A new species and two new synonyms in the genus *Plexippus* C.L. Koch, 1846 from India (Araneae: Salticidae: Plexippina)

Новый вид и два новых синонима в роде *Plexippus* C.L. Koch, 1846 из Индии (Araneae: Salticidae: Plexippina)

John T.D. Caleb¹, Clement Francis², Vijay Krishna Bhat³, Soosaimanickam Maria Packiam¹,⁴

Джон Т.Д. Калеб¹, Клемент Фрэнсис², Виджай Кришна Бхат³, Сусаиманикам Мари Пакиам¹,⁴

ABSTRACT. A new jumping spider species, *Plexippus ignatus* Caleb sp.n. (♂), is described from Karnataka state, India. Two new synonyms are proposed: *Plexippus andamanensis* (Tikader, 1977) syn.n. and *P. calcutaensis* (Tikader, 1974) syn.n., are junior synonyms of *P. paykulli* (Audouin, 1826) and *P. petersi* (Karsch, 1878) respectively. A detailed description and illustrations of the studied specimens are provided.

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KEY WORDS: Aranei, description, Karnataka, species discovery, taxonomy, type specimen.

Materials and methods

Live specimen was photographed with a Nikon D850 DSLR camera with a Nikkor 105 mm macro lens, illuminated by a Godox 860ii flash light with a diffuser. The specimen was hand-collected and preserved in 70% ethanol. A morphological examination of *P. ignatus* sp.n. was carried out under a Leica SAPO stereomicroscope and micrographs were taken with a Leica MC190 HD camera and processed with the Leica Application Suite (LAS) version 4.13. The type specimens from ZSI, Kolkata were examined under a Leica EZ4 HD stereomicroscope and micrographs were taken with a Leica DFC500 HD camera attached to Leica M205.
A stereomicroscope and processed with LAS version 3.8. Male left palp was detached and examined in detail and photographed. The epigyne was cleared in 10% KOH. Leg measurements are given as follows: total length (femur, patella, tibia, metatarsus, tarsus). All measurements are in millimeters (mm). The descriptive style follows Caleb et al. [2020; 2021]. The studied specimens are deposited in the following museums: National Zoological Collection, Zoological Survey of India (NZC-ZSI), Kolkata, India and Southern Regional Centre, Zoological Survey of India (ZSIC), Chennai, Tamil Nadu, India.

Abbreviations used in the text: AER — anterior eye row; ALE — anterior lateral eye; AME — anterior median eye; EFL — eye field length; PER — posterior eye row; PLE — posterior lateral eye; PME — posterior median eye; RTA — retrolateral tibial apophysis.

**Taxonomy**

**Genus Plexippus C.L. Koch, 1846**

Type species: *Plexippus ligo* C.L. Koch, 1846 (= *Plexippus paykulli* (Audouin, 1826)).

**Plexippus ignatius** Caleb sp.n.

Figs 1–12, Map.

**Type. HOLOTYPE:** ♀ (ZSIC), INDIA: Karnataka, Mandya District, Halagur, Dhanaguru village (12.3799°N, 77.1627°E), 602 m a.s.l., 12 September 2021, V.K. Bhat.

**ETYMOLOGY.** The specific epithet is a patronym after St. Ignatius of Loyola, the founder of the Society of Jesus, in honor for his invaluable contributions to environment and spirituality and on the occasion marking the 500th anniversary of his spiritual conversion, and the 400th anniversary of his canonization on March 12, 2022. The name is treated as a noun in apposition.

**DIAGNOSIS.** The male of *P. ignatius* sp.n. is morphologically similar to that of *P. clemens*, but can be recognized by the carapace colour pattern with three thin white longitudinal stripes joined by a transverse stripe in the ocular region (Figs 1, 2, 5). The palp is most similar to that of *Plexippus minor* Wesołowska et van Harten 2010, but can be readily distinguished by the proportions of the bulbus, which is notably wider anteriorly and sharply narrowing posteriorly (rounded in *P. minor*); tibia with a distinct retrolateral bulge at the base of RTA, apparent in ventral view (absent in *P. minor*); RTA protrudes at an angle of 60° (40° in *P. minor*) in ventral view; RTA thumb-like and pointing dorsad in retrolateral view (triangular and pointing apically in *P. minor*) (cf. Figs 8–12 with figs 15, 16 in Tripathi et al. [2022]).

**DESCRIPTION. MALE:** total length 4.65; carapace 2.40 long, 1.77 wide; abdomen 2.25 long, 1.33 wide. Carapace
Figs 5–12. Somatic morphology and palp of *Plexippus ignatius* sp.n., holotype male. 5 — habitus, dorsal view; 6 — ditto, ventral view; 7 — front view; 8, 11 — left palp, ventral view; 9, 12 — ditto, retrolateral view; 10 — ditto, retrolateral, slightly posterior view. Scale bars: 1 mm (5–7); 0.2 mm (8–12).

Рис. 5–12. Соматическая морфология и пальпа *Plexippus ignatius* sp.n., голотип-самец. 5 — внешний вид, дорзально; 6 — то же, вентрально; 7 — тоже, спереди; 8, 11 — левая пальпа, снизу; 9, 12 — то же, сзади-сбоку; 10 — то же, сзади-сбоку, но более сзади. Масштаб: 1 мм (5–7); 0.2 мм (8–12).
black, with three short longitudinal white stripes, two behind ALEs and one from between AMEs joined by a transverse band present between posterior eye rows; ocular region covered with rusty brown setae; thoracic slope with a median patch of white hairs. Anterior eyes surrounded by white and reddish orbital setae (Figs 1–3, 5). Eye measurements: AME 0.51, ALE 0.30, PME 0.07, PLE 0.26; AER 1.60; PER 1.59; EFL 1.04. Clypeus height 0.10. Clypeus brown, with black hairs; oblique thin white stripes run down from lateral sides of AMEs; anterior margin fringed with white hairs (Figs 4, 7). Sternum oval, yellow-brown; labium and maxillae brown, ovate, dark brownish yellow, covered with rusty brown scales; all femora with light brown patches, arrow-shaped brown marking present medially, pointing posteriorly toward spinnerets (Figs 1, 2, 5, 6). Spinnerets yellow with white hairs dorsally. Legs I 4.46 (1.42, 0.81, 0.97, 0.75, 0.51); II 4.13 (1.36, 0.73, 0.84, 0.75, 0.45); III 4.71 (1.56, 0.75, 0.94, 0.82, 0.64); IV 5.12 (1.60, 0.74, 1.02, 1.14, 0.62). Leg formula 4312. Palp as shown in Figs 8–12.

FEMALE unknown.

DISTRIBUTION. Known only from the type locality (Karnataka, India) (Map).

Plexippus paykulli (Audouin, 1826)
Figs 13–19.

Attus paykullii Audouin, 1826: 409, pl. 7, fig. 22 (D♀, D♂).

Plexippus ligo C.L. Koch, 1846: 107, figs 1168–1169 (D♀, D♂).
Plexippus paykulli: Peckham, Peckham, 1886: 296; Simon, 1903: 712, 735, figs 839–841; Zakba, 1990: 170, figs 22–25; Zakba, Gardzińska, 2017: 232, figs 1A–F, 2A–F (C♀); Tyagi et al., 2019: Supplement, figs S2.57, S3.33–36 (C♀).

Marpissa andamanensis Tikader, 1977: 199, figs 22A–C (D♀, D♂); holotype ♂ and allotype ♀, in NZC-ZSI, examined, syn.n.

For a complete list of taxonomic references see WSC [2022].

TYPES. Marpissa andamanensis Tikader, 1977: HOLOTYPE ♀ (NZC-ZSI 5387/18), INDIA, South Andaman, Chiriatapu (also Chiria-Tapu/Chidiya Tapu/Chidiyatappu) village, 30.05.1971, B.K. Tikader. ALLOTYPE ♂ (NZC-ZSI 5388/18), together with the holotype.

COMMENTS. Marpissa andamanensis was described based on the holotype female and the allotype male from Chiriatapu village, South Andaman [Tikader, 1977]. A detailed examination of the holotype has revealed that the abdominal colour pattern and the female epigyne with slit-like, curved copulatory openings, the median epigynal pocket situated below the openings, the broad copulatory ducts and oval spermathecae are unambiguously identical with that of *P. paykulli* (cf. Figs 13–15 and figs 22A–B in Tikader [1977] with figs 24, 25 in Zakba [1990] and figs 2D–F in Zakba & Gardzińska [2017]). Based on the above observations, we have concluded that the species name *M. andamanensis* is to be treated as a junior synonym of *P. paykulli*.

The allotype male, however, is neither conspecific nor congeneric with the holotype female, belonging to *Evarcha* Simon, 1902. The general morphology, colour pattern and the genital morphology fit nicely to those of *Evarcha pococki* Zakba, 1985 (cf. Figs 16–18 with figs 184, 186 in Zakba & Gardzińska [1985]), and hence the allotype male of *M. andamanensis* is to be re-identified as *E. pococki*.

Plexippus petersi (Karsch, 1878)
Figs 20–27.

Euophrys petersii Karsch, 1878: 332, pl. 2, fig. 7 (D♂). Plexippus petersi: Simon, 1903: 728; Zakba, 1985: 433, figs 464–470 (C♂); Zakba, Gardzińska, 2017: 232, figs 3A–F, 4A–F (C♂); Tyagi et al., 2019: Supplement, figs S2.56, S3.37–40 (C♂).

Marpissa calculusaensis Tikader, 1974: 210, figs 9–10 (D♂); holotype ♂ and paratype ♀, in NZC-ZSI, examined, syn.n.

For a complete list of taxonomic references see WSC [2022].

TYPES. Marpissa calculusaensis Tikader, 1974: HOLOTYPE ♀ (NZC-ZSI 5393/18), INDIA, West Bengal, Calcutta (now Kolkata), 12.01.1958, B.K. Tikader. PARATYPE: 1♀ (NZC-ZSI 5994/18), together with the holotype.

COMMENTS. Marpissa calculusaensis was described based on the holotype female and the paratype female from
Figs 13–19. Somatic morphology and copulatory organs of *Plexippus andamanensis* (Tikader, 1977). 13 — habitus of the holotype female, dorsal view; 14 — epigyne of the holotype, ventral view; 15 — vulva of the holotype, dorsal view; 16 — habitus of the allotype male, dorsal view; 17 — left male palp of the allotype, ventral view; 18 — ditto, retrolateral view; 19 — data labels. Scale bars: 2 mm (13, 16); 0.2 mm (14, 15, 17, 18).

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New species and synonyms of *Plexippus* from India

Figs 20–27. Somatic morphology and copulatory organ of *Plexippus calcutaensis* (Tikader, 1974). 20 — habitus of holotype female, dorsal view; 21 — ditto, ventral view; 22 — ditto, front view; 23 — epigyne of the holotype, ventral view; 24 — habitus of the paratype female, dorsal view; 25 — ditto, ventral view; 26, 27 — data labels. Scale bars: 2 mm (20, 21, 24, 25); 0.5 mm (23).

Рис. 20–27. Соматическая морфология и копулятивный орган *Plexippus calcutaensis* (Тикадер, 1974). 20 — общий вид голотипа-самки, дорзально; 21 — то же, вентрально; 22 — то же, спереди; 23 — эпигина голотипа, снизу; 24 — внешний вид паратипа-самки, дорзально; 25 — то же, вентрально; 26, 27 — этикетки. Масштаб: 2 мм (20, 21, 24, 25); 0.5 мм (23).
Compliance with ethical standards
Conflict of interest: The authors declare that they have no conflict of interest.
Ethical approval: No ethical issues were raised during our research.

References
Caleb J.T.D. 2016. New data on the jumping spiders (Araneae: Salticidae) from India // Arthropoda Selecta. Vol.25. No.3. P.271–277.
Caleb J.T.D., Bera C., Acharya S. 2020. New species and new synonymies of the genus Carrhotus Thorell from India (Aranei: Salticidae: Salticini) // Arthropoda Selecta. Vol.29. No.1. P.51–66.
Caleb J.T.D., Francis C., Bhat V.K. 2021. A new baviine species of the genus Maripanthis Maddison from India (Araneae: Salticidae) // Revue Suisse de Zoologie. T.128. Fasc.1. P.199–205.
Caleb J.T.D., Sankaran P.M. 2022. Araneae of India. Version 2022, online at http://www.indianspiders.in (accessed on 26.05.2022).
Koch C.L. 1846. Die Arachniden. Nürnberg: J.L. Lotzbeck. Dreizehnter Band, S.1–234; Vierzehnter Band, S.1–88.
Nenilin A.B. 1984a. [Materials on the fauna of the spider family Salticidae of the USSR. I. Catalog of the Salticidae of central Asia] // Utotchkin A.S. (ed.). Fauna i ekologiya paukobraznykh. University of Perm. P.6–37 [in Russian].
Nenilin A.B. 1984b. [On the taxonomy of spiders of the family Salticidae of the fauna of the USSR and adjacent countries] // Zoologicheskii Zhurnal. Vol.43. No.8. P.1175–1180 [in Russian with English abstract].
Peckham G.W., Peckham E.G. 1888. Attidae of North America // Transactions of the Wisconsin Academy of Sciences, Arts and Letters. Vol.7. P.1–104.
Prajapati D.A., Tatu K., Kamboj R.D. 2021. Redescription and junior synonymy of Plexippus clemens (O. Pickard-Cambridge, 1872) (Araneae: Salticidae) // Arachnology. Vol.18. No.8. P.809–811.
Prószyński J. 2017. Remarks on the genus Plexippus C.L. Koch, 1846 (Araneae: Salticidae) // Ecologica Montenegrina. Vol.13. P.39–69.
Simon E. 1903. Histoire naturelle des araignées. Deuxième édition, tome second. Paris: Roret. P.669–1080.
Tikader B.K. 1974. Studies on some jumping spiders of the genus Marpissa from India (family-Salticidae) // Proceedings of the Indian Academy of Science. Vol.79. No.B. P.204–215.
Tikader B.K. 1977. Studies on spider fauna of Andaman and Nicobar islands, Indian Ocean // Records of the Zoological Survey of India. Vol.72. P.153–212.
Tripathi R., Henrard A., Jangid A.K., Dutta S., Sudhikumar A.V. 2022. First documentation of Plexippus minor Wesołowska & van Harten, 2010 (Araneae: Salticidae) from India // Arachnology. Vol.19. No.1. P.66–71.
Tyagi K., Kumar V., Kundu S., Prakash A., Prasad P., Caleb J.T.D., Chandra K. 2019. Identification of Indian spiders through DNA barcoding: cryptic species and species complex // Scientific Reports. Vol.9(14033). P.1–13 & Supplement.
WSC 2022. World Spider Catalog. Version 23.0. Natural History Museum Bern. http://wsc.nmbe.ch (accessed on 26.05.2022).

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