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Research article

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A review of the Indian species formerly assigned to the genus *Storena* Walckenaer, 1805 (Araneae: Zodariidae) with the description of a new genus

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Abstract. Indian spider species currently assigned to *Storena* Walckenaer, 1805 are revised mostly based on the type material available in the National Zoological Collection, Zoological Survey of India, Kolkata. A new genus, *Laminion* gen. nov. is proposed to include four species; three are transferred from *Storena*: *Laminion arakuensis* (Patel & Reddy, 1989) gen. et comb. nov., *Laminion birenifer* (Gravely, 1921) gen. et comb. nov. and *Laminion debasrae* (Biswas & Biswas, 1992) gen. et comb. nov., whereas the fourth species is from *Suffasia* Jocqué, 1991: *Laminion gujaratensis* (Tikader & Patel, 1975) gen. et comb. nov. The species *Storena tikaderi* Patel & Reddy, 1989 syn. nov. is synonymised with *L. birenifer* gen. et comb. nov. *Storena dibangensis* Biswas & Biswas, 2006 and *Storena indica* Tikader & Patel, 1975 are transferred to *Mallinella* Strand, 1906. All the type material examined are imaged and redescribed. In addition, images of the type material of *Storenomorpha joyaus* (Tikader, 1970) are presented.

Keywords. India, redescription, synonymy, taxonomy, transfer, Zoological Survey of India.

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Introduction

The zodariid genus *Storena* Walckenaer, 1805 currently consists of 61 nominal species distributed across Africa, Australia, Australasia, Neotropical and Southeast Asia (World Spider Catalog 2020). The genus is particularly rich in Australia with more than half of the described species (41 species) and is relatively well revised (Jocqué & Baehr 1992; World Spider Catalog 2020). Species described from

other parts of the globe are poorly known and currently the African, Australasian and one Southeast Asian representative (probably other species also) are considered to be misidentified (Bosmans & Van Hove 1986; Dankittipakul *et al.* 2012; World Spider Catalog 2020). *Storena* is most probably an endemic Australian genus (Jocqué & Baehr 1992; Baehr & Jocqué 1994) and representatives of this genus from other countries need to be revised as well. The genus currently has six representatives in India: *Storena arakuensis* Patel & Reddy, 1989, *Storena birenifer* Gravely, 1921, *Storena debasrae* Biswas & Biswas, 1992, *Storena dibangensis* Biswas & Biswas, 2006, *Storena indica* Tikader & Patel, 1975 and *Storena tikaderi* Patel & Reddy, 1989 (Caleb & Sankaran 2020; World Spider Catalog 2020). One species, *Storena gujaratensis* Tikader & Patel, 1975 has already been transferred to *Suffasia* Jocqué, 1991 (Solanki *et al.* 2018). All the Indian species of *Storena* are known only from their original descriptions, which lack clear diagnostic illustrations (see Gravely 1921; Tikader & Patel 1975; Patel & Reddy 1989; Biswas & Biswas 1992, 2006), making their identification very difficult. Because of inadequate descriptions, Dankittipakul *et al.* (2012) considered all Indian *Storena* species as *incertae sedis*. Therefore, we revise the Indian species of *Storena* based on the type material available in the National Zoological Collection, Zoological Survey of India, Kolkata.

Material and methods

The specimens were studied under a Leica EZ4 HD stereo microscope. All measurements are in millimetres (mm). Lengths of pedipalp/palp and leg segments are given as: total (femur, patella, tibia, metatarsus (except for pedipalp/palp), tarsus). The micrographic images were taken with a Leica DFC500 digital camera attached to a Leica M205A stereo microscope with the software package Leica Application Suite (LAS, ver. 3.8) for stacking images taken at different focal planes.

Institutional abbreviations

BMNH = British Museum of Natural History, London, UK
NZC-ZSI = National Zoological Collection, Arachnida Section, Zoological Survey of India, Kolkata

Abbreviations

AER = anterior eye row
ALE = anterior lateral eye
AME = anterior median eye
MA = median apophysis
MOQ = median ocular quadrangle
PER = posterior eye row
PLE = posterior lateral eye
PME = posterior median eye
PVS = posterior ventral spines
I–IV = 1st to 4th leg

Results

Class Arachnida Lamarck, 1801
Order Araneae Clerck, 1757
Family Zodariidae Thorell, 1881

Genus *Laminion* gen. nov.

[urn:lsid:zoobank.org:act:AEA4B317-503D-4D43-8603-96A86156AB83](https://doi.org/10.21203/rs.3.rs-1000000/v1)

Type species

Storena birenifer Gravely, 1921.

Diagnosis

Males of *Laminion* gen. nov. can be separated from all other zodariid genera by the combination of a huge, prominent cymbial flange (Figs 4A, 8D, arrows 1, 2) and cymbial processes (Figs 4D–F, 8D–E, G; CP1, CP2, CP3); females by the presence of three sclerotised plates on the epigynum (Figs 3D, 6B; ISP, mSP), in combination with strongly compact, stout spermathecae (Fig. 6C). *Laminion* gen. nov. resembles *Hermippus* Simon, 1893, but can be separated by the sclerotised plates of epigynum, cymbial processes of pedipalp and lack of complex and multiple apophyses on pedipalpal tibia (compare Figs 1A–C, E, 3A–D, 6A–B, 7A, 8A–E, G with Sankaran *et al.* 2014: figs 1a, c, 2a, 4a, 5a, c, 6b–c, 9b–c, 10a, c, 11a, 13a, 14a, c, 15a, 17a).

Etymology

The genus name refers to the lateral and median sclerotised plates of the female genitalia (Latin ‘*laminam*’ = ‘plate’) (Figs 3D, 6B; ISP, mSP), in combination with the terminal ‘-ion’ taken from *Zodarion* Walckenaer, 1826, which is the familytype. Gender neuter.

Description

SIZE. Medium-sized zodariid spiders.

PROSOMA. Elongate-ovoid (Figs 1A–B, 6A, 7A), widest at level of coxa II, domed in lateral view (Fig. 1C, E), highest between PME and deep, vertical fovea, abruptly sloping backwards (Fig. 1C, E). Carapace uniform dark reddish-brown/orange-brown, with black shades on the margin, covered with fine hairs.

CHILUM. Unipartite, inverted triangular, medially elevated.

CLYPEUS. Very high, covered with fine hairs (Fig. 1D, F).

CHELICERAE. Covered with fine hairs dorsally, with disto-mesal group of hairs; cheliceral margins without teeth, but with denticles; lateral condyles prominent, moderately elevated. Fangs short and stout.

LABIUM. Triangular, longer than wide, slightly constricted at base, sparsely covered with setae (Fig. 2C–D).

ENDITES. Triangular, covered with thick antero-mesal scopulae (Fig. 2C–D).

STERNUM. Roughly triangular, rebordered, granulate, medially elevated, anterior margin with median concavity, lateral margin with blunt or pointed extensions fitting into coxal and intercoxal concavities (Figs 2C–D, 7B).

EYES. All eyes circular, pale, AER slightly procurved, PER moderately procurved, AME largest, PME smallest, lateral eyes nearly contiguous (Fig. 2A–B), MOQ longer than wide, distinctly wider in front than behind (Fig. 2A–B).

LEGS. Covered with fine hairs, with elongated metatarsi and tarsi, femora and patellae with few spines, tibiae and metatarsi with numerous spines, mostly on posterior ones, metatarsi bear brush of disto-ventral setae distinctly denser on posterior ones, tarsi lined with paired ventral spinules; leg formula 4132.

OPISTHOSOMA. Elongate-ovoid, black, dorsum, laterals and venter with distinct pale stripes and blotches of varying sizes and shapes (Figs 1A–B, G, 6A, E, 7A, E). Dorsal scutum present (Fig. 7A) or absent

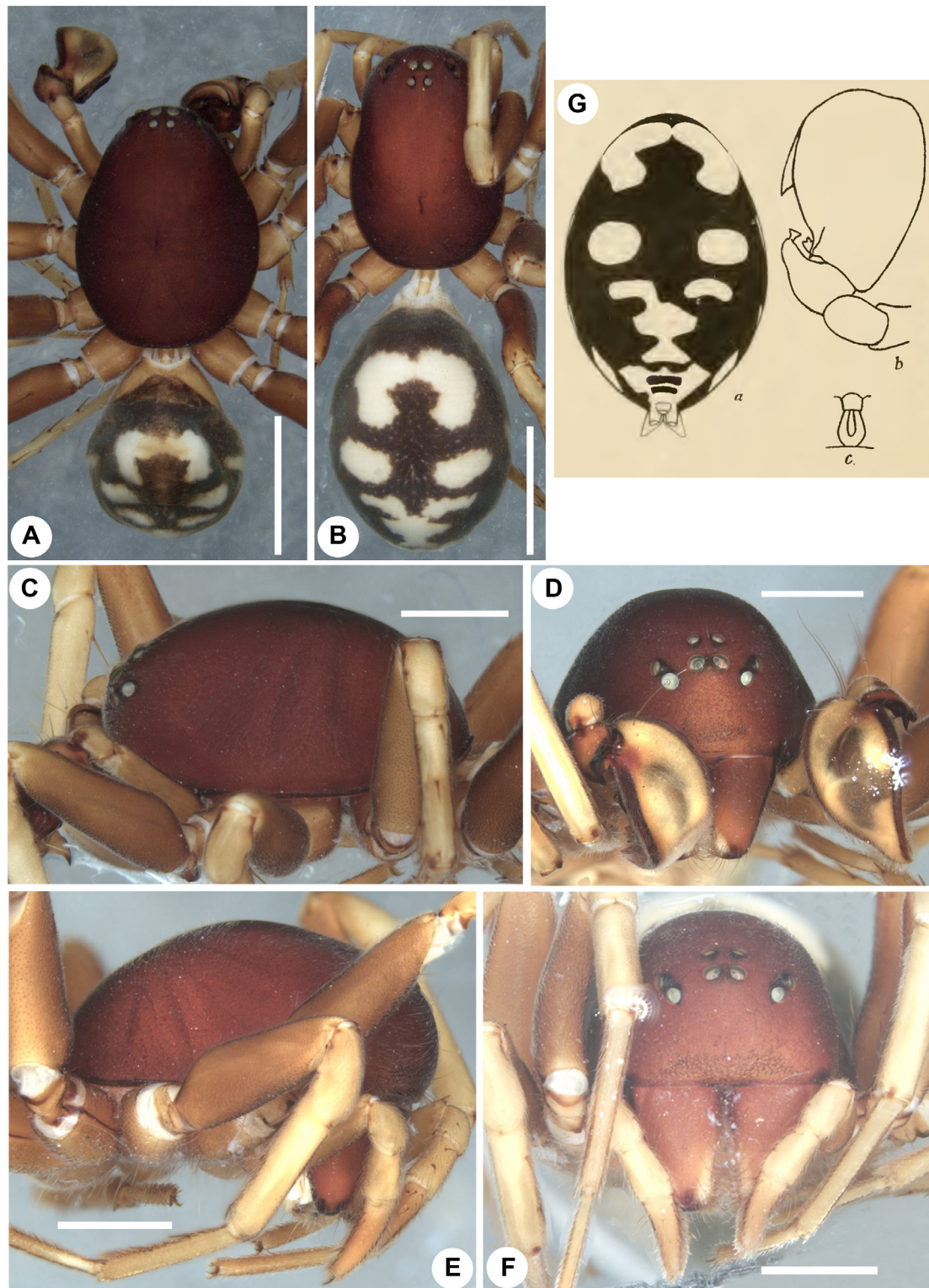


Fig. 1. *Laminion birenifer* (Gravely, 1921) gen. et comb. nov., ♂♀, syntypes of *Storena birenifer* Gravely, 1921. **A, C–D.** ♂ (NZC-ZSI-2914/H2). **A.** Habitus, dorsal view. **C.** Prosoma, retrolateral view. **D.** Same, frontal view. **B, E–F.** ♀ (NZC-ZSI-2914/H2). **B.** Habitus, dorsal view. **E.** Prosoma, prolateral view. **F.** Same, frontal view. **G.** Original illustrations of *S. birenifer* adapted from Gravely (1921). Scale bars: A–B = 2 mm; C–F = 1 mm.

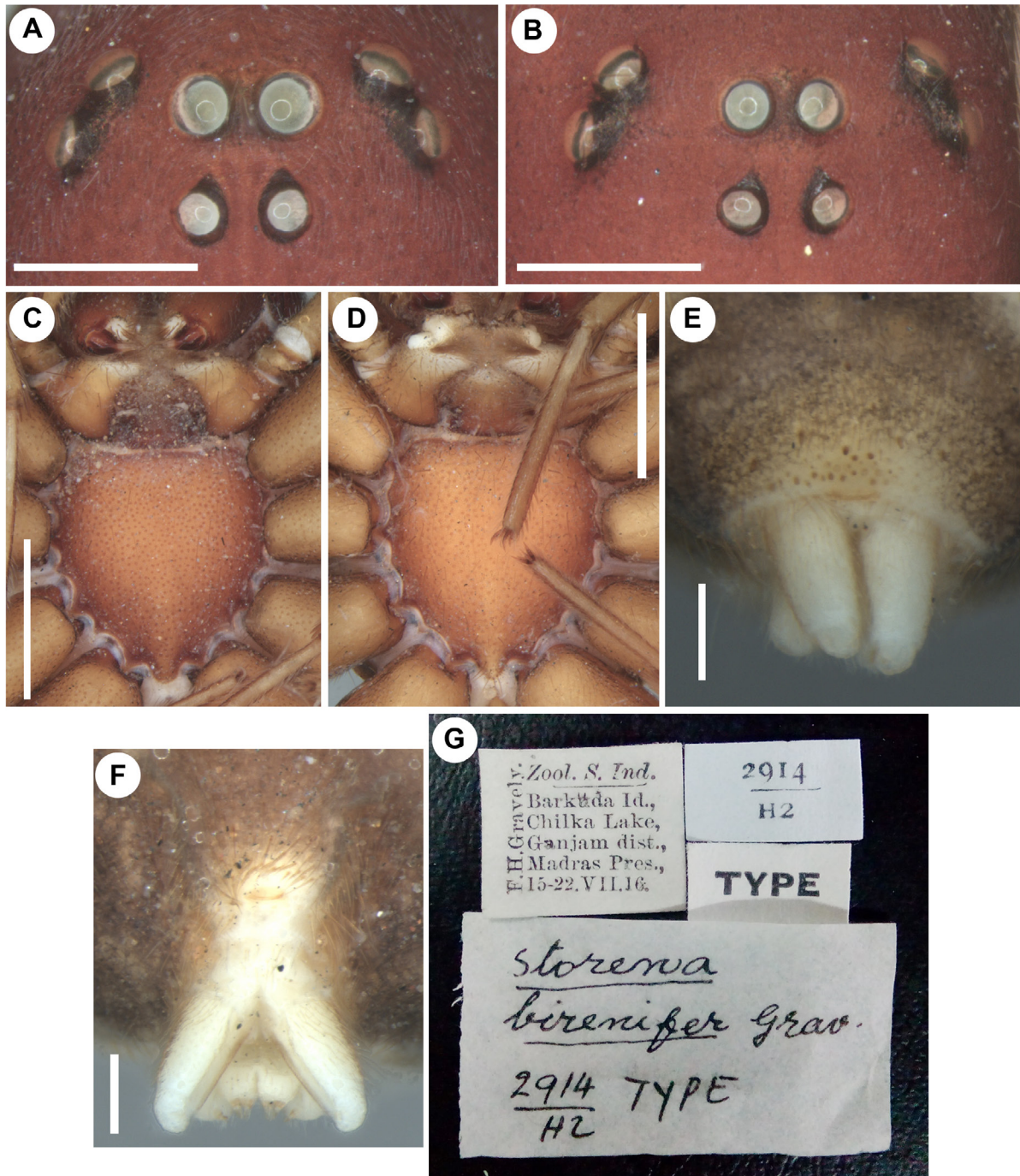


Fig. 2. *Laminion birenifer* (Gravely, 1921) gen. et comb. nov., ♂♀, syntypes of *Storena birenifer* Gravely, 1921. **A, C, E.** ♂ (NZC-ZSI-2914/H2). **A.** Eye group, fronto-dorsal view. **C.** Endites, labium and sternum, ventral view. **E.** Spinnerets, ventral view. **B, D, F.** ♀ (NZC-ZSI-2914/H2). **B.** Eye group, fronto-dorsal view. **D.** Endites, labium and sternum, ventral view. **F.** Spinnerets, ventral view. **G.** Type label. Scale bars: A–B = 0.5 mm; C–D = 1 mm; E–F = 0.2 mm.

(Figs 1A–B, 6A). Epiandrum distinct. PVS present (Fig. 7C) or absent (Fig. 2E–F). Spinnerets with large spigots (Fig. 2F).

PEDIPALP. Femur with a disto-ventral depression (Figs 3A–B, 8A, arrows). Patella with a dorsal apophysis (Figs 4I, 8D; PA). Tibia with a very long prolateral seta (Figs 3A, 8A), apical margin on dorso-retrolateral side lamellate and elevated (Fig. 4D, G–H; LTi). RTA short, broader at base, gradually tapered towards pointed or blunt apex (Figs 4D–E, G–H, 8D, G). Cymbium with truncated apex (Figs 3C, 8B), with two very long setae at prolateral base (Fig. 3A), antero-dorsally decorated with a mat of fine hairs (Figs 4B, 8A–C, arrow 2), with huge prominent retrolateral flange along entire length (Figs 4A, 8D, arrows 1, 2), with retro-basal processes (Figs 4D–F, 8D–E, G; CP1, CP2, CP3). Tegulum highly sclerotised, with disto-prolateral apophysis (Figs 4B–C, 5B; dpTA). MA stout, with lateral extensions (Figs 5B, D, 8F; pMA, rMA). Conductor highly sclerotised, transversely oriented, with prominent retrolateral processes (Figs 5B–D, 8F; C, rC1, rC2). Embolus long, filiform, with prominent embolic base, with blunt tip (Figs 5A, 8B, F, arrow 3; E, EB).

Females generally as in males, but carapace more elongated, anteriorly slightly wider. Palp tarsus spinose, with single claw. Epigynal plate represented by broad, paired lateral and a narrow median plates (Figs 3D, 6B; lsp, mSP). Internal genitalia represented by very compact, stout spermathecae with broad internal ducts (Fig. 6C). Insemination ducts short (Fig. 6C).

Species included

Laminion birenifer (Gravely, 1921) gen. et comb. nov., *Laminion arakuensis* (Patel & Reddy, 1989) gen. et comb. nov., *Laminion debasrae* (Biswas & Biswas, 1992) gen. et comb. nov. and *Laminion gujaratensis* (Tikader & Patel, 1975) gen. et comb. nov.

Distribution

Currently known to occur only in India (Andhra Pradesh, Gujarat, Odisha, West Bengal) (Fig. 9).

Laminion birenifer (Gravely, 1921) gen. et comb. nov.
Figs 1–5, 9

Storena birenifer Gravely, 1921: 408, fig. 2a–c.

Storena tikaderi Patel & Reddy, 1989: 223, fig. 2a–h. syn. nov.

Type material

Syntypes of *S. birenifer*

INDIA • ♂♀; Odisha (formerly Orissa), Ganjam, Chilika Lake (= Chilka Lake), Barkuda Island (formerly part of Madras Presidency); 19°33'12.7" N, 85°08'47.2" E; 13 m a.s.l.; 15–22 Jul. 1916; F.H. Gravely leg.; NZC-ZSI, Kolkata (no register number specified).

Cotype of *S. birenifer*

INDIA • ♂; same collection data as for syntypes; NZC-ZSI, Kolkata (no register number specified).

Holotype of *S. tikaderi* (not examined)

INDIA • ♀; Andhra Pradesh, Visakhapatnam, Araku Valley; 18°19'38.45" N, 82°52'39.08" E; 919 m a.s.l.; 18 Oct. 1986; T.S. Reddy leg.; NZC-ZSI, Kolkata (no register number specified). (The original illustrations of habitus and epigynum are diagnostic and were used for comparison.)

Paratypes of *S. tikaderi* (not examined)

INDIA • 6 ♀♀; same collection data as for holotype; NZC-ZSI, Kolkata (no register number specified).

Allotype of *S. tikaderi* (not examined)

INDIA • ♂; same collection data as for holotype; NZC-ZSI, Kolkata (no register number specified).

Supplementary description

Male (syntype (2914/H2); Figs 1A, C–D, 2A, C, E)

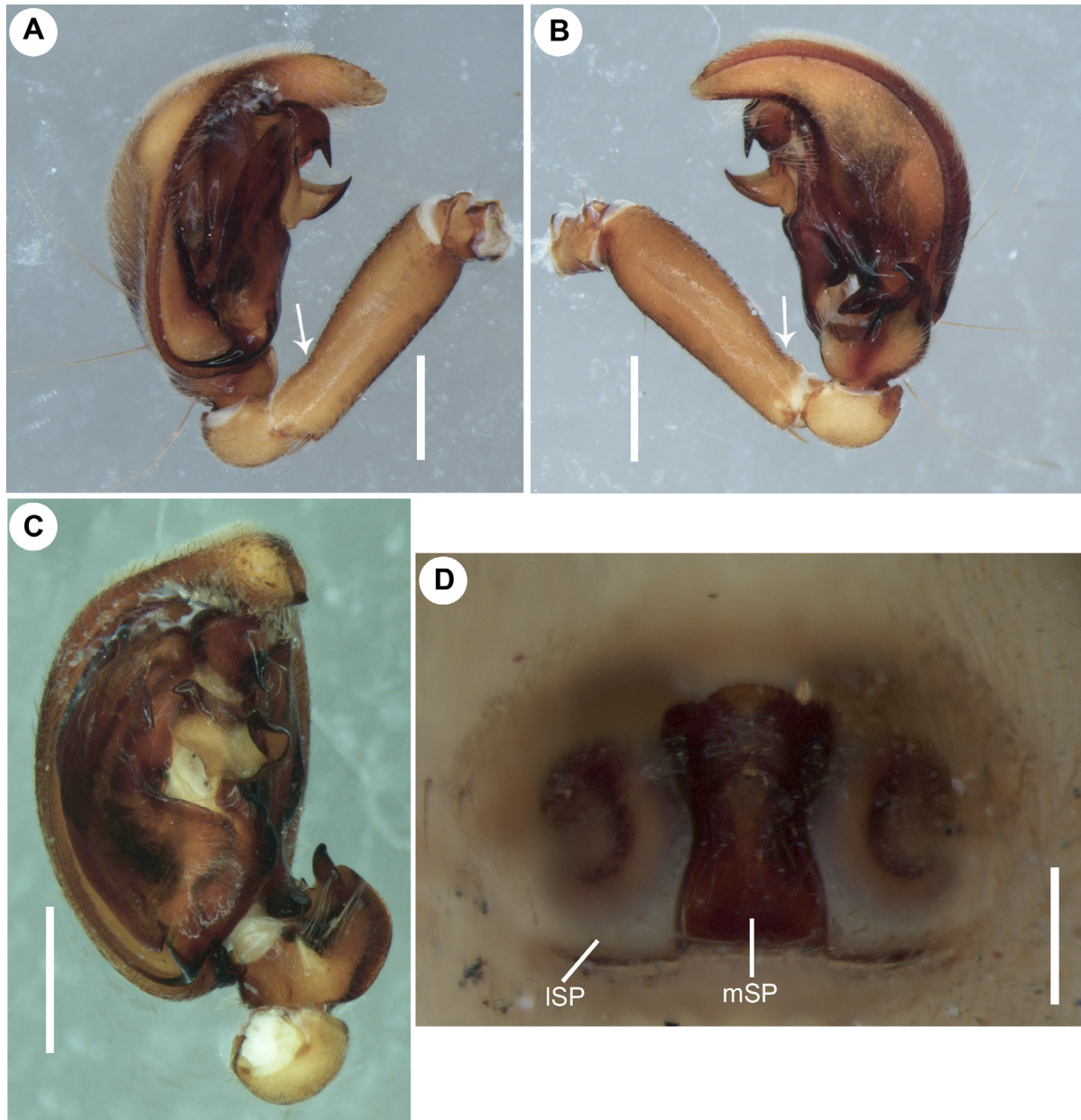


Fig. 3. *Laminion birenifer* (Gravely, 1921) gen. et comb. nov., ♂♀, syntypes of *Storena birenifer* Gravely, 1921 (NZC-ZSI-2914/H2). **A.** Left pedipalp of male, prolateral view. **B.** Same, retrolateral view. **C.** Same, ventral view. **D.** Epigynum of female, ventral view. Abbreviations: ISP = lateral sclerotised plate; mSP = median sclerotised plate. Scale bars: A–C = 0.5 mm; D = 0.2 mm. Arrows indicate the femoral disto-ventral depression.

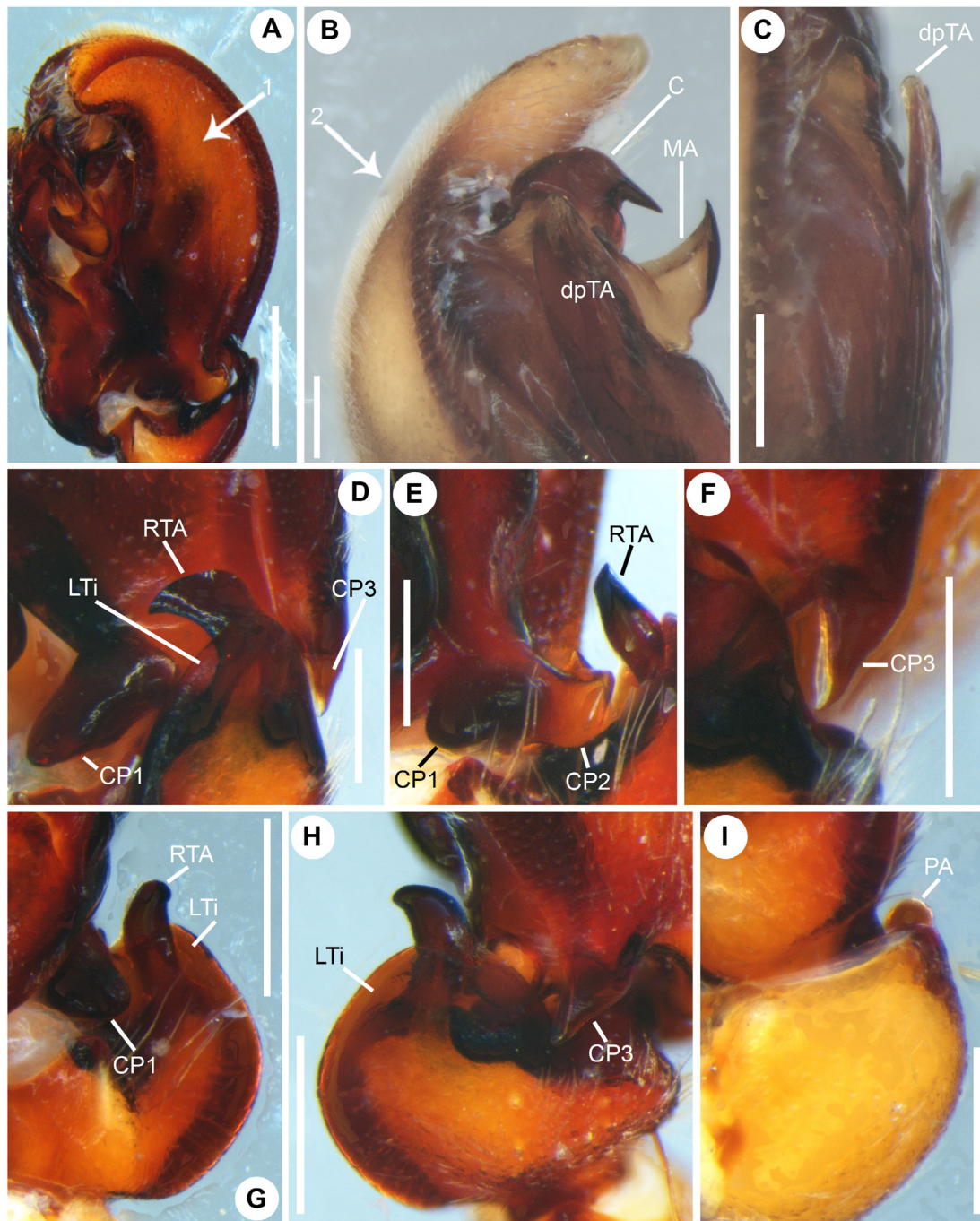


Fig. 4. *Laminion birenifer* (Gravely, 1921) gen. et comb. nov., ♂, syntype of *Storena birenifer* Gravely, 1921 (NZC-ZSI-2914/H2), left pedipalp. **A.** Cymbial retrolateral flange, ventral view. **B.** Distal part of cymbium and bulb, prolateral view. **C.** Disto-prolateral tegular apophysis, dorso-prolateral view. **D–I.** Details of retrolateral tibial apophysis, cymbial processes, lamellate extension of tibia and patellar apophysis. **D, F.** Retrolateral view. **E.** Ventral view. **G.** Prolateral-ventral view. **H.** Dorso-ventral view. **I.** Ventral view. Abbreviations: C = conductor; CP1 = first cymbial process; CP2 = second cymbial process; CP3 = third cymbial process; dpTA = disto-prolateral tegular apophysis; LTi = lamellate extension of tibia; MA = median apophysis; PA = patellar apophysis; RTA = retrolateral tibial apophysis. Scale bars: A = 0.5 mm; B–I = 0.2 mm. Arrows: 1 indicates cymbial retrolateral flange, 2 indicates dorsal hair mat of cymbium.

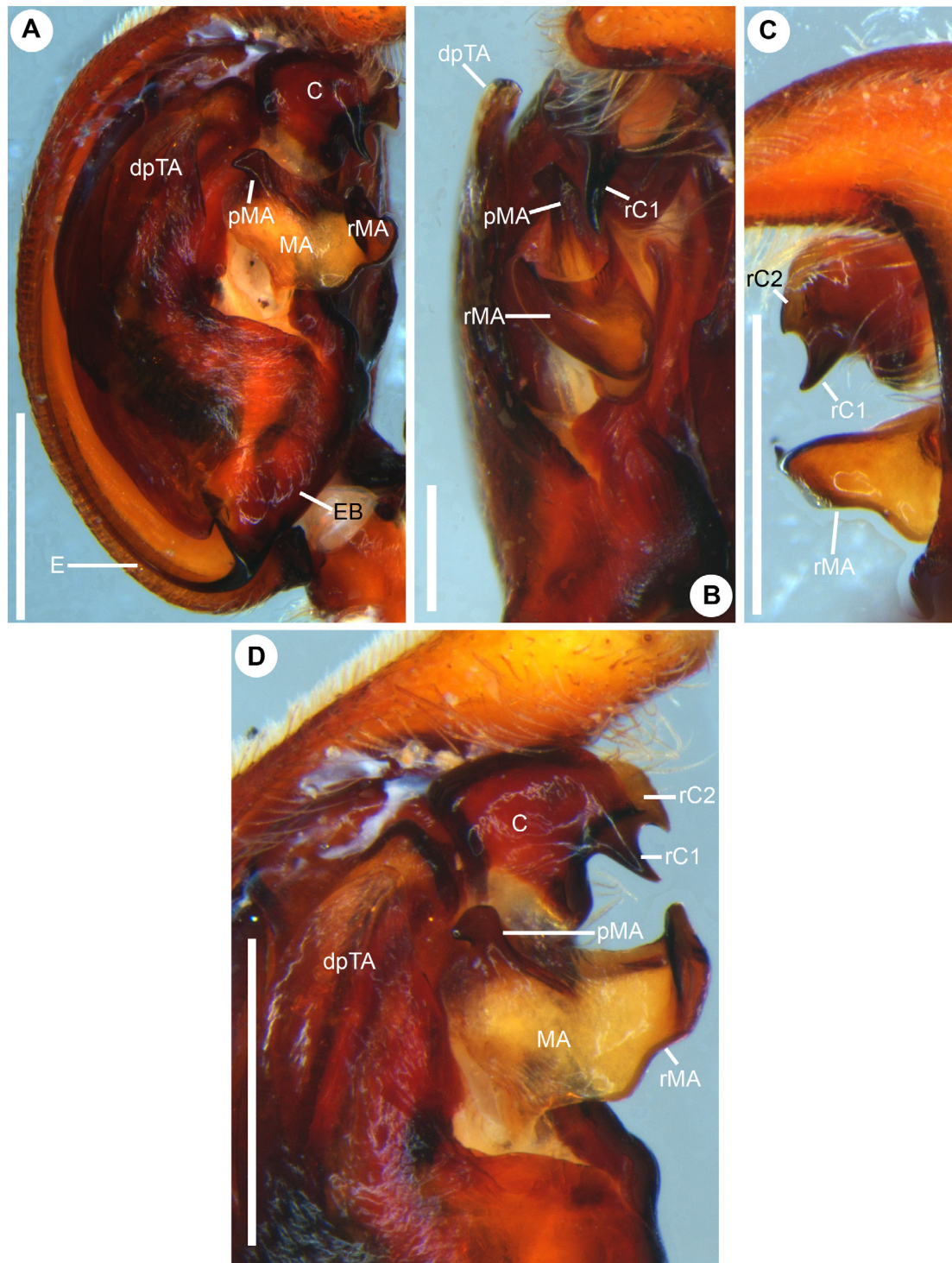


Fig. 5. *Laminion birenifer* (Gravely, 1921) gen. et comb. nov., ♂, syntype of *Storena birenifer* Gravely, 1921 (NZC-ZSI-2914/H2), details of left pedipalp. **A.** Bulb, prolatero-ventral view. **B–D.** Details of conductor, median apophysis and disto-prolateral tegular apophysis. **B.** Ventro-retrolateral view. **C.** Oblique ventral view. **D.** Prolateral view. Abbreviations: C = conductor; dpTA = disto-prolateral tegular apophysis; E = embolus; EB = embolic base; MA = median apophysis; pMA = prolateral branch of median apophysis; rC1 = first retrolateral branch of conductor; rC2 = second retrolateral branch of conductor; rMA = retrolateral branch of median apophysis. Scale bars: A, C = 0.5 mm; B, D = 0.2 mm.

Colour in alcohol: carapace, eye region, clypeus, chilum, chelicerae, fangs, endites, labium, sternum dark reddish-brown; leg and pedipalp segments yellowish-brown; opisthosoma black; dorsum with paired anterior reniform, paired medio-lateral and a posterior transversely oriented diamond-shaped pale blotches, laterally with obliquely oriented posterior pale stripes, venter with paired broad lateral and a narrow median pale blotches. Chelicerae without teeth or denticles. Chilum unipartite, inverted triangular. Sternum posteriorly bluntly pointed, with prominent coxal and intercoxal extensions (Fig. 2C). Body length 6.65. Carapace length 3.54, width 2.75. Opisthosoma length 3.11, width 2.21. Eye diameters: ALE 0.14. AME 0.16. PLE 0.15. PME 0.12. Eye interdistances: ALE–AME 0.18. ALE–PLE 0.06. AME–AME 0.08. AME–PME 0.13. PME–PLE 0.36. PME–PME 0.12. Chelicerae length 1.00. Clypeus height at ALEs 0.71, at AMEs 0.88. Measurements of pedipalp and legs. Pedipalp 3.37 [1.22, 0.34, 0.31, 1.50], I 9.17 [2.46, 1.06, 1.92, 2.06, 1.67], II 7.82 [2.22, 1.05, 1.66, 1.66, 1.23], III 8.38 [2.14, 1.07, 1.54, 2.21, 1.42], IV 11.30 [2.81, 1.09, 2.34, 3.19, 1.87]. Leg formula: 4132. Pedipalp as in Figs 3A–C, 4A–I, 5A–D.

Measurements of cotype male: body length 6.56. Carapace length 3.38, width 2.62. Opisthosoma length 3.18, width 2.34.

Female (syntype (2914/H2); Figs 1B, E–F, 2B, D, F)

Like male except the following: sternum with less developed intercoxal extensions (Fig. 2D). Body length 6.75. Carapace length 3.25, width 2.22. Opisthosoma length 3.50, width 2.56. Eye diameters: ALE 0.13. AME 0.15. PLE 0.13. PME 0.11. Eye interdistances: ALE–AME 0.25. ALE–PLE 0.06. AME–AME 0.07. AME–PME 0.10. PME–PLE 0.38. PME–PME 0.11. Chelicerae length 1.05. Clypeus height at ALEs 0.77, at AMEs 0.98. Measurements of palp and legs. Palp 2.64 [0.99, 0.40, 0.46, 0.79], I 6.64 [1.92, 0.86, 1.39, 1.22, 1.25], II 5.73 [1.60, 0.86, 1.22, 1.18, 0.87], III 6.03 [1.63, 0.67, 1.16, 1.64, 0.93], IV (right) 8.27 [2.03, 0.88, 1.79, 2.13, 1.44]. Leg formula: 4132. Epigynum as in Fig. 3D.

Justification of the synonymy

The species *S. tikaderi* was described on the basis of male and female specimens collected in Andhra Pradesh (Patel & Reddy 1989). Although we did not examine the types of this species, the habitus and the female genitalia illustrated for this species show similarities with that of *L. birenifer* gen. et comb. nov., including paired, reniform markings on anterior opisthosoma and the shape of median and lateral plates of epigynum (compare Figs 1B, 3D with Patel & Reddy 1989: fig. 2a, c). Moreover, the type localities of both species are only about 320 km apart along the eastern Coast, which reflects a wide distributional range of *L. birenifer* gen. et comb. nov. Based on these observations, we propose to consider *S. tikaderi* as a junior synonym of *L. birenifer* gen. et comb. nov.

Remarks

The ZSI collection has two glass tubes for *S. birenifer*. First tube labeled as “Types” (2914/H2) contains one male and one female specimens in good condition, with intact genitalia. Second tube labeled as “cotype” (2915/H2) contains one male specimen in good condition. We were unable to trace out the types of *S. tikaderi* in the arachnid collection of ZSI, even though the authors mentioned that the types would be deposited here (Patel & Reddy 1989).

***Laminion arakuensis* (Patel & Reddy, 1989) gen. et comb. nov.**

Fig. 9

Storena arakuensis Patel & Reddy, 1989: 223, fig. 1a–h.

Type material

Holotype (not examined)

INDIA • ♀; Andhra Pradesh, Visakhapatnam, Araku Valley; 18°19'38.45" N, 82°52'39.08" E; 919 m a.s.l.; 28 Sep. 1985; T.S. Reddy leg.; NZC-ZSI, Kolkata (no register number specified). (The original illustrations of habitus and genitalia were used for comparison.)

Paratypes (not examined)

INDIA • 2 ♀♀; same collection data as for holotype; NZC-ZSI, Kolkata (no register number specified).

Allotypes (not examined)

INDIA • 3 ♂♂; same collection data as for holotype; NZC-ZSI, Kolkata (no register number specified).

Male

Unknown.

Justification of the transfer

Patel & Reddy (1989) described this species on the basis of male and female specimens collected in Andhra Pradesh. Although we did not examine the types of this species, the female genitalia illustrated for this species clearly show the presence of sclerotised lateral and median epigynal plates (Patel & Reddy 1989: fig. 1c), which allows the inclusion of this species in *Laminion* gen. nov.

Remarks

We were unable to trace out the types of *S. arakuensis* in the arachnid collection of ZSI, even though the authors mentioned that the types would be deposited here (Patel & Reddy 1989).

Laminion debasrae (Biswas & Biswas, 1992) gen. et comb. nov.

Figs 6, 9

Storena debasrae Biswas & Biswas, 1992: 381, figs 11–13.

Type material

Holotype

INDIA • ♀; West Bengal, North 24 Parganas, Palta, Santi Nagar; 22°46'58.00" N, 88°22'50.96" E; 12 m a.s.l.; 25 Dec. 1986; Bijan Biswas leg.; NZC-ZSI, Kolkata (5411/18).

Supplementary description

Female (holotype (5411/18); Fig. 6A)

Colour in alcohol: carapace, eye region, clypeus, chelicerae, fangs, chilum, sternum, endites, labium, leg and palp segments dark reddish-brown; dorsal opisthosoma black, with paired medio-lateral and posterior creamy-white blotches; lateral opisthosoma pale black, with obliquely oriented posterior creamy-white stripes. Lateral eyes nearly contiguous. Cheliceral promargin with two denticles. Chilum unipartite, inverted triangular. Sternum posteriorly bluntly pointed, with coxal and intercoxal extensions. Body length 6.73. Carapace length 2.88, width 2.00. Opisthosoma length 3.85, width 2.69. Eye diameters: ALE 0.14. AME 0.16. PLE 0.14. PME 0.12. Eye interdistances: ALE–AME 0.21. AME–AME 0.08. AME–PME 0.13. PME–PLE 0.37. PME–PME 0.10. Chelicerae length 1.06. Clypeus height at ALEs 0.59, at AMEs 0.82. Measurements of palp and legs. Palp (right) 2.60 [0.84, 0.53, 0.54, 0.69], I (right) 7.06 [1.86, 0.94, 1.66, 1.31, 1.29], II ---, III 6.19 [1.75, 0.76, 1.23, 1.65, 0.80], IV 6.46 [1.90, 0.82, 1.32, 1.52, 0.90]. Leg formula: ----. Genitalia as in Fig. 6B–C.

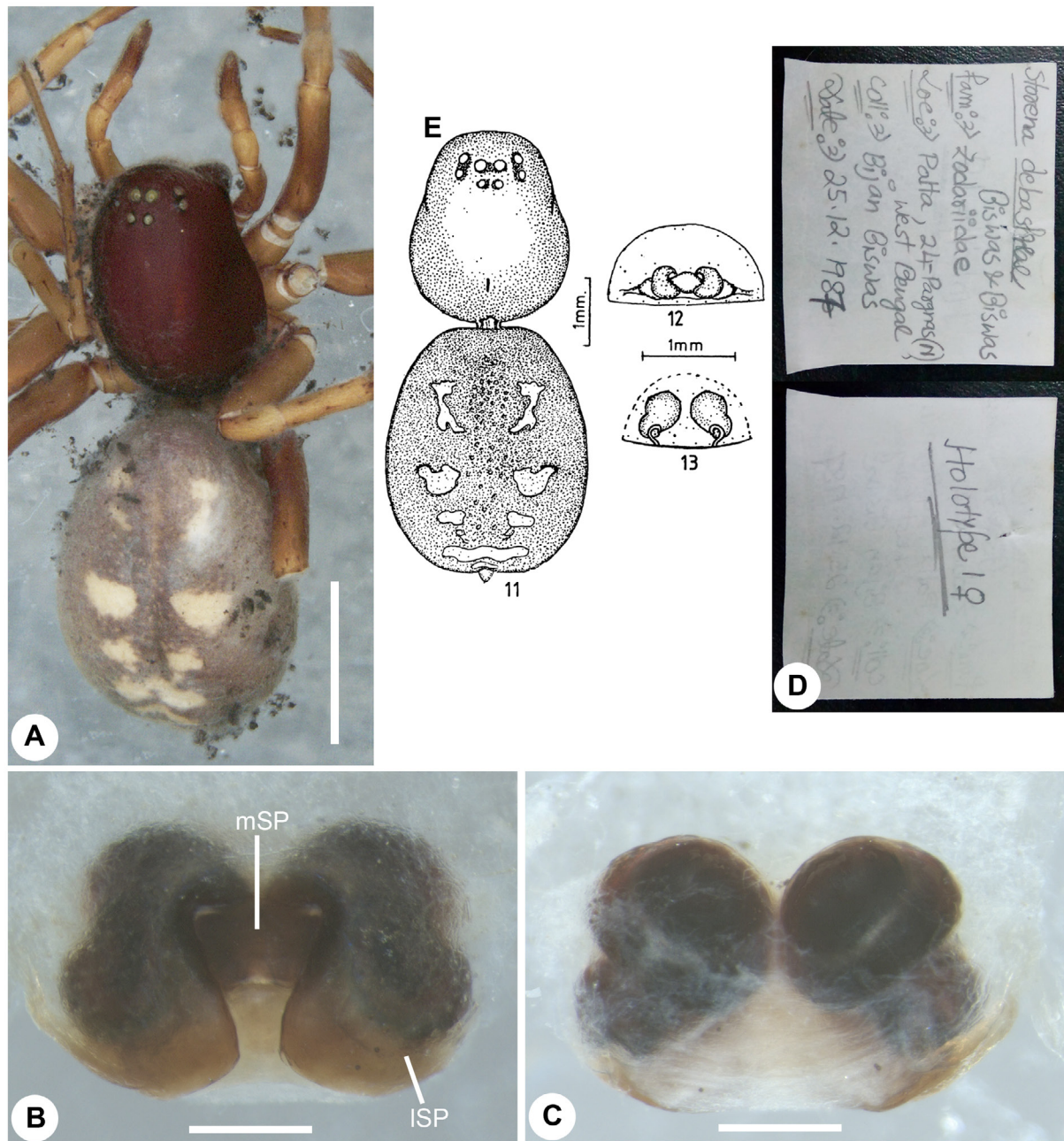


Fig. 6. *Laminion debasrae* (Biswas & Biswas, 1992) gen. et comb. nov., ♀, holotype of *Storena debasrae* Biswas & Biswas, 1992 (NZC-ZSI-5411/18). **A.** Female habitus, dorso-lateral view. **B.** Epigynum of the same, ventral view. **C.** Vulva of the same, dorsal view. **D.** Type label. **E.** Original illustrations of *S. debasrae* adapted from Biswas & Biswas (1992). Abbreviations: ISP = lateral sclerotised plate; mSP = median sclerotised plate. Scale bars: A = 2 mm; B–C = 0.2 mm.

Male

Unknown.

Remarks

The ZSI collection has one glass tube for this species, which is labeled as “holotype” (no register number) containing one female specimen in fairly good condition, with broken legs and chelicerae and almost detached opisthosoma. The same tube has a small glass vial containing the dissected genitalia. The label mentions the year of collection as “1987”.

Laminion gujaratensis (Tikader & Patel, 1975) gen. et comb. nov.

Figs 7–9

Storena gujaratensis Tikader & Patel, 1975: 138, figs 7–11.

Storena gujaratensis – Patel & Reddy 1989: 223.

Suffasia gujaratensis – Solanki *et al.* 2018: 12131, figs 1–5.

Type material

Holotype

INDIA • ♂; Gujarat, Kheda (= Kaira), Napad; 22°28'47.6" N, 72°58'36.1" E; 43 m a.s.l.; 23 Jul. 1972; B.H. Patel leg.; NZC-ZSI, Kolkata (no register number specified).

Supplementary description

Male (holotype; Fig. 7A–C)

Colour in alcohol: carapace, eye region, clypeus, chelicerae, chilum, sternum orange-brown; fangs brownish; endites, labium, venter opisthosoma straw coloured; leg and pedipalp segments straw coloured with brownish shades; scutum on dorsal opisthosoma brownish, with three pairs of irregular creamy blotches; lateral opisthosoma with dark striations. Fovea vertical, dark. Lateral eyes nearly contiguous. Cheliceral promargin with paired denticles. Chilum unipartite, inverted triangular. Sternum posteriorly bluntly pointed, with coxal and intercoxal extensions. Body length 6.51. Carapace length 3.69, width 2.76. Opisthosoma length 2.82, width 2.09. Eye diameters: ALE 0.13. AME 0.18. PLE 0.12. PME 0.10. Eye interdistances: ALE–AME 0.14. AME–AME 0.04. AME–PME 0.11. PME–PLE 0.32. PME–PME 0.11. Chelicerae length 1.06. Clypeus height at ALEs 0.57, at AMEs 0.72. Chilum length 0.16, width 0.32. Measurements of pedipalp and legs. Pedipalp 3.26 [1.14, 0.34, 0.25, 1.53], I 7.78 [2.11, 0.85, 1.87, 1.54, 1.41], II (right) 7.09 [1.95, 0.91, 1.54, 1.54, 1.15], III (right) 7.33 [1.96, 0.98, 1.48, 1.86, 1.05], IV 8.65 [2.65, 0.73, 2.31, 1.94, 1.02]. Leg formula: 4132. Pedipalp as in Fig. 8A–G.

Female

Unknown.

Justification of the transfer

Solanki *et al.* (2018) recently transferred *S. gujaratensis* to *Suffasia* based on one fresh male specimen collected in Gujarat. The examination of the type material of *S. gujaratensis* revealed that their transfer is wrong and this species in fact belongs to *Laminion* gen. nov. as it possesses a dorsal apophysis on patella, a huge prominent cymbial retrolateral flange, cymbial retro-basal processes, long, filiform embolus, lateral extensions of median apophysis and retrolateral processes of conductor (Fig. 8B, D–G). Thus its transfer to *Laminion* gen. nov. is confirmed.

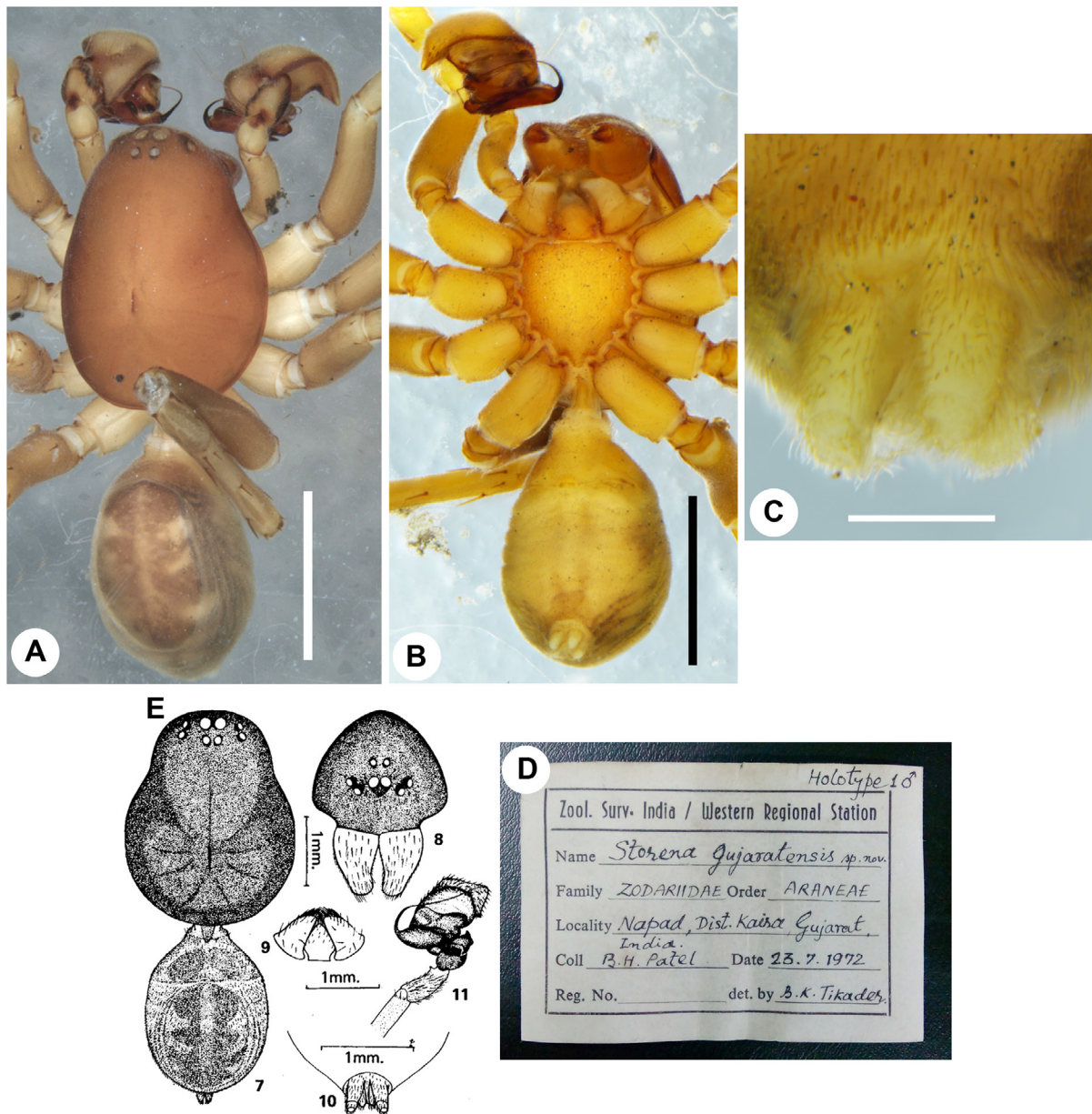


Fig. 7. *Laminion gujaratensis* (Tikader & Patel, 1975) gen. et comb. nov., ♂, holotype of *Storena gujaratensis* Tikader & Patel, 1975. **A.** Male habitus, dorsal view. **B.** Same, ventral view. **C.** Spinnerets showing PVS, ventral view. **D.** Type label. **E.** Original illustrations of *S. gujaratensis* adapted from Tikader & Patel (1975). Scale bars: A–B = 2 mm; C = 0.1 mm.

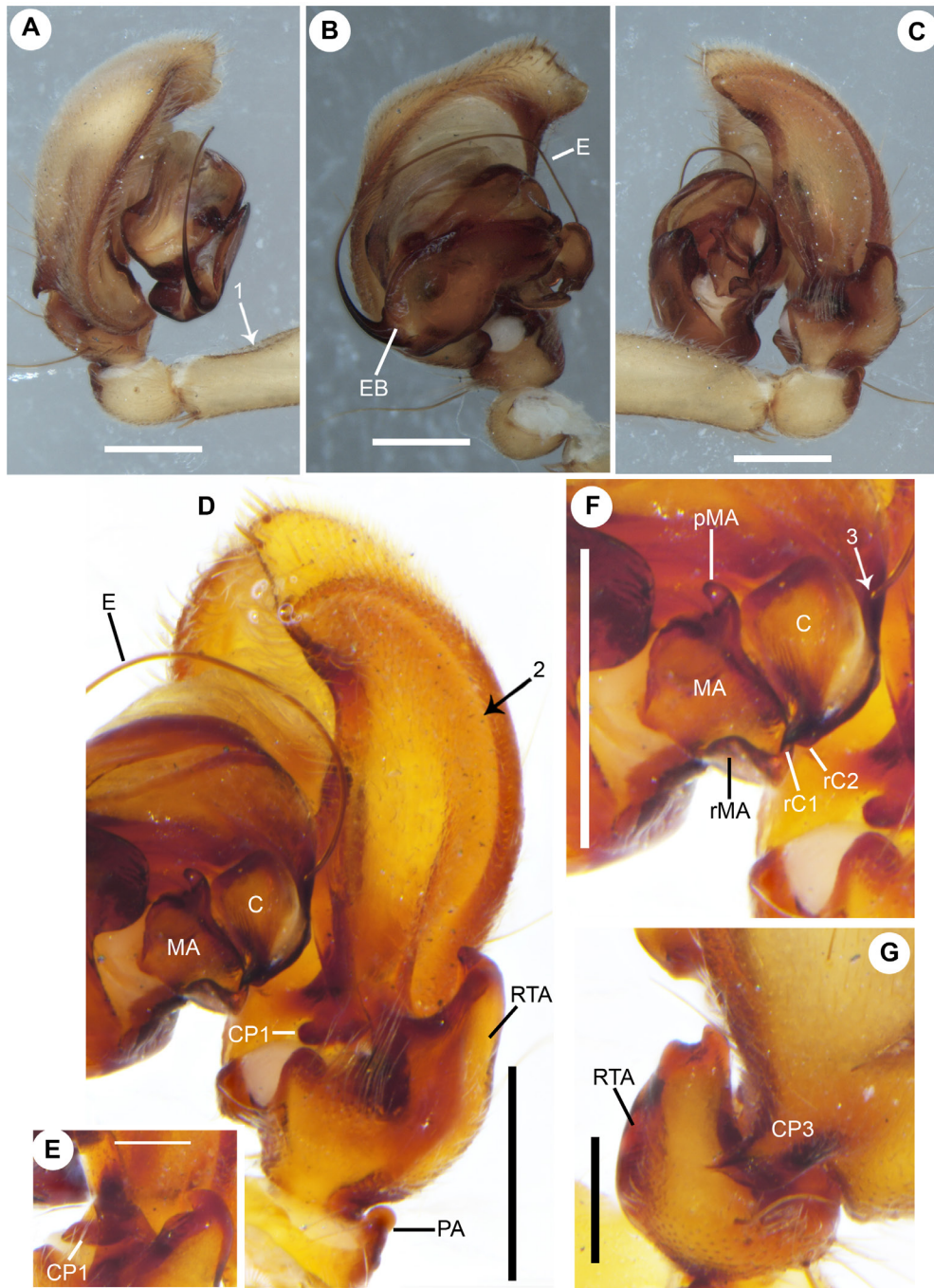


Fig. 8. *Laminion gujaratensis* (Tikader & Patel, 1975) gen. et comb. nov., ♂, holotype of *Storena gujaratensis* Tikader & Patel, 1975. **A.** Left pedipalp, prolateral view; arrow 1 indicates femoral distoventral depression. **B.** Same, ventral view. **C–D.** Same, retrolateral view; arrow 2 indicates cymbial retrolateral flange. **E.** First cymbial process, dorso-retrolateral view. **F.** Median apophysis and conductor, retrolateral view; arrow 3 indicates embolic tip. **G.** Retrolateral tibial apophysis and third cymbial process, dorsal view. Abbreviations: C = conductor; CP1 = first cymbial process; CP3 = third cymbial process; E = embolus; EB = embolic base; MA = median apophysis; PA = patellar apophysis; pMA = prolateral branch of median apophysis; rC1 = first retrolateral branch of conductor; rC2 = second retrolateral branch of conductor; rMA = retrolateral branch of median apophysis; RTA = retrolateral tibial apophysis. Scale bars: A–C = 0.5 mm; D–G = 0.2 mm.

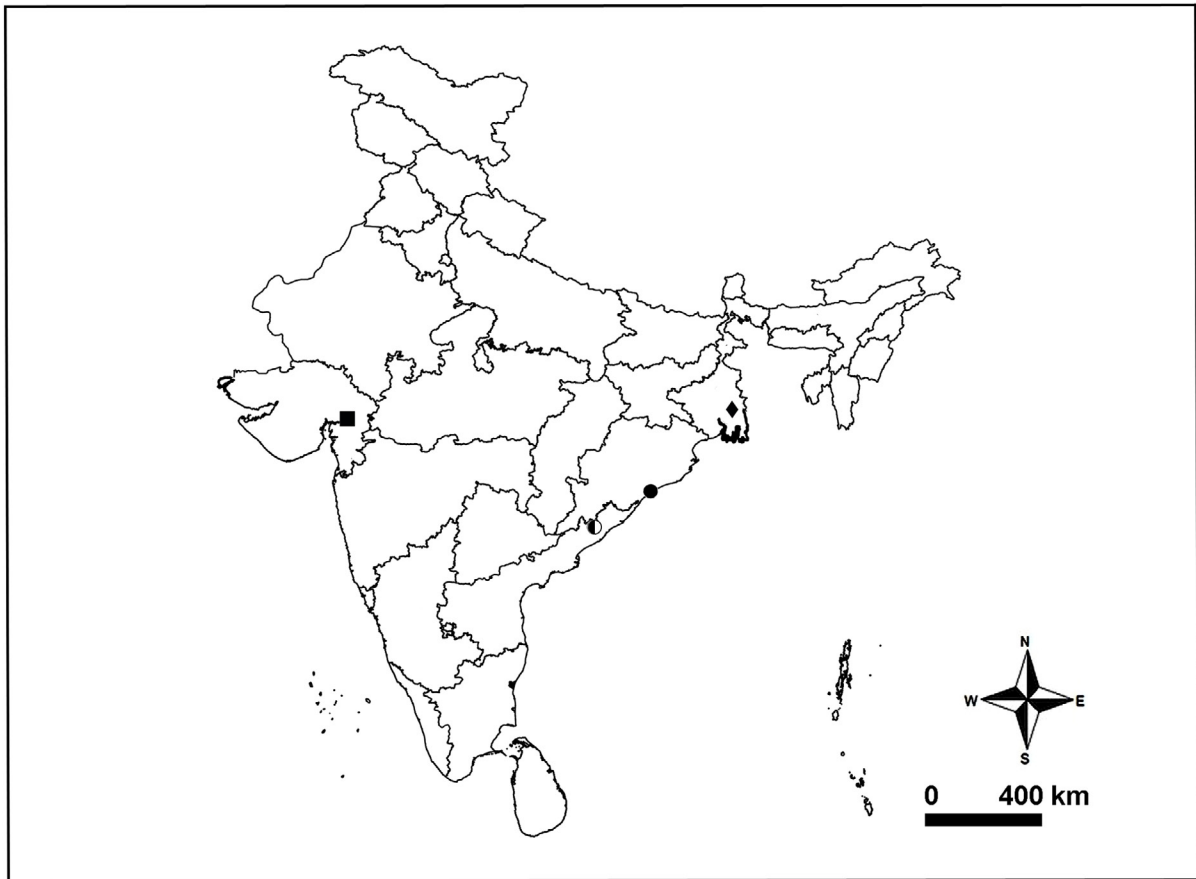


Fig. 9. Currently known distributional records of *Laminion* gen. nov. ○ *Laminion arakuensis* (Patel & Reddy, 1989) gen. et comb. nov. ● *Laminion birenifer* (Gravely, 1921) gen. et comb. nov. ◆ *Laminion debasrae* (Biswas & Biswas, 1992) gen. et comb. nov. ■ *Laminion gujaratensis* (Tikader & Patel, 1975) gen. et comb. nov.

Remarks

The ZSI collection has one glass tube for this species, which is labeled as “holotype” (no register number) containing one male specimen in good condition. Its left pedipalp found removed and kept in the same tube.

Genus *Mallinella* Strand, 1906

Mallinella dibangensis (Biswas & Biswas, 2006) comb. nov.

Storena dibangensis Biswas & Biswas, 2006: 494, figs 1–3.

Type material

Holotype (not examined)

INDIA • ♀; Arunachal Pradesh, Dibang Valley, 3 km from Mayodia; 28°13'59.7" N, 95°54'26.8" E; 2441 m a.s.l.; 16 Sep. 1991; T.K. Pal and Party leg.; NZC-ZSI, Kolkata (5535/18). (The original illustrations of vulva are diagnostic and were used for comparison.)

Male

Unknown.

Justification of the transfer

This species was described on the basis of one female specimen collected in Arunachal Pradesh. Although we did not examine the type of this species, the internal female genitalia illustrated for this species (Biswas & Biswas 2006: fig. 3) clearly matches with that of *Mallinella* Strand, 1906 in its general appearance. Based on this observation, we propose to transfer *S. dibangensis* to *Mallinella*. The vulva illustrated for this species suggests a possible synonymy of this species with *Mallinella redimita* (Simon, 1905); however, confirmation requires the re-examination of type or topotype materials of *M. dibangensis* comb. nov.

Remarks

We were unable to trace out the type of *S. dibangensis* in the arachnid collection of ZSI. It may either be lost or misplaced elsewhere in the collection.

Mallinella indica (Tikader & Patel, 1975) comb. nov.

Figs 10–11

Storena indica Tikader & Patel, 1975: 137, figs 1–6.

Storena indica – Patel & Reddy 1989: 223.

Type material

Holotype

INDIA • ♀; Gujarat, Panch Mahals (= Panchmahals), Pavagadh; 22°27'43.7" N, 73°31'26.6" E; 433 m a.s.l.; 10 Sep. 1972; B.H. Patel leg.; NZC-ZSI, Kolkata (no register number specified).

Paratype

INDIA • ♀; Gujarat, Kheda (= Kaira), Vallabh Vidyanagar; 22°32'48.0" N, 72°55'45.9" E; 44 m a.s.l.; 26 Jul. 1971; B.H. Patel leg.; NZC-ZSI, Kolkata (no register number specified).

Allotype

INDIA • ♂; same collection data as for paratype; NZC-ZSI, Kolkata (no register number specified).

Supplementary description

Male (allotype (5356/18); Fig. 10C)

Colour in alcohol: carapace, eye region, clypeus, chelicerae, fangs, chylum, sternum, endites, labium dark reddish-brown; leg and palp segments pale yellowish; dorsal opisthosoma black, with paired medio-lateral creamy-white blotches. Body length 6.54. Carapace length 3.45, width 2.47. Opisthosoma length 3.09, width 2.20. Eye diameters: ALE 0.19. AME 0.21. PLE 0.20. PME 0.18. Eye interdistances: ALE–AME 0.11. ALE–PLE 0.03. AME–AME 0.13. AME–PME 0.15. PME–PLE 0.25. PME–PME 0.15. Chelicerae length 1.14. Clypeus height at ALEs 0.71, at AMEs 0.92. Measurements of pedipalp and legs. Pedipalp 4.41 [1.49, 0.55, 0.36, 2.01], I (right) 11.25 [2.83, 1.21, 2.25, 2.91, 2.05], II 10.17 [2.66, 1.02, 2.12, 2.53, 1.84], III 9.74 [2.48, 1.03, 1.84, 2.73, 1.66], IV 12.60 [2.95, 0.90, 2.59, 3.98, 2.18]. Leg formula: 4123. Pedipalp as in Fig. 11C–E.

Female (holotype (5354/18); Fig. 10A)

Like male except the following: body length 7.69. Carapace length 3.63, width 2.37. Opisthosoma length 4.06, width 3.22. Eye diameters: ALE 0.19. AME 0.20. PLE 0.19. PME 0.17. Eye interdistances:

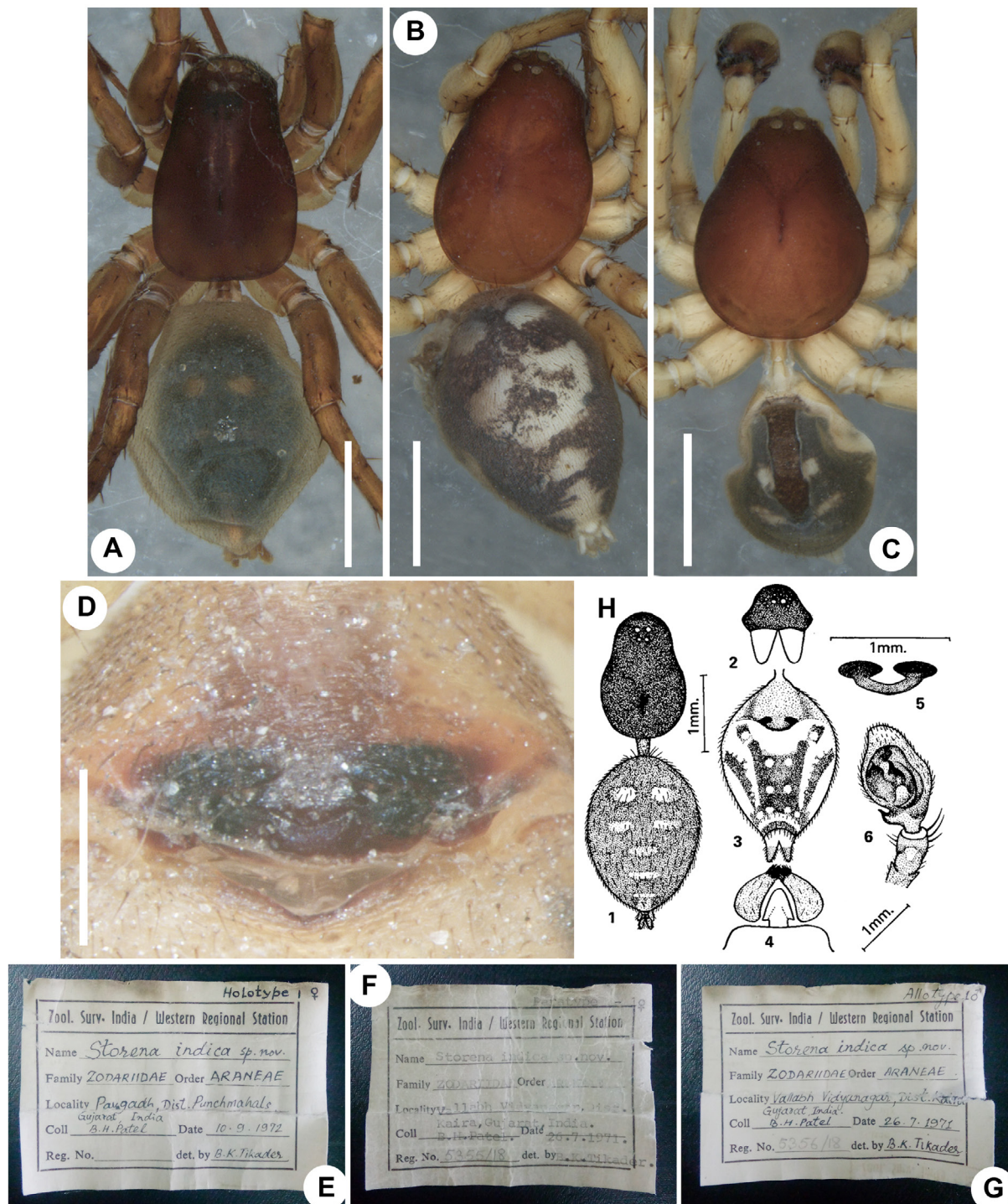


Fig. 10. *Mallinella indica* (Tikader & Patel, 1975) comb. nov., ♂♀, holotype, paratype and allotype of *Storena indica* Tikader & Patel, 1975. **A, D, E.** Holotype, ♀ (NZC-ZSI-5354/18). **A.** Habitus, dorsal view. **D.** Epigynum, ventral view. **E.** Type label. **B, F.** Paratype, ♀ (NZC-ZSI-5355/18). **B.** Habitus, dorsal view. **F.** Type label. **C, G.** Allotype, ♂ (NZC-ZSI-5356/18). **C.** Habitus, dorsal view. **G.** Type label. **H.** Original illustrations of *S. indica* adapted from Tikader & Patel (1975). Scale bars: A–C = 2 mm; D = 0.5 mm.

ALE–AME 0.12. ALE–PLE 0.06. AME–AME 0.19. AME–PME 0.19. PME–PLE 0.35. PME–PME 0.17. Chelicerae length 1.35. Clypeus height at ALEs 0.80, at AMEs 1.02. Measurements of palp and legs. Palp 3.44 [1.20, 0.61, 0.64, 0.99], I 9.63 [2.41, 0.99, 2.00, 2.34, 1.89], II 9.07 [2.40, 1.02, 1.87, 2.33, 1.45], III (right) 9.60 [2.42, 1.08, 1.80, 2.67, 1.63], IV (right) 11.85 [2.88, 0.97, 2.35, 3.99, 1.66]. Leg formula: 4132. Epigynum as in Fig. 10D.

Measurements of paratype female (Fig. 10B): body length 7.95. Carapace length 4.17, width 2.60. Opisthosoma length 3.78, width 2.80. Genitalia as in Fig. 11A–B.

Justification of the transfer

Tikader & Patel (1975) described this species on the basis of male and female specimens collected in Gujarat. Detailed study of the types of this species indicates that it has diagnostic features of *Mallinella*

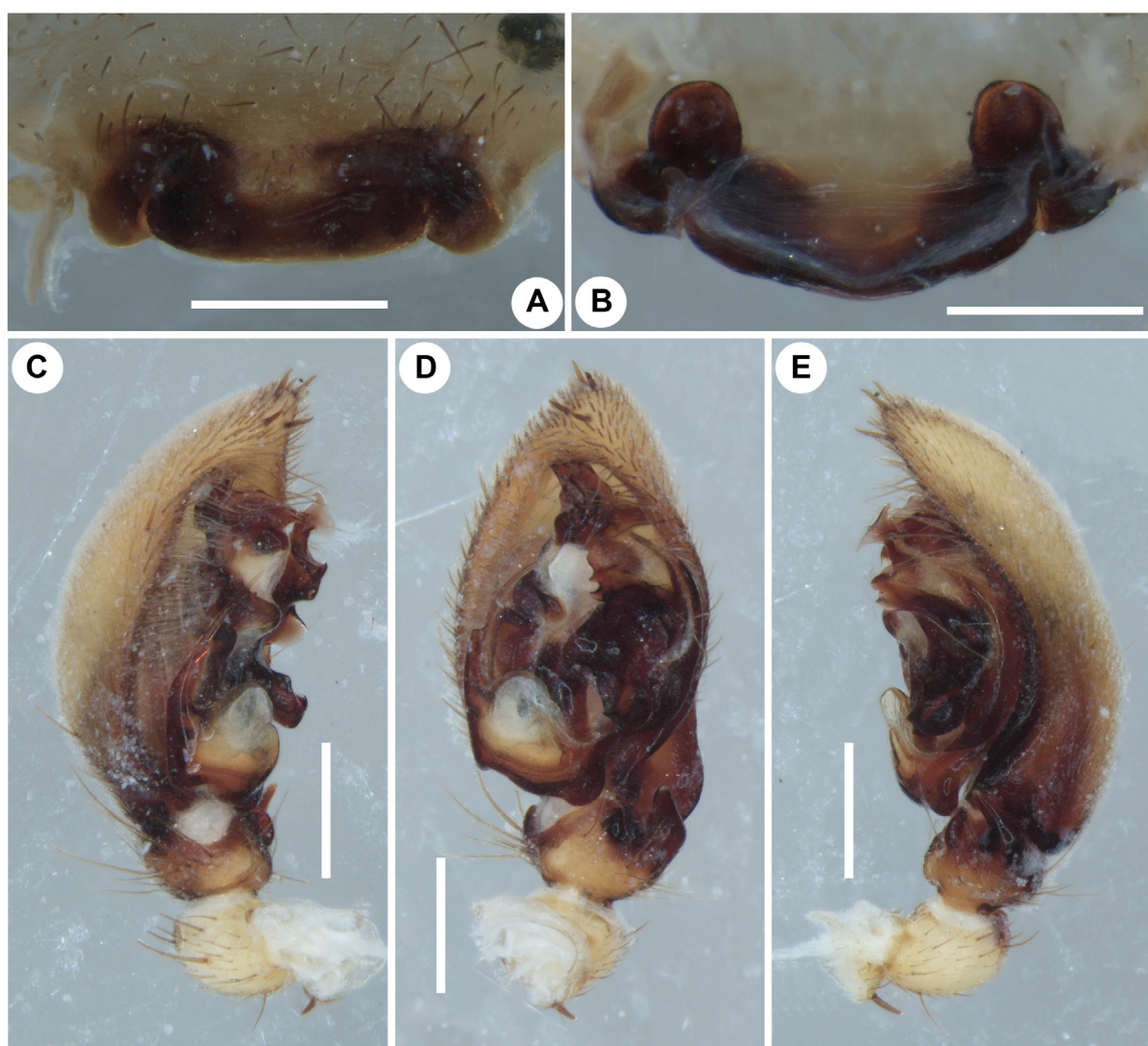


Fig. 11. *Mallinella indica* (Tikader & Patel, 1975) comb. nov., ♂♀, paratype and allotype of *Storena indica* Tikader & Patel, 1975. **A–B.** Genitalia of paratype, ♀ (NZC-ZSI-5355/18). **A.** Epigynum, ventral view. **B.** Vulva, dorsal view. **C–E.** Left pedipalp of allotype, ♂ (NZC-ZSI-5356/18). **C.** Prolateral view. **D.** Ventral view. **E.** Retrolateral view. Scale bars: A–B = 0.2 mm; C–E = 0.5 mm.

as illustrated in Dankittipakul *et al.* (2012). Based on this observation, we propose to transfer *S. indica* to *Mallinella*.

Remarks

The ZSI collection has three glass tubes for this species. First tube labeled as “holotype” (5354/18) contains one female specimen in good condition, with intact genitalia. Second tube labeled as “paratype” (5355/18) contains one female specimen in good condition, with detached opisthosoma. Third tube labeled as “allotype” (5356/18) contains one male specimen in good condition. The same tube contains another label mentioning that the collecting locality of holotype, paratype and allotype as Pavagadh with register number 5354/18.

Genus *Storenomorpha* Simon, 1884

Storenomorpha joyaus (Tikader, 1970)

Fig. 12

Homalonychus joyaus Tikader, 1970: 6, figs 2a–c.

Genus (?) *joyaus* – Roth 1984: 3. — Brignoli 1976: 211.

Storenomorpha joyaus – Jocqué & Bosmans 1989: 129, figs 10–12. — Sen *et al.* 2015: 93, pl. xx, figs 536–540. — Dhali *et al.* 2017: 89, pl. xxvi, figs 480–484.

Type material

Holotype

INDIA • subadult ♀; West Sikkim, Bank of Great Rangeet (= Rangit) River; 20 Sep. 1959; B.K. Tikader leg.; NZC-ZSI, Kolkata (no register number specified).

Paratypes

INDIA • 4 subadult ♀♀; same collection data as for holotype; NZC-ZSI, Kolkata (no register number specified).

Allotype

INDIA • subadult ♂; same collection data as for holotype; NZC-ZSI, Kolkata (no register number specified).

Note

We examined the holotype, paratypes and allotype of *S. joyaus* (Fig. 12A–E) and found that these were all subadults, thereby, the morphology of its female genitalia remains yet unknown. Jocqué & Bosmans (1989) described the male of this species based on non-type material deposited in BMNH, London, that were collected in Sikkim. Without referring this, Sen *et al.* (2015) claimed that they had provided the first description of the male of *S. joyaus*. It is surprising that, even though they had two female specimens at hand, they never attempted to illustrate its genitalia, instead illustrated the male genitalia that was already well illustrated (Jocqué & Bosmans 1989: figs 11–12).

Remarks

The ZSI collection has three glass tubes for this species. First tube labeled as “holotype” (no register number) contains one subadult female specimen in good condition, with intact genitalia. Second tube labeled as “paratype” (3232/18) contains four subadult female and one juvenile specimens in good condition. Third tube labeled as “allotype” (3231/18) contains one subadult male specimen in good condition.

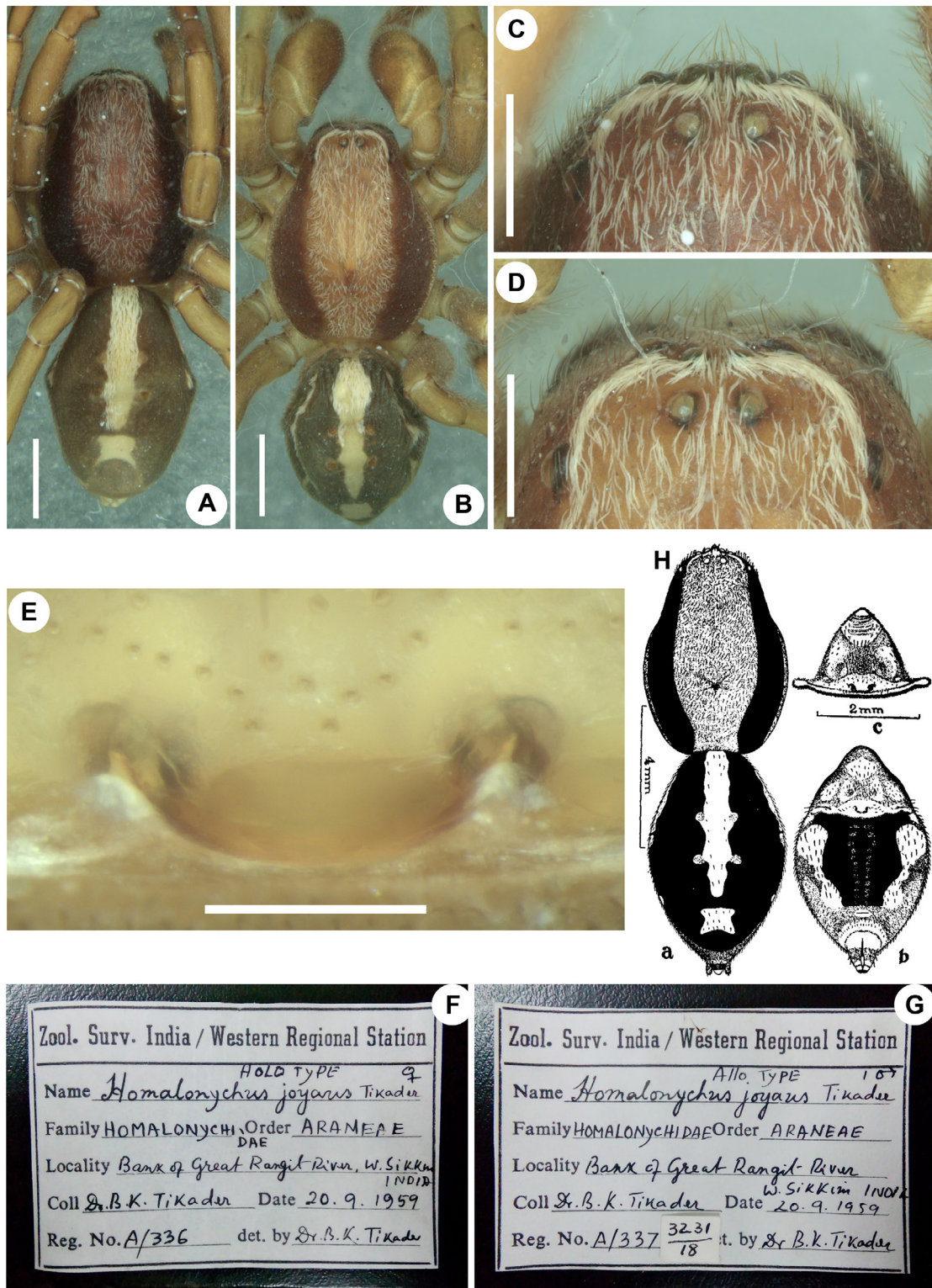


Fig. 12. *Storenomorpha joyaus* (Tikader, 1970), ♂♀, holotype and allotype of *Homalonychus joyaus* Tikader, 1970. A, C, E–F. Holotype, ♀ (subadult). A. Habitus, dorsal view. C. Eye group, dorsal view. E. Pre-epigynum, ventral view. F. Type label. B, D, G. Allotype, ♂ (subadult) (NZC-ZSI-3231/18). B. Habitus, dorsal view. D. Eye group, dorsal view. G. Type label. H. Original illustrations of *H. joyaus* adapted from Tikader (1970). Scale bars: A–B = 2 mm; C–D = 0.5 mm; E = 0.2 mm.

Discussion

The zodariid spiders in India are currently represented by 11 genera and 31 species (Caleb & Sankaran 2020). Like many other poorly represented spider families known in India, the zodariid spiders are also poorly known compared to the intensely studied fauna of Southeast Asia (e.g., see Dankittipakul *et al.* 2012). Species described from India are mostly based on descriptions that are poor and insufficient, which make their proper identification often impossible. Most often, the majority of these species are misplaced and misidentified (e.g., see Sankaran *et al.* 2019). All these demand revisions of known Indian zodariid species in order to facilitate their identification and help to aptly classify unknown/undescribed taxa. In the present work, we transferred all Indian species of *Storena* into the right genera including a new genus, as *Storena* occurs only in Australia. It not only resolves the taxonomic dilemma (in part) existing in Indian Zodariidae, but the description of the new genus highlights the need for extensive surveys to get a clear picture of the actual diversity of this group in the country.

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