A new species of the cob web spider genus *Theridion* from India (Araneae: Theridiidae)

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**Abstract**

A new species – *Theridion odisha* sp.n. – is described from Odisha state, India. An updated checklist of *Theridion* species known from India with taxonomic remarks is enlisted and mapped. Two new combinations are also proposed, *Nihonhimea indicum* (Tikader, 1977) comb.n., ex *Theridion* and *Nihonhimea tikaderi* (Patel, 1973) comb.n., ex *Theridion. Nihonhimea indicum* (Tikader, 1977) is considered a senior synonym of *Parasteatoda brookesiana* (Barrion & Litsinger, 1995).

**Key words:** Description, new species, taxonomy, Odisha, distribution, checklist.

**Introduction**

The genus *Theridion* was erected by Walckenaer in 1805. The members of this genus are small-sized with oval or spherical abdomen without colulus (Levy & Amitai, 1982). The genus is currently known by 586 valid species worldwide, of which, 13 are known from India (World Spider Catalog, 2019). Most of the species reported from India are known from their type only and the illustrations provided by them are very poor for the identification of the species. Even some of the species mentioned below in (Table 1) may be synonymized with other species described from other regions. Out of 13 known species from India, four of them are described by Simon, 1906 and deposited at Muséum National d’Histoire Naturelle in Paris, France. Due to unavailability of the types, it was not possible to study all of them. Although, the available types of two species deposited at the National Zoological collections of Zoological Survey of India, Kolkata are studied.

The present paper deals with the description of a new species, *Theridion odisha* sp.n. from Odisha state of India. An updated list of the Indian congeners along with their distribution details and taxonomic remarks is provided. Here, two new combinations *Nihonhimea indicum* (Tikader, 1977) comb.n., ex *Theridion* and *Nihonhimea tikaderi* (Patel, 1973) comb.n., ex *Theridion. Nihonhimea indicum* (Tikader, 1977) is considered as a senior synonym of *Parasteatoda brookesiana* (Barrion & Litsinger, 1995).
Materials and methods

Specimen was collected by vegetation beating method and preserved in 80% ethanol. Morphological examination was performed under a M205C stereomicroscope and images were obtained with a Leica DFC295 camera attached to the stereomicroscope. Female genitalia was dissected and cleared in 10% NaOH. Temporary preparations were observed and photographed on a Leica DM1000 compound microscope. All measurements are in millimeters. Leg measurements are given as total length (femur, patella, tibia, metatarsus, tarsus). The type is deposited in the National Zoological Collections, Zoological Survey of India, Kolkata.

Abbreviation used in the text are as follows: ALE – anterior lateral eyes, AME – anterior median eyes, PLE – posterior lateral eyes, PME – posterior median eyes; NZC– National Zoological Collection; ZSI-CDT – Centre for DNA Taxonomy, Zoological Survey of India, Kolkata.

Taxonomy

Genus Theridion Walckenaer, 1805

Theridion odisha Prasad, Caleb, Tyagi & Kumar sp.n.
Figs 1–6, 24
https://zoobank.org/urn:lsid:zoobank.org:act:F7E58000-51C9-498A-B449-C13B17343542

Type. Holotype female (ZSI-CDT-AA-1694), India: Odisha: KIIT campus, Bhubaneshwar (20.3547°N, 85.8152°E), 55 m, 16 March 2018, coll. Priya Prasad.

Etymology. The species epithet is a noun taken in apposition with reference to the Indian state, Odisha from where the holotype was collected.

Diagnosis. The species closely resembles to Theridion odoratum Zhu, 1998 by the genitalia morphology but can be distinguished by the laterally placed copulatory openings (closely placed, near the median axis in T. odoratum); the copulatory duct wider at the distal region and narrowing proximally (uniform in T. odoratum) and the ovoid spermatheca (globular in T. odoratum) (cf. Figs 3–6 with figs 86B–C in Zhu, 1998); abdominal pattern, with a mid-dorsal white patch (absent in T. odoratum) (cf. Fig. 1 with fig. 86A in Zhu, 1998). The abdominal pattern of the new species is more or less similar to Theridion petraeum L. Koch, 1872 and Theridion pinastri L. Koch 1872, but can be easily distinguished from T. petraeum by the globular shape of the abdomen in new species (elongated in T. petraeum) and from T. pinastri by the presence of yellowish dentate median band in new species (reddish band in T. pinastri). Furthermore, these two species, T. petraeum and T. pinastri have different arrangement for coiling of copulatory duct. This new species have copulatory duct with a broader distal loop and narrow proximal region, while more complex and longer copulatory ducts, large atrium in T. pinastri and outwardly curved copulatory ducts in T. petraeum.

Description. Female (holotype). Total length: 2.55, carapace: 0.89 long, 0.77 wide; abdomen: 1.66 long, 1.75 wide. Eye measurements: AME 0.07, ALE 0.06, PME 0.08, PLE 0.07. Leg measurements: I 2.81 (0.58, 0.37, 0.88, 0.74, 0.24); II 2.69 (0.82, 0.31, 0.58, 0.63, 0.35); III 1.93 (0.56, 0.26, 0.36, 0.45, 0.30); IV 2.74 (0.77, 0.35, 0.55, 0.64, 0.43). Leg formula: 1423. Carapace yellow-brown with dark brown lateral margins (Fig. 1). Sternum brownish with a lighter yellowish median region. Labium, maxillae and chelicera light brown (Fig. 2). Legs yellowish with dark brown spots and annulations. Abdomen globular, brownish covered with pale white patches and a mid-dorsal broad white patch with wide serrated margins (Fig. 1). Spinnerets yellowish-brown. Epigyne with lateral copulatory openings; copulatory ducts with a broader distal loop and narrow proximal region; spermathecae oval (Figs 3–6).

Distribution. India (Odisha).
NEW SPECIES OF THE COB WEB SPIDER GENUS THERIDION FROM INDIA

Figures 1–6. Theridion odisha sp.n. 1, habitus, dorsal view. 2, same, ventral view. 3, epigyne, ventral view. 4, vulva, dorsal view. 5, epigyne, ventral view. 6, vulva, dorsal view. Scale bars 1–2, 1mm; 3–6, 0.2 mm
Table 1. The taxonomic remarks with distribution details of 13 species of the genus *Theridion* known from India. Two species, *Theridion subitum* O. Pickard-Cambridge, 1885 and *Theridion incertum* O. Pickard-Cambridge, 1885 described from Murree, (formerly part of British India) now located in the political boundaries of present day Pakistan, have been excluded from the Indian checklist.

| S. No | Name of the species | Distribution in India | Elsewhere | References | Remarks |
|-------|---------------------|-----------------------|-----------|------------|---------|
| 1.    | *Theridion bengalensis* Sen, Saha & Raychaudhuri, 2011 | Jaldapara Wildlife Sanctuary (West Bengal) | – | Sen et al., 2011 | This species is a true *Theridion*, but has different genitalia as compared to *T. odisha* sp.n. |
| 2.    | *Theridion indicum* Tikader, 1977 | Neil Island (South Andaman), Chapramari (West Bengal) | – | Tikader, 1977; Sen et al., 2015 | *T. indicum* show diagnostic characters similar to the genus *Nihonhimea* Yoshida, 2016 and have been placed in this genus. |
| 3.    | *Theridion leucophaeum* Simon, 1905 | Puducherry Ginjee (Tamil Nadu) | – | Simon, 1905 | *T. leucophaeum* is placed in the *T. simile* group in the original description and thus would seem to belong in *Simitidion* (but as this group is poorly studied the exact affinity is unclear). |
| 4.    | *Theridion maindroni* Simon, 1905 | Nilgiris, Coonor (Tamil Nadu) | – | Simon, 1905 | *T. maindroni* have an analogy with *T. tinctum* as mentioned in the original description. Recently Ijland & van Helsdingen, 2019 transferred *Theridion tinctum* to the genus *Platnickina* Koçak & Kemal, 2008. Thus it can be said that *T. maindroni* should also be placed in the genus *Platnickina*. |
| 5.    | *Theridion manjithar* Tikader, 1970 | Manjithar (West Sikkim), Vallabh Vidyanganar Ahwa and Ambaji (Gujarat) | – | Tikader, 1970; Patel, 1973 | *T. manjithar* resembles *Theridion lunatum* according to the original description and would therefore be a *Parasteatoda* species (but see discussion below). |
| 6.    | *Theridion melanostictum* O. Pickard-Cambridge, 1876 | Lonar Crater Sanctuary (Maharashtra) | Macaronesia, Mediterranean to Egypt, Central Asia, China, Japan. Introduced to Poland, Canada, USA, Galapagos Island, Society Island. | Levi, 1980; Levy, 1998; Le Peru, 2011; Ono 2011, Yin et al., 2012; Bosmans et al., 2013; Bodkhe, Manthen & Uniyal, 2015; Déjean, 2015; Baert et al., 2016; El-Hennawy, 2017 | *T. melanostictum* is a well known species and has very different and distinct female genitalia as shown (Figs.22-23). |

...continued on the next page
### Table 1

| No. | Taxon                  | Location                               | Author, Year | Comments                                                                                                                                 |
|-----|------------------------|----------------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 7.  | *Theridion nilgherinum* | Nilgiris, Coonor (Tamil Nadu)          | Simon, 1905  | This species lacks the light dorsal band that characterizes *T. odisha* sp.n. and related species of *Theridion* s. str.                    |
| 8.  | *Theridion odisha* sp.n.| Bhubaneshwar (Odisha)                  | –            | See diagnosis                                                                                                                             |
| 9.  | *Theridion piligerum* | Nicobar Island                         | Frauenfeld, 1867 | *T. piligerum* is a nomen dubium even the description doesn’t indicate the sex of the specimen. The species is likely to be a synonym of one of the cosmopolitan theridiid species as described in (Levi, 1967). |
| 10. | *Theridion sadani*     | Shalimar garden, Srinagar (Jammu and Kashmir) | Monga & Singh, 1989 | The description does not allow its confident placement in *Theridion* s. str., but it is not synonymous with *T. odisha* sp.n., as it has a different opisthosomal pattern with a dark midline. |
| 11. | *Theridion subvittatum*| Jaunsar, Siri (Uttarakhand)            | Simon, 1889  | As mentioned by Simon, 1889, *T. subvittatum* have an analogy with *T. vittata*. Levi (1956), have transferred *T. vittata* to the genus, *Anelosimus* Simon, 1891. So, *T. subvittatum* should belong to the genus *Anelosimus*. |
| 12. | *Theridion tikaderi*   | Ahwa (Gujarat)                         | Patel, 1973  | Based on the illustrations provided by (Patel, 1973) the species is placed in the genus *Nihonhimea* Yoshida, 2016 (see discussion below)   |
| 13. | *Theridion zonulatum*  | Thrisssur, Ernakulam, Trivandrum, Kol lam (Kerala) | Thorell, 1890; Zhu, 1998; Song, Zhu & Chen, 1999; Ehrler 2014; Sankaran et al., 2015 | *T. zonulatum* is a true *Theridion* with a striking and having a different opisthosomal pattern, which is not similar to *T. odisha* sp.n.  |
Figures 7–13. Nihonhimea indicum (Tikader, 1977) comb.n., type material (NZC-ZSI-5352/18). 7, female holotype, habitus, dorsal view. 8, same, ventral view. 9, same, lateral view. 10-11, epigyne, dorsal view. 12-13, vulva, dorsal view. Scale bars, 7-9, 1mm; 10-11, 0.2mm; 12-13, 1mm.

*Theridion melanostictum* O. Pickard-Cambridge, 1876
(Figs. 22-23)

*Theridion melanostictum* O. Pickard-Cambridge, 1876b: 570 (based on female).
*Theridion melanostictum* Levy & Amitai, 1982a: 99, f. 32-37 (based on male and female).
*Theridion melanostictum* Yin et al., 2012: 412, f. 182a-e (based on female).

**Material examined**: One female (ZSI-CDT-AA-574), Sirohi, Rajasthan (24.5917°N, 72.7237°E) 1139 m, 14 March 2017, coll. Kaomud Tyagi.

**Distribution**: Macaronesia, Mediterranean to Egypt, Central Asia, China, Japan, Poland, Canada, USA, Galapagos Island, Society Island.
Figures 14–23. 14–21 Theridion manjithar Tikader, 1970, holotype (NZC-ZSI-3275/18). 14, abdomen, dorsal view. 15, same, anterior view. 16, same, posterior view. 17, same, ventral view. 18, carapace, dorsal view. 19, same, lateral view. 20, epigyne, dorsal view. 21, vulva, dorsal view. Scale bars 14-17, 0.5mm; 18-19, 0.2mm; 20-21, 1mm. 22–23 Theridion melanostictum O. Pickard-Cambridge, 1876. 22- internal epigyne, dorsal view. 23- vulva, dorsal view. Scale bars, 1mm.
Figure 24. Distributional records of Theridion sp. in India.

Theridion manjithar Tikader, 1970  
(Figs. 14-21)

Theridion manjithar Tikader, 1970: 8, f. 3a-b (description of female).

Material examined: Holotype female (3275/18), Manjithar, West Sikkim, India, 22 September 1959, coll. B.K. Tikader.

Distribution: India.

Nihonhimea indicum (Tikader, 1977) comb.n.
Figs 7-13.

Theridion indica Tikader, 1977: 168, f. 5A-C (description of female)  
Theridion indicum Brignoli, 1983: 416; Sen et al., 2015: 85, figs 499-503, pl. 19 (description and illustration of female).
Material examined: Holotype female (5352/18), Neil Island, South Andaman, India, 13 April 1970, coll. B.K. Tikader. Paratypes (3♀♀) (5353/18), (same data as holotype).

Remarks. Theridion indicum Tikader, 1977 was originally described based on four female specimens from South Andaman, India (Tikader, 1977) and subsequently reported from West Bengal (Sen et al., 2015). However, Ganeshkumar & Siliwal (2007) reported Achaearanea brookesiana Barrion & Litsinger, from mainland India and mentioned that this species could be the synonym of T. indicum, without examining the type material. Later on, A. brookesiana was transferred to the genus Parasteatoda based on genitalia characters (Yoshida 2008). We have studied the genitalia of the paratype female of T. indicum from National Zoological Collections of Zoological Survey of India, Kolkata. The epigynum have thick and short ducts, globular spermathecae and two openings on both sides of the depression (Figs.12-13). The abdomen is having a median cardiac pattern with lateral light lines (Fig.7). These characters are showing the affinity of T. indicum towards the genus Nihonhimea. Further, based on descriptions and illustrations provided by Chrysanthus (1963), it is certain that T. indicum, A. brookesiana may be junior synonyms of the very variable and widespread species Nihonhimea mundula (L. Koch, 1872), which was already known from India. So, on the basis of external morphology and the structure of the genitalia, this species can be transferred to the genus Nihonhimea.

Nihonhimea tikaderi (Patel, 1973) comb.n.

Theridion tikaderi Patel, 1973: 149, f. 1-4 (description and illustration of female).

Comments. Theridion tikaderi was originally described on the basis 26 females from Gujarat state of India (Patel, 1973) with poor description of genitalia and illustration. The type depository information was not mentioned (World Spider Catalog, 2019). The external morphology and the patterns on the dorsum of the abdomen provided by original description indicate the affinity of this species towards the genus Nihonhimea. The abdomen is globular in shape with white and chocolate patches on ventral and dorsal side (Figs1-4 in Patel, 1973). So, it is concluded that the species can be transferred to the genus Nihonhimea.

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