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## **Synonymization of *Pardosa mysorensis* (Tikader & Mukerji, 1971) with *Pardosa sumatrana* (Thorell, 1890)**

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### **Abstract**

*Pardosa* is the largest genus in family Lycosidae. Many of the members in this family and genus show morphological similarity and intra-specific variation, which makes their taxonomy difficult. The conclusive method of genitalic analysis was limited in olden days might have resulted in misplacement of various taxa. In this paper, *Pardosa mysorensis* (Tikader & Mukerji, 1971) is synonymized with *Pardosa sumatrana* (Thorell, 1890) based on examination of specimen from southern Indian state of Kerala. Detailed genitalic photographs and habitus images are given.

**Keywords:** Wolf spiders, Lycosidae, *Pardosa*, synonym, Kerala, India.

### **Introduction**

Lycosidae Sundevall, 1833, wolf spiders, are 6<sup>th</sup> largest spider family in the world with 2431 species and 125 genera and genus *Pardosa* C.L. Koch, 1847 is the largest group in this family (World Spider Catalog, 2021). Many of the members of genus *Pardosa* show genitalic polymorphism which results in misplacements of them as different species (Jocqué, 2002). Morphologically they are very similar but intra-specific variation also present. So, many of the morphological features are non-informative for species level identification (Wang & Zhang, 2021). The best way of genitalic analysis might be limited in the past and might have resulted in misplacement of many morphologically different individuals under different species. The correction of these

errors will require great effort. The literature survey for these studies revealed about synonymization of so many species with *Pardosa sumatrana* (Thorell, 1890). In our studies themselves, various morphologically different specimens showed similarity in genitalic structures. These all points towards the importance of genitalic analysis of spiders for the classification, especially in families like Lycosidae. In the same time, genitalic polymorphism should be kept in mind. A taxonomist's prime job is to accurately classify an organism, not simply reporting new species.

## Material and Methods

All specimens are preserved in 70% ethanol and were studied, photographed and measured using a Leica M205C stereomicroscope, a Leica DFC450 Camera, and LAS software (Ver.4.12). Epigynes dissected and were cleared in potassium hydroxide (KOH) solution. Ocular measurements were taken after placing the specimen dorsally. Leg measurements are shown as: total length (femur, patella and tibia, metatarsus, tarsus). All measurements are given in millimetres (mm).

Abbreviations used in the main text are: ALE = anterior lateral eye, AME = anterior median eye, CATE = Center for Animal Taxonomy and Ecology, CD = copulatory duct, CO = copulatory opening, FD = fertilization duct, PLE = posterior lateral eye, PME = posterior median eye, SS = septal stem.

### Taxonomy

Family **Lycosidae** Sundevall, 1833

Genus *Pardosa* C.L. Koch, 1847

*Pardosa sumatrana* Thorell, 1890

*Lycosa sumatrana* Thorell, 1890, 136 (♂♀); Gravely, 1924, 604, f. 4 C-E (♂♀); Sherriffs, 1939, 137, f. 3.

*Pardosa sumatrana* Hogg, 1919, 100 (♀); Buchar, 1976, 207, f. 4I-L (♀); Buchar, 1980, 80, f. 1-9, 11-14, 16-26 (♂♀); Tikader & Malhotra, 1980, 353, f. 211-215 (♂♀); Tikader & Biswas, 1981, 56, f. 90-91 (♀); Chen & Gao, 1990, 129, f. 161a-b (♂♀); Okuma *et al.*, 1993, 51, f. 45C (♀); Zhao, 1993, 101, f.41a-b (♂♀); Barrion & Litsinger, 1994, 311, f. 1622-1624 (♀); Barrion & Litsinger, 1995, 382, f. 226a-f, 227a-d (♂♀); Yin *et al.*, 1997, 258, f. 122a-h (♂♀); Yang & Chai, 1998, 63, f. 4a-d (♀); Song *et al.*, 1999, 334, f. 198k (♂♀); Hu, 2001, 203, f. 103.1-4 (♂♀); Biswas & Raychaudhuri, 2003, 119, f. 56-62 (♂♀); Gajbe, 2007, 501, f. 240-244 (♂♀); Yin *et al.*, 2012, 856, f. 429a-h (♂♀); Sen *et al.*, 2015, 50, f. 229-233, pl. 15 (♀); Dhali *et al.*, 2017, 75, f. 374-378, pl. 26 (♀); Tyagi *et al.*, 2019, Supplement, f. S2.30, S3.15-18 (♀); Wang *et al.*, 2021, 50, f. 47A-I, 48A-F (♂♀).

*Lycosa chengta* Fox, 1935, 453 f. 5 (♀) [synonymized by Chen & Gao, 1990]

*Lycosa arorai* Dyal, 1935, 140, pl 13, f. 40-41(♂) [synonymized by Barrion & Litsinger, 1995]

*Arkalosula chengta* Roewer, 1955, 231 [Genus transfer from *Lycosa chengta* which is synonymized later]

*Chorilycosa arorai* Roewer, 1955, 237 [Genus transfer from *Lycosa arorai* which is synonymized later]

*Pardosa davidi* Schenkel, 1963, 378, f. 219 (♀); Hu, 1984, 235, f. 242-243 (♂♀); Zhao, 1993, 86, f. 36a-c (♂♀) [synonymized by Chen & Gao, 1990]

*Lycosa mysorensis* Tikader & Mukerji, 1971, 531, f. 1a-b (♀) – **New synonym**

*Pardosa mysorensis* Tikader & Malhotra, 1980, 332, f. 168-170 (♀) [transferred from *Lycosa*] – **New synonym**

*Pardosa shyamae* Hu & Li, 1987, 293, f. 25.3-4 (f, misidentified).

*Pardosa tieshinglii* Barrion *et al.*, 2013, 16, f. 17A-G (♂♀) [synonymized by Wang *et al.*, 2021]

*Pardosa villarealae* Barrion *et al.*, 2013, 17, f. 18A-E (♂) [synonymized by Wang *et al.*, 2021]

### Material examined

**INDIA, Kerala:** 3 ♀♀ from agricultural lands of Erezha south, Alappuzha 9°22.37'N, 76°51.85'E, alt. 32.81 ft, February 8, 2021, Abhijith (CATE); 4 ♀♀ from Christ College campus, Thrissur, 10°35.57'N, 76°21.32'E, alt. 49.2 ft, January 31, 2021, Abhijith (CATE); 2 ♀♀ from paddy fields of Ochira, Kollam, 9°13.25'N, 76°51.68'E, alt. 29.53ft, December 2, 2020, Abhijith (CATE).

### Diagnosis

Only female sex is being discussed here as the proposed junior synonym was described based only on female sex. Females are morphologically similar to other members of *Pardosa*, but, differ in the genitalia structure. The epigyne in ventral view shows an inverted T shaped uniform septal stem (SS). Internally copulatory duct (CD) shows a distinguishable in folding and tip of spermatheca points towards hood. Fertilization duct (FD) resembles a horizontally placed kidney (Fig. 1).

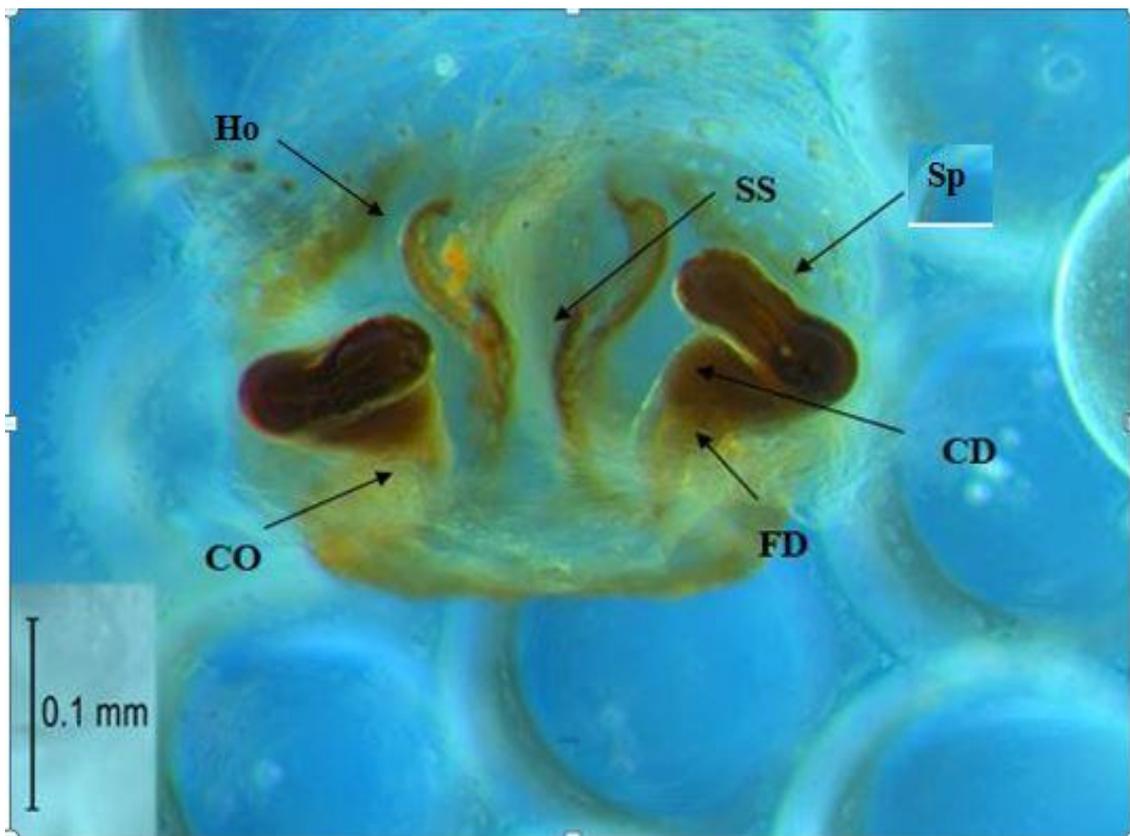


Fig. 1. *Pardosa sumatrana* (Thorell, 1890), female from Erezha south, Alappuzha, Kerala, cleared epigyne dorsal view. Abbreviations: CD = copulatory duct, CO = copulatory opening, FD = fertilization duct, Ho = hood, Sp = spermatheca, SS = septal stem.

## Description

Female from Erezha south, Alappuzha (Fig. 2.A-B). Total length 3.72. Prosoma 1.99 long, 1.5 wide. Opisthosoma 1.73 long, 1.14 wide. Carapace yellowish brown with distinct longitudinal fovea. Dark greenish spots along lateral edges of carapace. Median band greenish yellow, broader near ocular area and narrower in thoracic area. Lateral band broad, dark greenish brown colour. Ocular area black and hairy. Head region flanks steep without any projections. Eye sizes and inter-distances: AME 0.087, ALE 0.07, PME 0.216, PLE 0.192, AME-AME 0.117, AME-ALE 0.094, PME-PME 0.383, PME-PLE 0.310. Clypeus height 0.154. Labium longer than wide. Chelicerae has 3 promarginal and 3 retromarginal teeth. Sternum heart shaped, clothed with sparse black hairs. Legs yellow with dark greenish yellow patches. Leg measurements: I 5.60 (1.56, 1.91, 1.26, 0.87); II 5.24 (1.40, 1.85, 1.22, 0.77); III 5.20 (1.43, 1.68, 1.38, 0.71); IV 7.70 (1.87, 2.28, 2.37, 1.18). Leg formula: 4123. Opisthosoma long oval. Dorsum dark yellowish brown with several lateral band like patterns. Ventral side yellow. Posterior spinnerets larger than anterior pair.

Epigyne in ventral view shows inverted T shaped SS (Fig. 2.C-D). In internal view two hoods present at anterior end (Fig. 2.E-F). SS is elongated, narrow throughout except a little broader near hood. Base of septum is elongate than broad. Copulatory opening (CO) near meeting point of base of septum and CD. CD has an interior bend visible as an in-folding. Spermatheca longer than wide and tip positioned towards hood in two dimensional view. FD which placed near CD has an in-folding, resembling a horizontally placed kidney.

**Distribution:** India, Indonesia, China, Bhutan, Myanmar, Sri Lanka, Philippines, Nepal, Bangladesh (World Spider Catalog, 2021).

## Remarks

*Pardosa sumatrana* is a very common lycosid throughout India and neighbouring countries. Earlier descriptions of the species lack clear pictures or description of genital structures. Other morphological features are not much conclusive in Lycosidae, especially *Pardosa* which shares very similar morphology. Morphological descriptions by Tikader & Malhotra (1980) is similar to our specimens. Epigyne pictures by Tyagi *et al.* (2019) also shows similarity.

*Pardosa mysorensis* (Tikader & Mukerji, 1971) was described based on single sex and a few specimens. Only two taxonomic references were present on the species collected from a single location (Tikader & Mukerji, 1971, 1980). The original description by Tikader & Mukerji (1971) is similar to the description of *P. sumatrana*. But, epigyne description is absent and figures are obscure and non conclusive. The epigyne pictures by the original author in another publication (Tikader & Malhotra, 1980) shows similarity to epigyne pictures of *P. sumatrana*. SS structure, arrangement of CD and spermathecae are similar to *P. sumatrana*. Other morphological descriptions are also similar. By these comparisons we are confident that *P. mysorensis* was a misidentification and is a junior synonym of *P. sumatrana*. The small variations seen in the epigyne of this species may arise due to genitalic polymorphism as described by Jocqué (2002).

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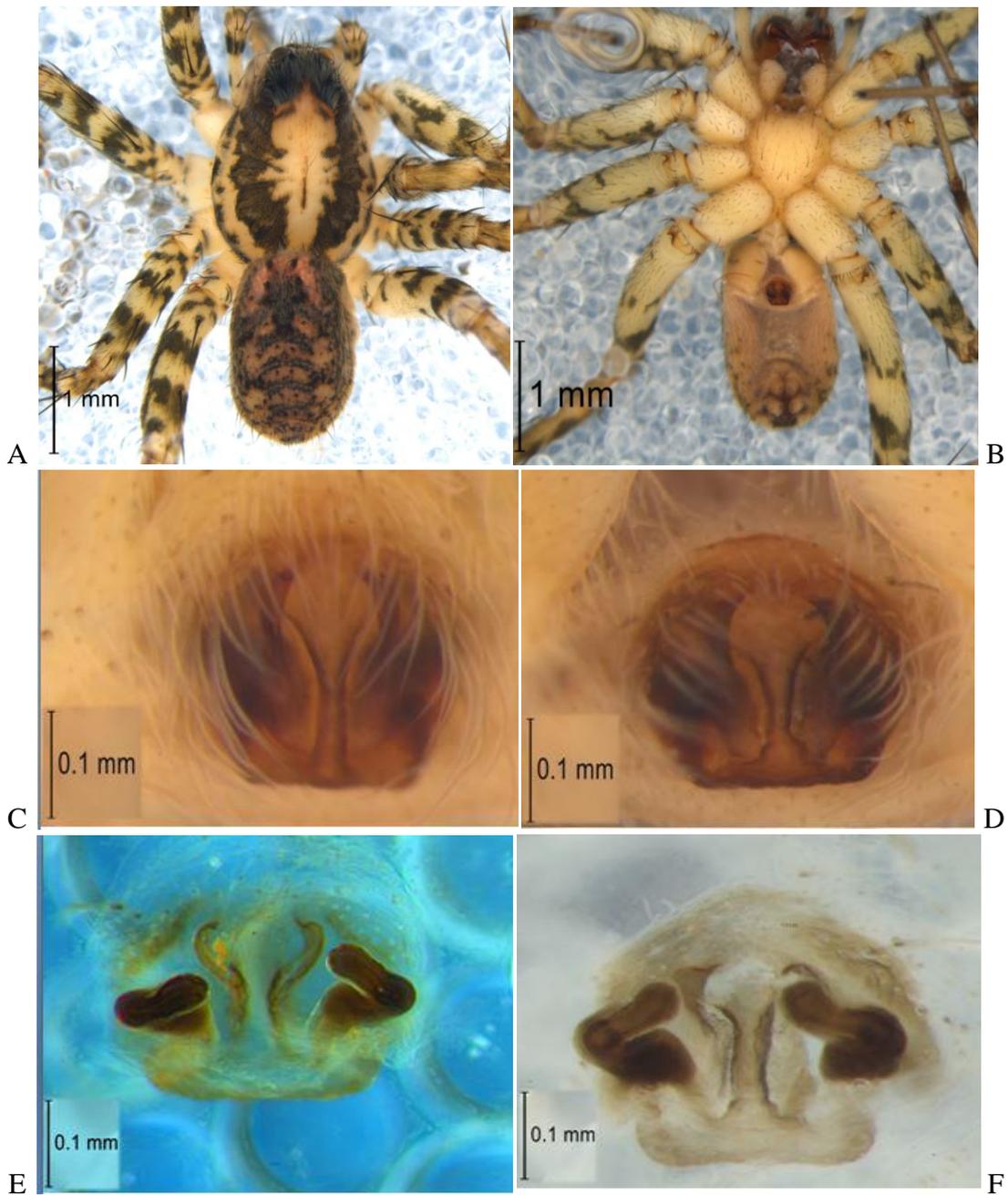


Fig. 2. *Pardosa sumatrana* (Thorell, 1890), females from Erezha South, Alappuzha, Kerala. A-B. Habitus. A. dorsal view. B. ventral view. C-F. Epigyne. C-D. ventral view. E-F. dorsal view, cleared. (C and E of the same specimen, D and F from another specimen).

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