importance degree of this species needs further research (Fig. 5).

The only previous record of *L. geometricus* was from Khorasan-e-Razavi Province (Rafinejad et al., 2007). Our single female specimen was also collected in Khorasan-e-Razavi, so no range is extended for this species (Fig. 5). The definite medical importance degree of this species in Iran requires further research, but due to its presence around human-dwellings, it should probably be of high medical importance.



**FIGURE 4.** Habitus of female specimens of Iranian spiders with significant medical importance. A) *Loxosceles rufescens* (photo: Zamani); B) *Latrodectus dabli* (photo: Talebi); C) *L. tredecimguttatus* (photo: Zamani); D) *L. cinctus* (photo: Mohajeran); E) *L. pallidus* (photo: Moody).



**FIGURE 5.** Distribution map of *Loxosceles rufescens* and *Latrodectus* spp., based on new (black) and old (white) records.

Hitherto, *L. pallidus* was reported from Khorasan-e-Razavi and Southern Khorasan Provinces only (Mirshamsi, 2005; Rafinejad et al., 2007). In this study, we report its distribution from Semnan and Alborz Provinces for the first time, extending its range to central parts of Iran (Fig. 5). Because of its distribution outside human dwellings and the harmless nature of the venom (Safarova et al., 1986), its medical importance is probably low.

*Latrodectus tredecimguttatus* is the abundant species of widow spiders in Iran. It has been reported from Lake Urmia (Azarbayjan) (Pocock, 1899), Hormozgan, Bushehr, Mazandaran (Roewer, 1959), Khorasan-e-Razavi, Northern Khorasan (Mirshamsi, 2005; Rafinejad et al., 2007) and Golestan (Ghavami et al., 2004) Provinces. In this study, we report its presence from Alborz, Qom, Semnan and Tehran Provinces for the first time, and as a result, extending its range to central parts of Iran (Fig. 5). The medical importance of this species in Iran is high: the bites are quite common in north eastern Iran, and induce morbidity, and in some cases, mortality (Afshari et al., 2009).

Finally, *L. cinctus* is reported for the first time from Iran (Hormozgan Province) and for the second time in Asia, after Kuwait (Knoflach & Van Harten, 2002). Considering reports of this species from other regions, this is the easternmost record of its presence globally. The presence of *L. basseltii* in



Iran was previously reported from Mazandaran (Roewer, 1959), Khoozestan (Goudarzi & Abdigoudarzi, 2010) and Hormozgan (Shahi et al., 2011) Provinces (Fig. 5). Although both of these species have similar body coloration pattern, *L. cinctus* can easily be separated from *L. hasseltii* by its' three-looped spermathecal ducts, which in *L. hasseltii* is four-looped. Considering the extreme physical similarities between these two species, and the fact that none of the previous reports of *L. hasseltii* provided reliable figures of the characteristic copulatory organs, it's safe to suggest that the specimens that were reported as *L. hasseltii* were misidentifications of *L. cinctus*; therefore, until further research confirm the true presences of *L. hasseltii* in Iran, it will be excluded from the list of Iranian spiders.

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