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New synonymy and redescription of two species from the Pseudoscorpion genus *Olpium* L. Koch, 1873 (Arachnida, Pseudoscorpiones, Olpiidae) in India

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ABSTRACT: *Olpium digitum* Murthy and Ananthakrishnan, 1977 is redescribed with first description of the female and updating its distribution in India. A new subjective synonymy is being proposed; *Olpium tibium* Sivaraman, 1980=*O. digitum,* Murthy and Ananthakrishnan, 1977. Supplementary description for *O. gladiatum* Murthy and Ananthakrishnan, 1977 is reported.

KEY WORDS: Morphology, redescription, variation, Western Ghats, distribution

INTRODUCTION

The genus *Olpium* L. Koch, 1873 has a total of 12 species identified till date in India and includes *Olpium jacobsoni* (Tullgren 1908), *O. lindbergi* (Beier,1952, 1959), *O. indicum* (Beier, 1967), *O. asiaticum*, *O. crypticum*, *O. digitum*, *O. gladiatum*, *O. graminum*, *O. granulatum*, *O. robustum*, *O. tropicum* (Murthy and Ananthakrishnan, 1977) and *O. tibium* (Sivaraman, 1980). Though the genus is numerically rich, species from India are known only from original descriptions, which lack detailed descriptions and illustrations. The type specimens of V.A. Murthy collections (VAM colls.) and Dr. S. Sivaraman which are deposited in the museum of Department of Zoology, Loyola College, Chennai are missing and were confirmed with personal observation and communication with Dr. Sivaraman and Dr. D. Sudarsanam. Thus, the revision of topotypes will end the ambiguity in the identity of the species. In the present paper, a proposal to synonymise *O. tibium* with *O. digitum* and a supplementary description of *O. gladiatum* is presented.

MATERIALS AND METHODS

Specimens were preserved in ethanol (70%) and studied under Leica M205C (Kerala) and Nikon SMZ25 (NHMW) stereomicroscopes, as well as Leica DM2000 (Kerala) and Nikon ECLIPSE Ni (NHMW) compound microscopes. Drawings were made by the aid of a drawing tube attached to the microscope. All measurements are in millimeters. Specimens are deposited in the Division of Arachnology, Department of Zoology, Sacred Heart College, Thevara, Cochin, Kerala, India (ADSH).

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Morphological terminology and mensuration follow Chamberlin (1931), Harvey (1992) and Judson (2007).

The following trichobothrial abbreviations were used: *eb*= external basal; *esb* = external sub-basal; *ib*= internal basal; *isb* = internal sub-basal; *ist* = internal sub-terminal; *est* = external sub-terminal; *it* = internal terminal; *et* = external terminal; *t* = terminal; *st*= sub-terminal; *b* = basal; *sb*= sub-basal.

RESULTS AND DISCUSSION

Taxonomy -

Family Olpiidae Banks, 1895

Genus *Olpium* L. Koch, 1873

Diagnosis: For description and diagnosis of the genus, see Dashdamirov & Schawaller (1993)

Type species- *Obisium pallipes* Lucas, 1849, by subsequent designation of International Commission of Zoological Nomenclature, 1987: 53

Olpium digitum Murthy and Ananthakrishnan, 1977 (Figs. 13 A–B)

Olpium digitum Murthy and Ananthakrishnan, 1977: 47, Figs. 13 a–b.

Olpium tibium Sivaraman, 1980: 335, Figs. 5 a–b. NEW SYNONYMY

Type material- Holotype (♂) of *O. digitum* from INDIA: Tamil Nadu, Madras from Neem tree log. Murthy V.A, 8 January 1961, repository VAM colls, not examined (lost from the repository; personal communication with Dr. Sivaraman).

Holotype (♂) of *O. tibium* from INDIA: Tamil Nadu, Avadi from waro house leg. Sivaraman S. 15 October 1976, repository museum of the Zoology Department, Loyola College, Madras, Tamil Nadu, India, not examined (lost from the repository; personal communication with Dr. Sivaraman).

Topotype examined: INDIA, Tamil Nadu: 5 ♂♂ (ADSH PS0101) Avadi, Chennai [13°8′8½ N; 80°6′10½ E], 30m, 12 December 2018, 21 January 2019 & 03 April 2019 M.V. Aneesh leg., from bark of *Tamarindus indicus*, 2 ♂♂ (ADSH PS0102), 1 ♀ (ADSH PS0103) Nungambakkam, Chennai [13°3′54½ N; 80°14′1½ E], 10m, 11 December 2019 & 22 January 2019 M.V. Aneesh leg., from bark of Neem tree.

Diagnosis - *O. digitum* is very similar to *O. lindbergi* in having equally sized femur and patella. It can be distinguished from *O. lindbergi* by its stouter chela and lesser number of palpal teeth. *O. digitum* can be distinguished from *O. indicum* by its stouter patella and having two

Redescription

Adults (Figs. 1A–D) chitinized regions are dark brown in colour.

Carapace (Fig. 2A): 1.32–1.40 (♂), 1.38 (♀) x longer than broad; both pairs of eyes well developed and corneate, tapetum present; 22 setae in the formula 4–6–4–4–2–2.

Chelicera (Figs. 2B, G). All the five setae well developed. Fixed finger with 5 triangular teeth. Movable finger with well–developed apical tooth and two subapically divided lobes (Fig. 2G); Serrula exterior with 17 (♂), 18 (♀) blades; rallum with 3 blades, distal blade longest and widest with serrations (Fig. 2G). Galea with 2 terminals and 1 sub-terminal rami in both males and females. Galeal seta shorter than galea.

Pedipalps (Figs. 3A, B). Dark brown in colour, smooth. Trochanter without tubercle, 1.65 (♂), 1.97(♀) x longer than broad. Femur with 2 long setae on the dorsal, 3.03–3.04 (♂), 2.98 (♀) x longer than broad. Patella 2.55–2.59 (♂), 2.54 (♀) x longer than broad. Chela 3.10–3.17 (♂), 3.09 (♀) x longer than broad. Trichobothrial pattern (Fig. 3B): *eb*, *esb*, *isb* are situated in the exterior aspect. *t* is situated proximal to the middle, at a distance more than *sb* from *st*; *ib* located basally; *it* much distal to est; *ist* sub–basal in position, nearer to *ib* than to it; distance between *t* and *st* is twice the distance between *sb* and *st*; *t* is proximal to *est*; fixed finger with 27–28 (♂), 27 (♀) and movable finger with 24 -27 (♂), 26 (♀) teeth, proximal 1/3rd with flattened teeth; venom tooth well developed in both fingers; venom ducts proximal to *et* of the fixed finger.

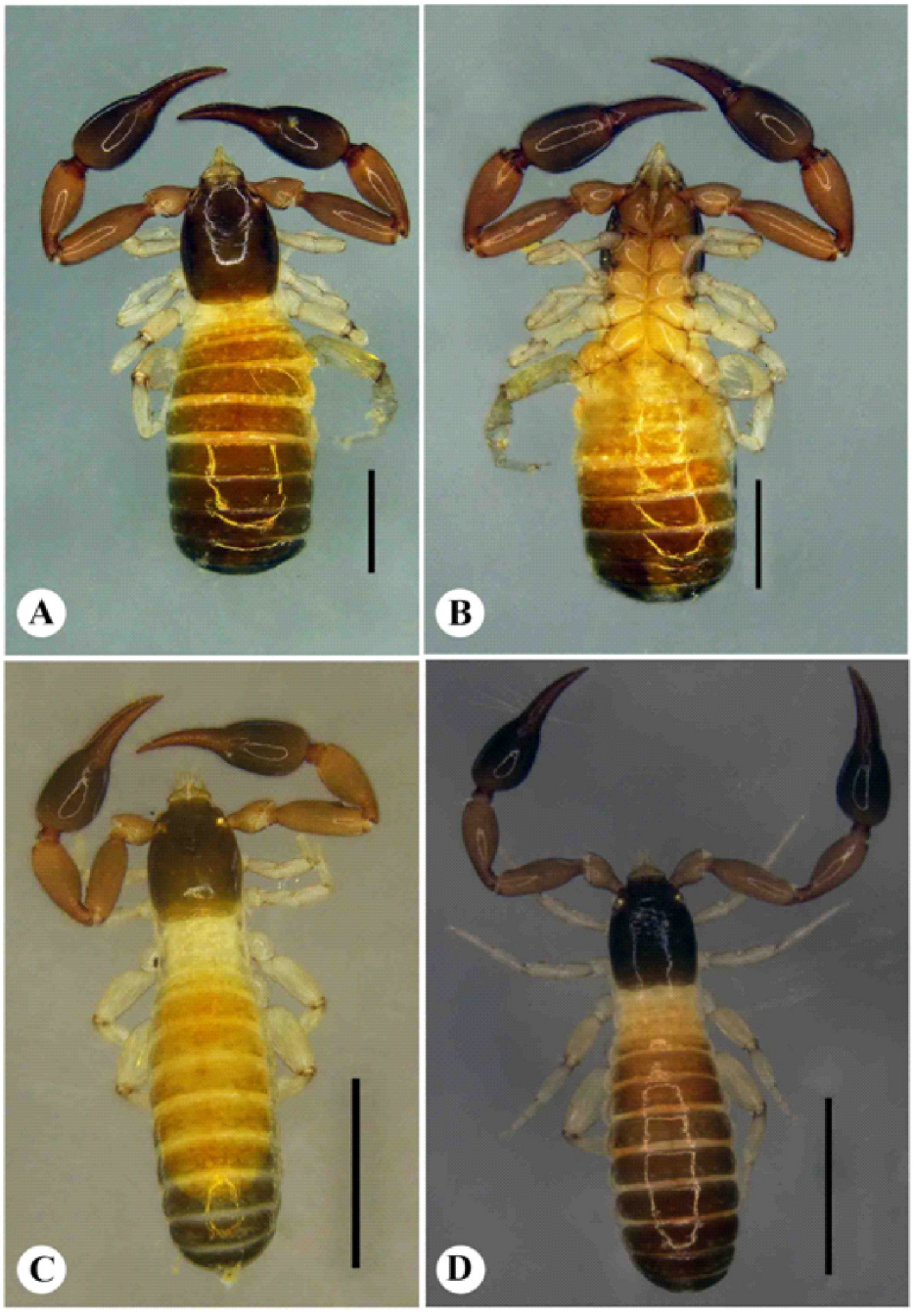

Fig. 1 *Olpium digitum*, A - male dorsal view; B - male ventral view; C - male (paratype) dorsal; D - male (paratype) dorsal. Scale bars: A–B = 0.5 mm, C–D = 1 mm

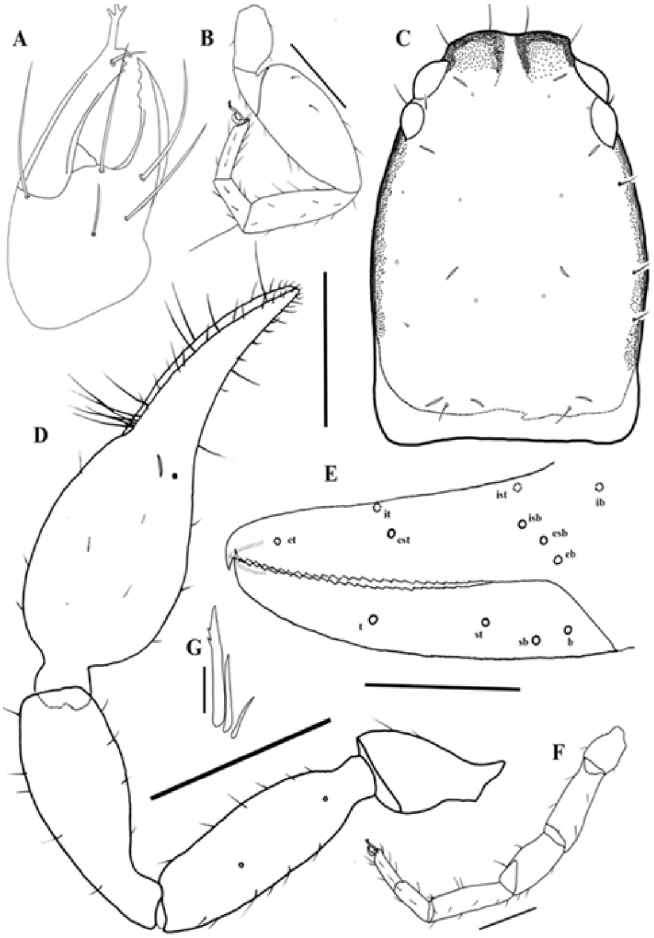

Fig. 2 *Olpium digitum*, A- chelicera; B- leg IV; C- carapace I; D- Pedipalp; E- Chela; F- Leg I; G- Rallum.
Scale bars: B–C, E, F = 0.2 mm, D = 0.5 mm, G = 0.02 mm, A = not to scale.

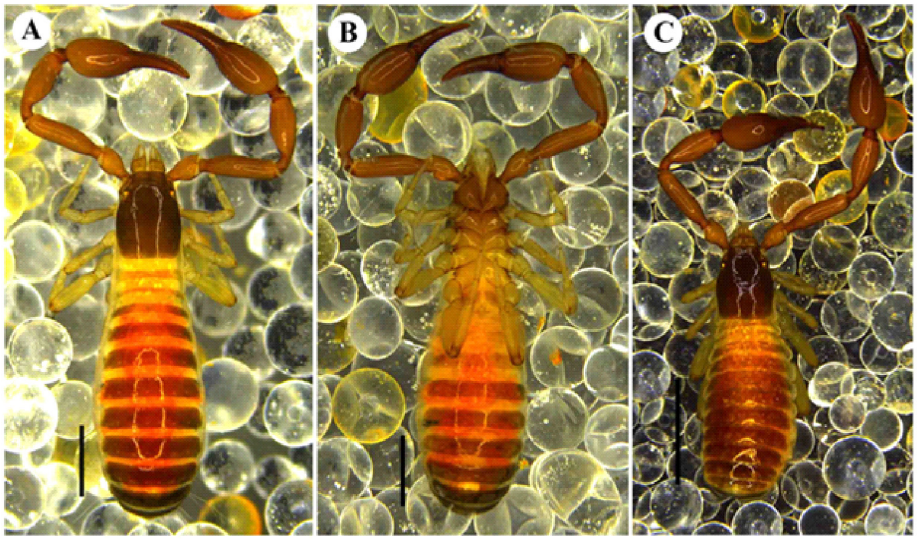

Fig. 3 *Olpium gladiatum* : A - male dorsal view; B - male ventral view; C- female dorsal view.
Scale bars: A–B = 0.5 mm, C = 1mm

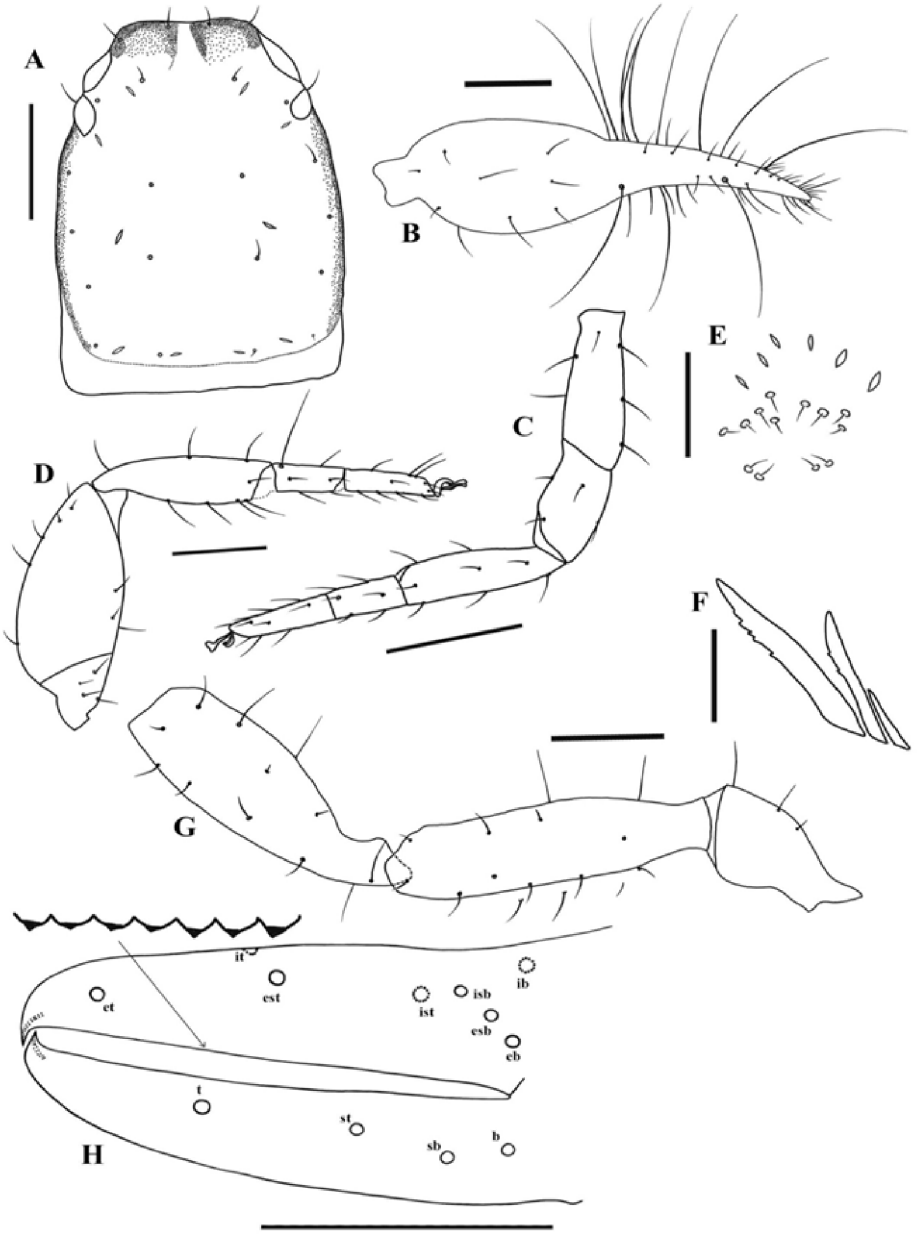

Fig. 4 *Olpium gladiatum:* A - carapace; B - chela dorsal view; C - Leg I; D - Leg IV; E -Pedipalp; F - Chela; Genital area; G - Rallum. Scale bars: A–D, G 0.2mm, E 0.05 mm, F 0.02 mm

Legs (Fig. 2C–D). Femur of leg I longer than telofemur. Femur + patella 2.38 (♂), 2.25 (♀) x longer than broad. Metatarsi of leg III and IV with pseudotactile seta.

Abdomen: Tergites II to XI highly sclerotised. Tergalchaetotaxy: ♂, 2:4:4:4:4:4:4:4:4–6:6 (including 2 tactile setae): 6 (including 2 tactile setae): 2, ♀, 2:4:4:4:4:4:4:4:6 (including 2 tactile setae):6 (including 2 tactile setae): 2. Spiracles obliquely placed in 3rdand 4th segment. Sternal chaetotaxy: ♂, 8+4:4:5:5:4:4:6:6 (including 2 tactile setae): 8 (including 2 tactile setae): 2, ♀, 5+6:4:4:6:5:4:4:6:6 (including 2 tactile setae): 8 (including 2 tactile setae):2.

Measurement. Male: body length 1.98–2.62. Carapace 0.629–0.699/0.477–0.499. Pedipalps: trochanter 0.299–0.330/0.180–0.181, femur 0.524–0.556/0.172–0.183, patella 0.510–0.535/0.20–0.206, chela (with pedicel) 0.941–0.955/0.296–0.308, chela (without pedicel) 0.891/0.296–0.308, hand 0.412–0.442, movable finger 0.456–0.474. Leg I: femur 0.222–0.237/0.092–0.093, patella.173–0.176/0.096–0.097, tibia 0.224–0.245/ 0.064–0.065), metatarsus 0.123–0.124/0.041–0.048, tarsus 0.11–0.136/ 0.032–0.039. Leg IV: femur + patella 0.512–0.525/0.215–0.242, tibia 0.267–0.440/ 0.99–0.115, metatarsus 0.177–0.179/0.059–0.066, tarsus 0.193–0.204/0.045–0.054.

Female: Body length 2.489. Carapace 0.68/0.491. Pedipalps: trochanter 0.287/0.197, femur 0.568/ 0.177, patella 0.557/0.218, chela (with pedicel) 0.992/0.319, chela (without pedicel) 0.915/0.319, hand 0.464, movable finger 0.480. Leg I: femur 0.234/0.097, patella 0.183/0.097, tibia 0.261/0.063, metatarsus 0.119/0.043, tarsus 0.142/ 0.037. Leg IV: femur + patella 0.505/0.224, tibia 0.422/0.111, metatarsus 0.162/0.060, tarsus 0.203/0.05.

Olpium gladiatum Murthy and Anantha krishnan, 1977

Olpium gladiatum Murthy and Ananthakrishnan, 1977: 57, fig. 17.

Type material-Holotype (♂) of *O. gladiatum* from INDIA: Goa from grass leg. Murthy V. A, 10 July 1966, repository VAM colls, not examined (lost from the repository; personal communication with Dr Sivaraman).

Topotype examined - INDIA, Goa: 7 ♂♂ (ADSH PS0104), 8♀♀ (ADSH PS0105) Netravali [15°3′42½ N; 74°14′35½ E], 420m, 30 January 2020 M.V. Aneesh leg., from litter.

Other materials examined- INDIA, Goa: 4 ♂♂ (ADSH PS0106), 5 ♀♀ (ADSH PS0107) Mollem [15°20′31½ N, 74°15′34½ E], 110m, 27 November 2019 M.V. Aneesh leg., from litter.

Diagnosis. *O. gladiatum* is very similar to *O.indicum* in having 4 posterior setae of carapace. It can be distinguished from *O. indicum* by its slender femur and chela. In *O. gladiatum ist* is nearer to *ib* than to *it* whereas in *O. indicum ist* is exactly in the middle of *ib* and *it. O. gladiatum* can be distinguished from *O. digitum* by its slender femur and greater number of teeth in the fixed

Redescription

Adults (Figs. 3A–C) chitinized regions are dark brown in colour.

Carapace (Fig. 4A):1.31–1.33 (♂), 1.29–1.36 (♀) x longer than broad; both pairs of eyes well developed and corneate, tapetum present; 22 setae in the formula 4–6–4–4–2–4.

Chelicera (Fig. 4F). All the five setae well developed. Fixed finger with 5 triangular teeth. Movable finger with well-developed apical tooth and two subapically divided lobes; serrula exterior with 17–19 (♂), 18 (♀) blades; rallum with 3 blades, distal blade longest and widest, two blades with serrations. Galea with 3 terminal rami in both males and females. Galeal seta shorter than galea.

Pedipalps (Figs. 4B, H). Dark brown in colour, smooth. Trochanter without tubercle, 1.86–1.96 (♂), 1.73–2.01 (♀) x longer than broad. Femur with 2 long setae on the dorsal, 3.51–3.81 (♂), 3.59–3.69 (♀) x longer than broad.Patella 2.85–3.04 (♂), 2.94–2.97 (♀) x longer than broad. Chela 3.44–3.56 (♂), 3.40–3.68 (♀) x longer than broad. Trichobothrial pattern (Fig. 4H): *eb*, *esb*, *isb* are situated in the exterior aspect. distance between *t* and *st* is 1.6 to 1.65 times the distance between *sb* and *st*; *ib* located basally; *it* much distal to est; *ist* sub–basal in position, nearer to *ib* than to it;

distance between *t* and *st* is twice the distance between *sb* and *st*; *t* is proximal to *est*; fixed finger with 26–28 (♂), 30–32 (♀) and movable finger with 29–30 (♂), 29–32 (♀) teeth; venom tooth well developed in both fingers; venom ducts proximal to *et* of the fixed finger.

Legs (Fig. 4C–D). femur of leg I longer than patella. Femur +patella 2.38 (♂), 2.25 (♀) x longer than broad. Metatarsi of leg III and IV with pseudotactile setae at the base.

Abdomen (Fig. 4E): Tergites II to XI highly sclerotised. Tergalchaetotaxy: ♂, 4:4:4:4:4:4:4:4:6 (including 2 tactile setae): 6 (including 4 tactile setae): 6 (including 4 tactile setae): 2,♀, 2:4:4:4:4:4:4:4: 6 (including 2 tactile setae): 6(including 4 tactile setae): 6(including 4 tactile setae): 2. Spiracles obliquely placed in 3rd and 4thsegment. Sternal chaetotaxy: ♂, 11–13:4:6:6:4:4:4:4:6 (including 2 tactile setae): 6 (including 2 tactile setae): 2, ♀, 7:4:4:6:5:4:4:6:6 (including 2 tactile setae): 8 (including 2 tactile setae): 2. Genital area of male with 7–9 anterior and 4 posterior setae (Fig. 4E).

Measurements. Male: Body length 1.901–2.50. Carapace 0.632–0.637/0.473–0.485. Chelicera: movable finger 0.133, palm 0.17/0.105. Pedipalps: trochanter 0.323–0.335/0.164–0.180, femur 0.568–0.587/0.156–0.164, patella 0.576–0.588/0.189–0.206, chela (with pedicel) 1.019–1.076/0.286–0.312, chela (without pedicel) 0.949–0.998, hand 0.524, movable finger 0.558–0.568. Leg I: femur 0.269/0.091, patella 0.170/0.092, tibia 0.250/0.067, metatarsus 0.128/0.049, tarsus 0.149/ 0.041. Leg IV: femur + patella 0.567/0.212, tibia 0.408/0.107, metatarsus 0.175/0.062, tarsus 0.201/0.050.

Female: Body length 2.0–2.18. Carapace 0.660–0.677/0.485–0.546. Chelicera: movable finger 0.032, palm 0.0485/0.027. Pedipalps: trochanter 0.320–0.350/0.159–0.202, femur 0.565–0.668/ 0.157–0.181, patella 0.557–0.681/0.187–0.231, chela (with pedicel) 1.016–1.009/0.276–0.361, chela (without pedicel) 0.944–1.143, hand 0.498–0.637, movable finger 0.570–0.606. Leg I: femur 0.272/0.098, patella 0.175/0.101, tibia 0.270/0.073, metatarsus 0.120/0.049, tarsus 0.162/ 0.041. Leg IV: femur + patella 0.590/0.224, tibia 0.428/0.112, metatarsus 0.174/0.062, tarsus 0.215/0.052.

Justification of synonymy

Sivaraman (1980) described *O. tibium* from Avadi, a province in Chennai, Tamil Nadu state of southern India. The original description of *O. tibium* is based on a single male holotype and is supported by two text figures. Sivaraman (1980) separated it from its *O. digitum* comparing the dimensions of carapace. But the dimensions of carapace show variation, which were not considered. The statement by Sivaraman (1980) and Murthy and Ananthakrishnan (1977) that the "proximal one third of the fixed finger without teeth" is incorrect. In our specimens, the tips of the teeth are flattened towards the proximal region of both fixed and movable fingers. Specimens collected from the type localities exhibited intra–specific variations and demands synonymy of species. The stripes on the carapace are not considered to be a valid characteristic feature to distinguish the species, as it is present in all *Olpium* species.

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