



A New Species of *Prochora* Simon, 1886 (Araneae: Miturgidae) and Some New Records of Superfamily Lycosoidea (Araneae) from Margalla Hills National Park, Pakistan

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ABSTRACT

A new species of miturgid spiders, *Prochora shahidi* sp. n. (♂♀) is described and illustrated on the basis of material collected from the Margalla Hills National Park, northern Pakistan. This is the third known species of *Prochora* and the first record of this family from Pakistan. New data on spiders from related families belonging to superfamily Lycosoidea is also provided, which constitute new records from Pakistan.

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Authors' Contribution

KHJ was involved in the collection, processing, identification and photography of the specimens. AB provided facilities, guidance and help in manuscript preparation. KZ provided the illustrations.

Key words

Lycosidae, Prowling spider, Oxyopidae, Psecridae, Thomisidae, Miturgid spiders

INTRODUCTION

The spider family Miturgidae Simon, 1886 currently consists of 28 genera and 136 species distributed worldwide (World Spider Catalog, 2023). Members of this family are free-living, nocturnal and cryptic. Their diagnostic characters include two tarsal claws, eight eyes with posterior medians dome shaped, entelegyne, ecribellate, three pairs of weak spines on ventral tibiae I and II of the females, posterior spinnerets being two-segmented with the distal segment being long or short depending on the genus (Jocqué and Dippenaar-Schoeman, 2006).

Prochora Simon, 1886 is a small genus from this family, currently consisting only two described species namely *P. lycosiformis* O. Pickard-Cambridge, 1872 from Algeria, Italy (Sicily), Israel and Iran, and *P. praticola*

(Bösenberg and Strand, 1906) from China, Korea and Japan (World Spider Catalog, 2023). The male palps of these spiders bear a looping embolus, a groove at the retro-lateral edge of the palp fringed with prominent setae and a bifurcate retrolateral tibial apophysis (Wunderlich, 2011; Zamani *et al.*, 2016; Zhou and Chen, 2016). The female has an ovoid abdomen, and the internal genitalia consist of long, thick and coiled ducts (Paik, 1990; Wunderlich, 2011; Zhou and Chen, 2016; Kim and Lee, 2018). The present paper adds a new species to the genus and reports the family for the first time from Pakistan.

Miturgidae was considered a part of the superfamily Lycosoidea. The characters: Grate shaped tapetum in secondary eyes and recurved PER were considered the synapomorphies of the group (Jocqué and Dippenaar-Schoeman, 2006). A recent total evidence analysis; however, restricts the superfamily to seven families:

Abbreviations

Eyes: AER, anterior eye row; ALE, anterior lateral eye; AME, anterior median eye; PER, posterior eye row; PLE, posterior lateral eye; PME, posterior median eye.

Male Palp: BTA, basal tibial apophysis; Co, conductor; CF, cymbial furrow; Em, embolus; FS, fringe setae; MTA, median tegular apophysis; RTA, retrolateral tibial apophysis; St, subtegulum; TA, tegular apophysis; Te, tegulum; VTA, ventral tibial apophysis.

Female genitalia: CD, central depression; Co, copulatory openings; EP, epigynal pit; MP, midpiece; Sa, sclerotized arches; Sp, spermatheca.

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Ctenidae Keyserling, Lycosidae Sundevall, Oxyopidae Thorell, Pisauridae Simon, Psechridae Simon, Thomisidae Sundevall and Trechaleidae Simon, with Miturgidae excluded (Polotow *et al.*, 2015); however, the latter is still related to the formers due to the presence of the retrolateral tibial apophysis (RTA) (Jocqué and Dippenaar-Schoeman, 2006). In the present paper, we have reported seven species belonging to four families: Lycosidae, Oxyopidae, Psechridae and Thomisidae, from the superfamily. These species constitute important new records for Pakistan.

This paper is a part of the project conducted to study the araneofauna of the Margalla Hills National Park, Islamabad, Pakistan (MHNP). MHNP is considered as low foothills of the Himalayas and is diverse in terms of range of altitude, weather, temperature, types and distribution of vegetation and variety of microhabitats (Masroor, 2011). Such a setting can be regarded as ideal for high faunal diversity, particularly of the invertebrates such as spiders.

MATERIALS AND METHODS

All specimens of the study were collected from the Margalla Hills National Park, Pakistan by hand picking, jarring, sweep netting and pitfall trapping. Collection localities of each species are mentioned with GPS coordinates. Specimens were brought to the laboratory, washed with absolute alcohol and preserved in glass vials containing 70 percent alcohol. Measurements were made using a calibrated ocular micrometer mounted on an IRMECO IM-SZ-500 stereo-microscope. Total body lengths were measured from anterior carapace to posterior abdomen. Chelicerae and spinnerets were excluded from total body length. Length and width of the carapace and abdomen were also measured individually with their widths taken at their widest points. Leg measurements were expressed as: total (femur, patella+tibia, metatarsus, tarsus). All measurements are in millimeters. Male palps were removed and washed with absolute alcohol. Epigynes were removed with dissecting needles and cleared in a 10% KOH solution prior to examination. Specimens were examined, measured and photographed using an IRMECO IM-SZ-500 stereo-microscope. Additionally for examination of the copulatory organs or photography under high magnification, a SWIFT M7000D compound microscope was used. Distribution records were inferred from the World Spider Catalog (2023). Distribution maps were constructed using the online map construction tool SimpleMapp (Shorthouse, 2010). Relevant literature for identification of the specimens was: Miturgidae: Jocqué and Dippenaar-Schoeman (2006); Lycosidae: Tikader and Malhotra (1980); Oxyopidae: Sherriffs (1951); Gajbe (2008); Deeleman-Reinhold (2009); Baehr *et al.* (2017);

Caleb (2020); Psechridae: Levi (1982); Thomisidae: Tikader (1980); Lehtinen (2004); Dippenaar-Schoeman and van Harten (2007); Kim and Lee (2012). All relevant literature is available through the World Spider Catalog (2023).

Depository: Laboratory of Arachnology Collection, University of the Punjab, Quaid-e-Azam campus, Lahore, Pakistan (PUZ-MHNP).

RESULTS

Prochora shahidi, new species

(Figs. 1A, 1B, 2)

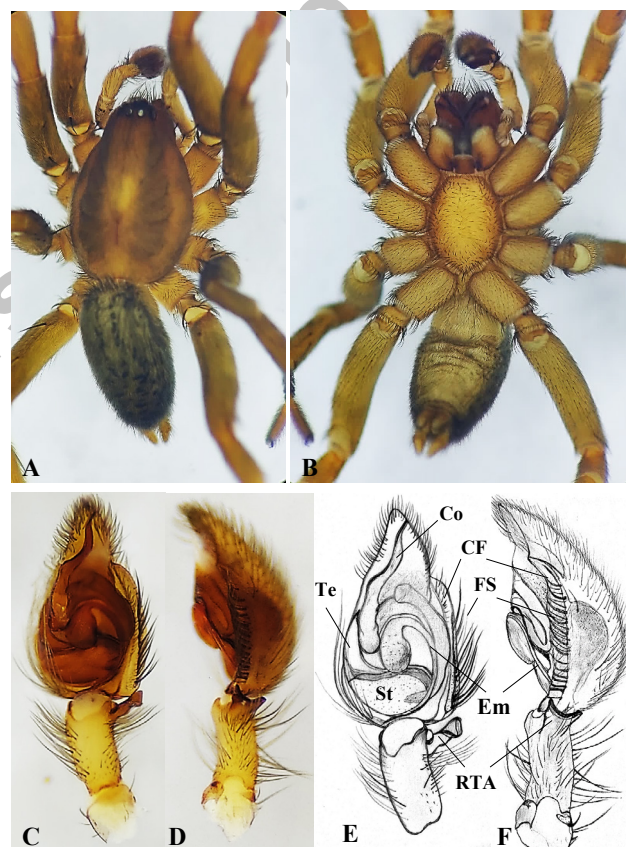


Fig. 1A. *Prochora shahidi* sp. n. (PUZ-MHNP-1872) Male. A–B, Habitus (A, dorsal; B, ventral); C–F, Palp (C, ventral view; D, retrolateral view; E, illustration ventral; F, illustration retrolateral). Co, Conductor; CF, Cymbial furrow; Em, Embolus; FS, Fringe setae; RTA, retrolateral tibial apophysis; St, Subtegulum; Te, Tegulum.

Type material

Holotype: Male (PUZ-MHNP-1872): Shakarparian Hills (N33°41.703', E73°04.466', 562 m), Islamabad,

Pakistan; 11 September, 2020, K. H. Jaffry leg.

Paratypes: 1 female (PUZ-MHNP-1871), Trail 2 (N33°43.475', E73°05.455', 367 m), 11 November, 2018, K. H. Jaffry; 1 male (PUZ-MHNP-1873), Shakarparian Hills (N33°41.703', E73°04.466', 562 m), 11 September, 2020, K. H. Jaffry; 2 males, 2 females, 6 juveniles (PUZ-MHNP-1874-1883), Trail 3 (N33°45.446', E73°07.496', 1011 m), 11 September, 2020, K. H. Jaffry.

Etymology: The specific epithet is a noun in the genitive case and dedicated to the loving memory of the first author's father, Shahid Ali Jaffry.

Diagnosis: Differs in the structure of the male palp and female genitalia from congeners, *P. lycosiformis* and *P. praticola*.

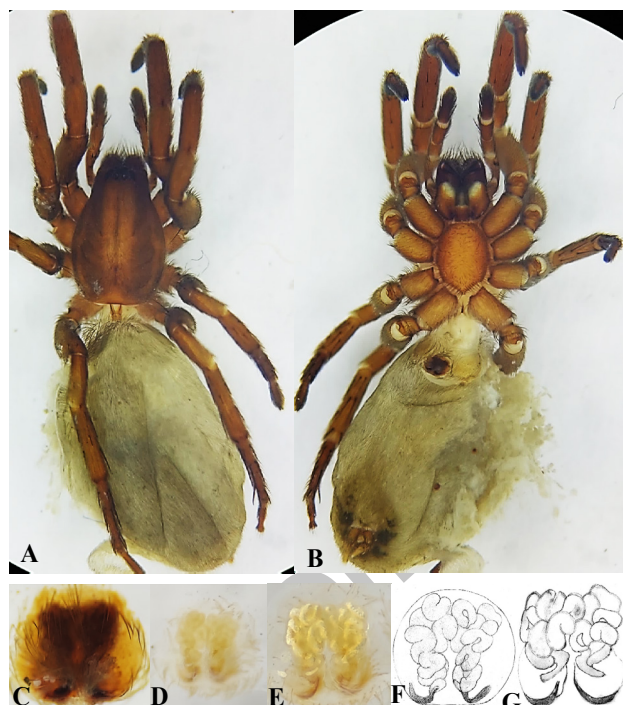


Fig. 1B. *Prochora shahidi* sp. n. (PUZ-MHNP-1871) Female. A–B, Habitus (A, dorsal; B, ventral); C–F, Female genitalia (C, epigynum; D, epigynum cleared; E, internal genitalia; F, illustration epigynum; G, illustration internal genitalia).

Male palp

Retrolateral tibial apophysis (RTA) is the longest and cymbium the narrowest in *P. shahidi* sp. n., embolus base comma shaped in *P. shahidi* sp. n. and the embolus not extended away from the bulbus as in *P. lycosiformis* (extended anteriorly) and *P. praticola* (looping midventrally). Conductor pointed and longest in *P. shahidi*

sp. n., median apophysis absent while very pronounced in *P. lycosiformis* and well developed in *P. praticola*. Conductor dorsal apophysis appears to be absent in *P. shahidi* sp. n. while well developed in *P. lycosiformis* and *P. praticola*.

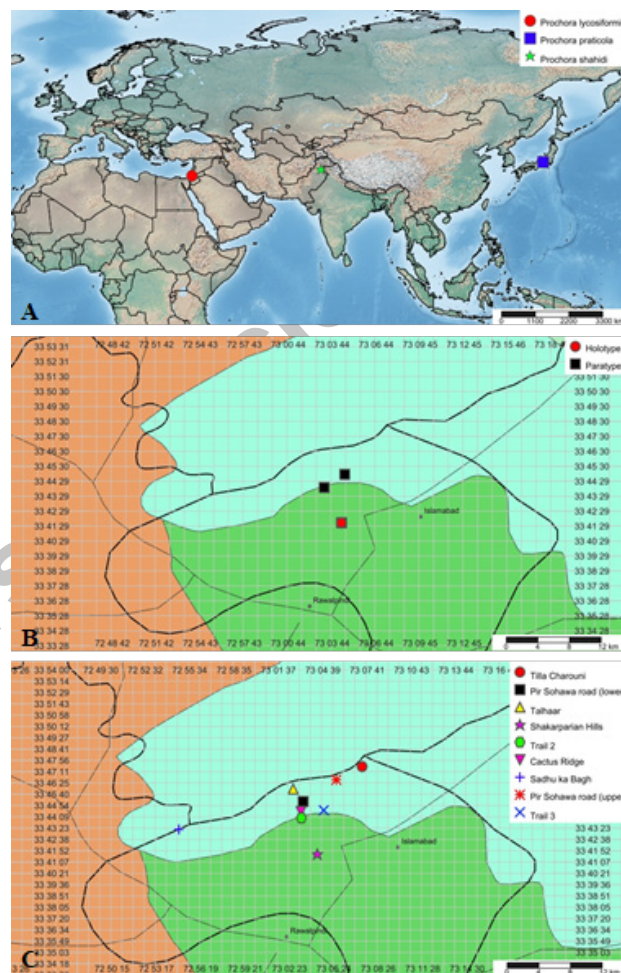


Fig. 2. (A) First reported location of the three species of genus *Prochora* *P. lycosiformis* from Jericho, West Bank, Palestine (O. Pickard-Cambridge, 1872), *P. praticola* from Japan (Bösenberg and Strand, 1906) and *P. shahidi* sp. n. from Margalla Hills National Park, Islamabad, Pakistan. (B) Location map of *P. shahidi* sp. n. within the collection locality. (C) Sampling sites of the data.

Female genitalia

The epigynum is simple in *P. shahidi* sp. n. and devoid of the sclerotized helm shaped structure as present in *P. lycosiformis* (Wunderlich, 2011). It is also different from the *P. praticola* (Kim and Lee, 2018). Internal genitalia exhibit the characteristic thick, long and coiled

ducts in other species which are narrower and of different configuration in *P. shahidi* sp. n.

Description

Male holotype (PUZ-MHNP-1872): Measurements (mm): Total length 6.67. Carapace 3.76 long, 2.63 wide; Opisthosoma 2.98 long, 1.63 wide.

Prosoma: Carapace brown, narrowed anteriorly, pubescent. Fovea conspicuous, reddish brown, with inconspicuous curved stripes radiating outwards (Fig. 1A, A). AER and PER slightly procurved. Chelicerae brown, with strong setae anteriorly, promargin with 3 and retromargin with 2 teeth. Endites elongated, light brown, distally pale, distinctly scopulate. Labium brown, as long as wide. Sternum light brown, scutiform, with dark acuminate setae, margins pale (Fig. 1A, B). Legs with tibia, metatarsus and tarsus I and II uniformly dark brown, lighter brown otherwise, with numerous spines, all trochanters with deep ventral notch (Fig. 1A, A,B).

Opisthosoma: Dorsally oval, yellowish gray, pubescent, with a long cardiac pattern anteriorly and numerous dark gray marks, posteriorly with 5 chevrons. Ventrally paler, pubescent, anterior spinnerets contiguous, posterior spinnerets thin, long and angulate (Fig. 1A, A, B).

Eye measurements (mm): AME 0.13; ALE 0.10; PME 0.10; PLE 0.17; AME–AME 0.07; AME–ALE 0.03; PME–PME 0.10; PME–PLE 0.07. Width of AER 0.56, PER 0.66. Clypeus height 0.10. Leg measurements (mm): I 6.75 (1.99, 2.63, 1.21, 0.92); II 6.67 (2.06, 2.41, 1.35, 0.85); III 5.76 (1.78, 2.06, 1.14, 0.78); IV 8.45 (2.20, 3.05, 2.13, 1.07), leg formula: 4123.

Palp: Tibia with long, bifurcated, apically concave retrolateral tibial apophysis (RTA); Cymbium with long and wide retro-lateral furrow, fringed with thick and dark setae at the outer margin; tegulum narrow, subtegulum broad; Conductor horn like and elongated, with a slight curvature; Embolus base comma shaped and broad, embolus long, filiform, looping, with the loop reaching the basal portion of the cymbium (Fig. 1A, C, F).

Female Paratype (PUZ-MHNP-1871): Measurements (mm): Total length 11.50. Carapace 3.91 long, 2.77 wide; Opisthosoma 7.1 long, 3.90 wide.

General somatic characters as in male except cephalic region of carapace with long setae (Fig. 1B, A), darker brown carapace, chelicerae, endites and sternum (Fig. 1B, B), legs uniformly dark brown dorsally and lighter ventrally (Fig. 1B, A,B), opisthosoma dorsally elliptical and grayish (Fig. 1B, A).

Eye measurements (mm): AME 0.14; ALE 0.14; PME 0.18; PLE 0.21; AME–AME 0.07; AME–ALE 0.07;

PME–PME 0.07; PME–PLE 0.21. Width of AER 0.85, PER 0.99. Clypeus height 0.21. *Leg measurements* (mm): I 8.25 (2.56, 3.27, 1.35, 1.07); II 8.31 (2.49, 3.41, 1.49, 0.92); III 7.1 (2.20, 2.49, 1.49, 0.92); IV 9.8 (2.70, 3.55, 2.63, 0.92), leg formula: 4213.

Female genitalia: Epigyne simple; Internal genitalia with long, thick, profusely convoluted and heavily sclerotized ducts (Fig. 1B, C, G).

Distribution

Pakistan

Comments

P. shahidi sp. n. is known only from the listed localities in Margalla Hills National Park, northern Pakistan (Fig. 2B). *P. lycosiformis* was first described from Jericho, West Bank, Palestine (Fig. 2A) (Pickard-Cambridge, 1872) and has been subsequently reported from adjacent regions Iraq and Iran as well as distant (to original discovery) regions Algeria and Italy. It can be predicted that the species could be present at least in areas lying in between these regions. *P. praticola* was first described from Japan (Fig. 2A) (Bösenberg and Strand, 1906) and has been subsequently found from adjacent regions of Korea and China. The discovery of *P. shahidi* sp. n. from Pakistan adds a notable mid-point in the overall distribution of the genus whereby both of its species had been previously widely segregated from a geographical point of view. Effectively, the genus is known westwards from Algeria and Italy to eastwards till Japan with distribution regions in between. It can be predicted that the genus will be discovered at least from regions located near to the currently known distribution range. Whether further new species will be discovered is debatable as it is not a very speciose genus.

Superfamily: Lycosoidea New Records and Data

Data on four families of the Lycosoidea: Lycosidae, Oxyopidae, Psechridae and Thomisidae, and seven species: *Hippasa himalayensis* Gravely, *Mastira menoka* (Tikader), *Oxyopes bhartatae* Gajbe, *O. macilentus* L. Koch, *Pardosa mukundi* Tikader and Malhotra, *Psechrus* sp. and *Thomisus unidentatus* Dippenaar-Schoeman and van Harten is provided. Out of these, the genera *Mastira* and *Psechrus* are first records for Pakistan while all species are new records for the country as well. Collection localities of the species are mapped in Figure 2C.

Family Lycosidae
Genus *Hipassa* Simon, 1885
Hipassa himalayensis Gravely, 1924
 (Fig. 3A–F)

Material examined

Pakistan, Islamabad, (PUZ-MHNP-1773–1841): 5 females, 15 juveniles, Tilla Charouni (N33°47.514, E73°07.428', 1358 m), 19 August, 2016, K. H. Jaffry; 20 juvenile, Tilla Charouni (N33°47.561, E73°07.499', 1381 m), 22 October, 2016, K. H. Jaffry; 7 females, 21 juveniles, Pir Sohawa road (lower) (N33°45.168', E73°03.401', 978 m), 22 October, 2016, K.H. Jaffry; 1 female (with brood), Talhaar (N33°46.008', E73°02.716', 976 m), 6 July, 2018, K.H. Jaffry.

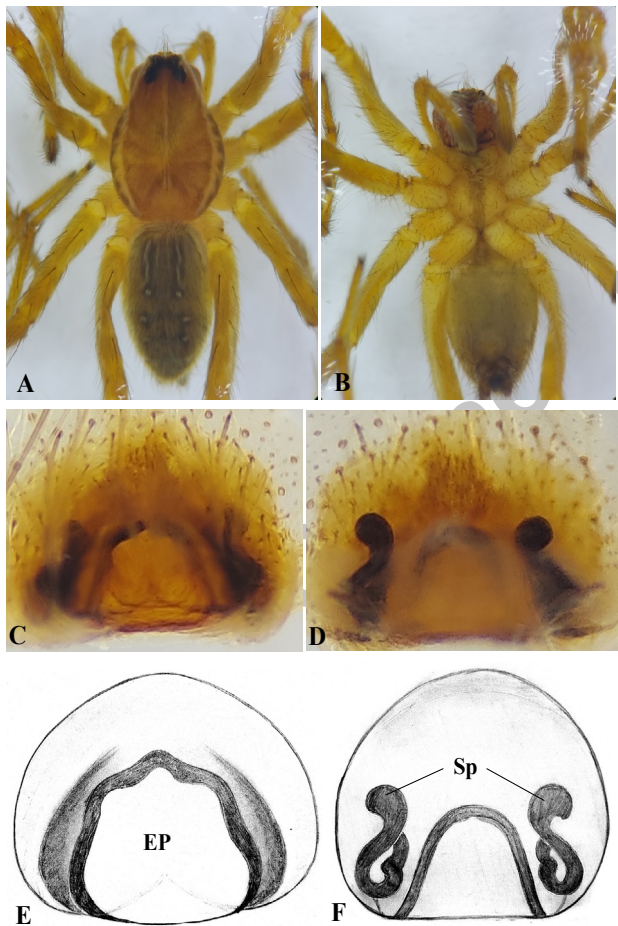


Fig. 3. *Hipassa himalayensis* (PUZ-MHNP-1773) Female. A–B, Habitus (A, dorsal; B, ventral); C–F, Female genitalia (C, epigynum; D, internal genitalia; E, illustration epigynum; F, illustration internal genitalia). EP, Epigynal pit; Sp, Spermatheca.

Distribution

India. Pakistan (New record)

Genus *Pardosa* C. L. Koch, 1847
Pardosa mukundi Tikader and Malhotra, 1980
 (Fig. 4A–F)

Material examined

Pakistan, Islamabad, (PUZ-MHNP-1854–1868): 15 females, Shakarparian Hills (N33°41.644', E73°04.363', 561 m), 22, July, 2016, K. H. Jaffry.

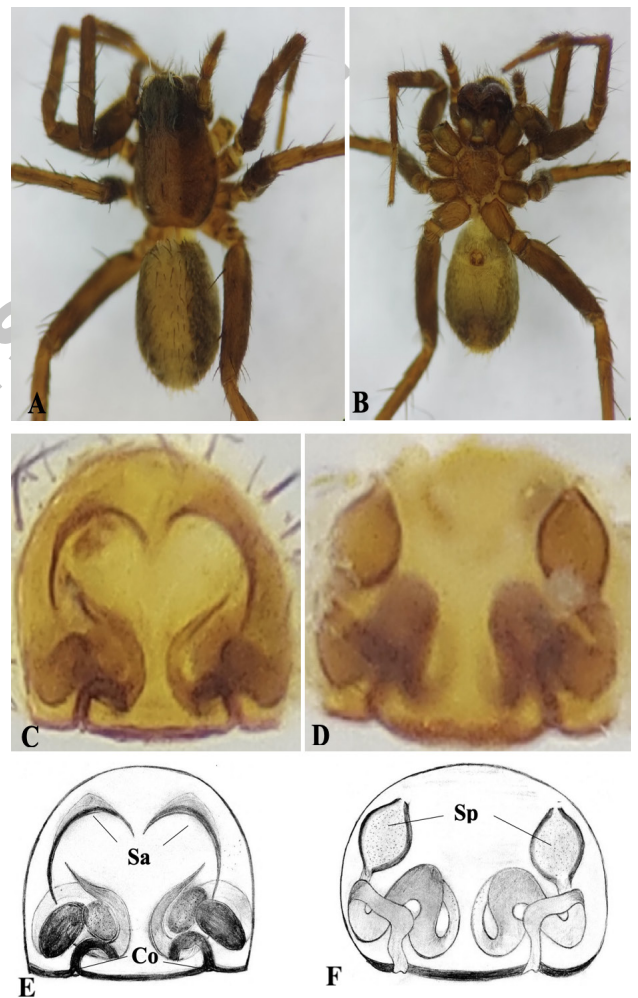


Fig. 4. *Pardosa mukundi* (PUZ-MHNP-1854) Female. A–B, Habitus (A, dorsal; B, ventral); C–F, Female genitalia (C, epigynum; D, internal genitalia; E, illustration epigynum; F, illustration internal genitalia). Co, Copulatory openings; Sa, Sclerotized arches; Sp, Spermatheca.

Distribution

Bhutan, India, Pakistan (New record).

Family Oxyopidae***Oxyopes bharatæ* Gajbe, 1999**

(Fig. 5A–F)

Material examined

Pakistan, Islamabad, (PUZ-MHNP-1882–1893): 4 females, Trail 2 (N33°73.479', E73°05.462', 366 m), 22 July 2016, K. H. Jaffry; 5 females, 3 juveniles, Shakar Parian (N33°41.645, E73°04.342', 356 m), 21 Oct. 2016, K. H. Jaffry.

Distribution

India, Pakistan (New record).

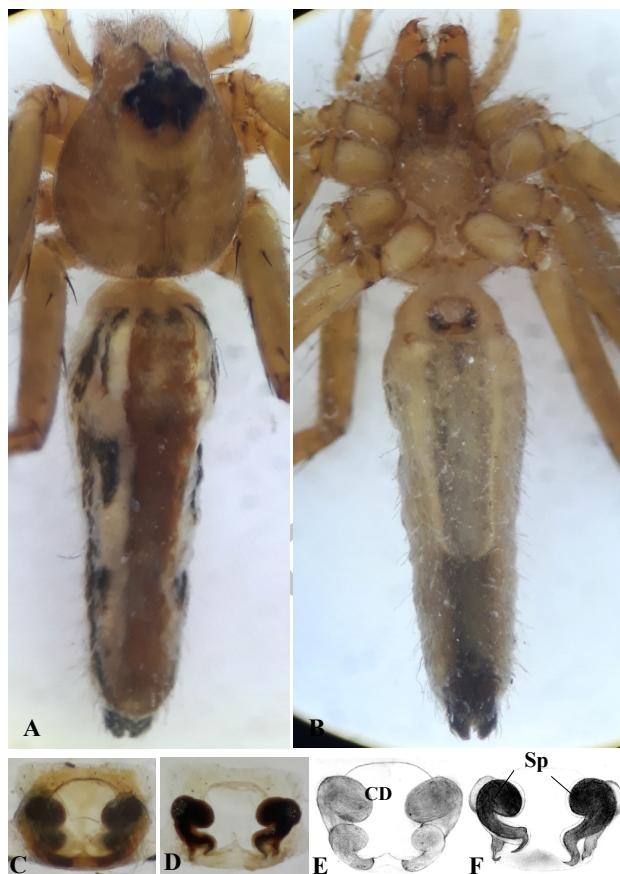


Fig. 5. *Oxyopes bharatæ* (PUZ-MHNP-1882) Female. A–B, Habitus (A, dorsal; B, ventral); C–F, Female genitalia (C, epigynum; D, cleared internal genitalia; E, illustration epigynum; F, illustration internal genitalia. CD, Central depression; Sp, Spermatheca.

***Oxyopes macilentus* L. Koch, 1878**

(Fig. 6A–F)

Material examined

Pakistan, Islamabad, (PUZ-MHNP-1930–1931): 1 female, Trail 2 (N33°44.079', E73°03.277', 360 m), 22 October, 2017, K. H. Jaffry; 1 female, Cactus Ridge (N33°44.513', E73°03.252', 670 m), 21 October, 2016, K. H. Jaffry.

Distribution

Widely distributed from China to Australia. Pakistan (New record).

Family Psechridae**Genus *Psechrus* Thorell, 1878*****Psechrus* sp.**

(Fig. 7A, B)

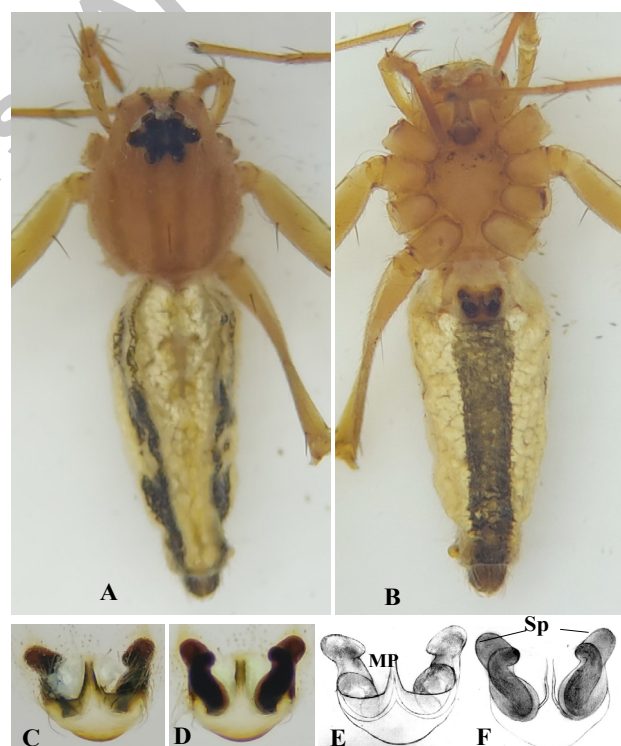


Fig. 6. *Oxyopes macilentus* (PUZ-MHNP-1930) Female. A–B, Habitus (A, dorsal; B, ventral); C–F, Female genitalia (C, cleared epigynum; D, cleared internal genitalia; E, illustration epigynum; F, illustration internal genitalia). MP, Midpiece; Sp, Spermatheca.

Material examined

Pakistan, Islamabad, (PUZ-MHNP-1999–2008): 10 juveniles, Pir Sohawa road (upper) (N33°46.624', E73°05.663', 1192 m), 12 September, 2020, K.H. Jaffry.



Fig. 7. *Psechrus* sp. Juvenile. A–B, Habitus (A, dorsal; B, ventral).

Distribution

Australian, Indo-Malayan and Palearctic geographical regions. Pakistan (New record).

Family Thomisidae
Genus *Mastira* Thorell, 1891
Mastira menoka (Tikader, 1963)
 (Figs. 8 A–E; 9 A–F)

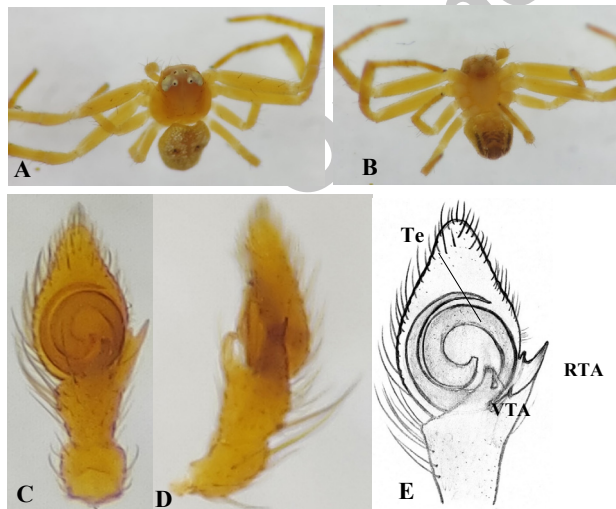


Fig. 8. *Mastira menoka* (PUZ-MHNP-2400) Male. A–B, Habitus (A, dorsal; B, ventral); C–E, Palp (C, ventral view; D, retrolateral view; E, illustration ventral view). RTA, Retrolateral tibial apophysis; VTA, Ventral tibial apophysis; Te, Tegulum.

Material examined

Pakistan, Islamabad, (PUZ-MHNP-2400–2412): 3 males and 8 juveniles, Tilla Charouni (N33°47.258', E73°07.481', 1324 m), 22 October, 2016, K. H. Jaffry; 1 female, Talhaar (N33°46.008', E73°02.716', 984 m), 6 July, 2018, K. H. Jaffry.

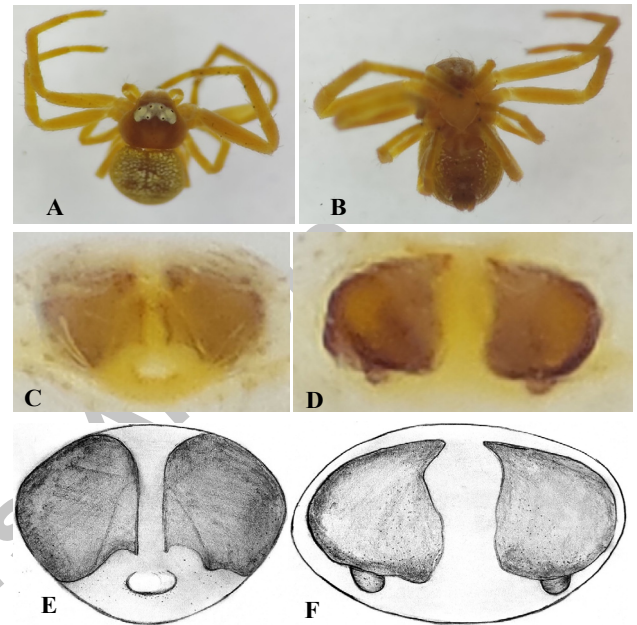


Fig. 9. *Mastira menoka* (PUZ-MHNP-2410) Female. A–B, Habitus (A, dorsal; B, ventral); C–F, Female genitalia (C, epigynum; D, internal genitalia; E, illustration epigynum; F, illustration internal genitalia).

Distribution

India. Pakistan (New record)

Family Thomisidae
Genus *Thomisus* Walckenaer, 1805
Thomisus unidentatus Dippenaar-Schoeman and van Harten, 2007
 (Fig. 10A–F)

Material examined

Pakistan, Islamabad, (PUZ-MHNP-2458–2466). 4 juveniles, Cactus ridge (N33°44.513', E73°03.252', 680 m), 21 October, 2016, K. H. Jaffry; 5 males, Sadhu ka Bagh (N33°43.303', E72°54.916', 763 m), 21 October, 2017, K.H. Jaffry.

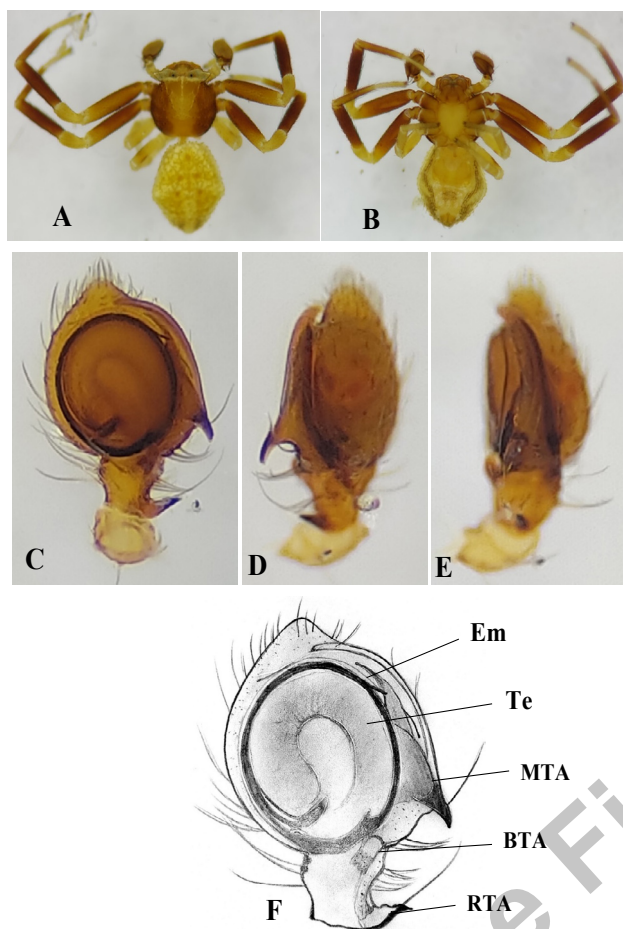


Fig. 10. *Thomisus unidentatus* (PUZ-MHNP-2462) Male. A–B, Habitus (A, dorsal; B, ventral); C–F, Palp (C, ventral view; D, retrodorsal view; E, retrolateral view; F, illustration ventral view). Em, Embolus; BTA, Basal tibial apophysis; MTA, Median tegular apophysis; RTA, Retrolateral tibial apophysis; Te, Tegulum.

Distribution

India, Iran, Iraq, Yemen, Pakistan (New record).

DECLARATIONS

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IRB approval

Approved, vide ASRB notification No. D/8380/Acad., dated 3-12-2018.

Statement of conflict of interest

The authors have declared no conflict of interest.

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