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Description of four new species of *Idris* Förster, 1856 (Hymenoptera: Scelionidae) from India

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Abstract. Four new species of *Idris* Förster, 1856 exhibiting gregarious parasitism, *Idris bianor* Sushama, Rajmohana & Debnath sp. nov, *Idris furvus* Sushama, Rajmohana & Debnath sp. nov, *Idris hyllus* Debnath, Rajmohana & Sushama sp. nov, and *Idris longiscapus* Debnath, Rajmohana & Sushama sp. nov. are described from India. A molecular phylogenetic analysis based on the mitochondrial cytochrome c oxidase I (mt COI) gene is presented to support species delimitation. The study emphasizes the need for more sampling of the Oriental fauna of *Idris*, followed by voucher-based integrated taxonomic studies.

Keywords. Baeini, egg parasitoid, new taxa, spider.

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Introduction

The genus *Idris* was erected by Förster (1856) with the type species *Idris flavicornis* Förster, 1856 from Germany. This mega genus (Johnson *et al.* 2018) is widely distributed and found in a diverse range of habitats worldwide (Masner & Denis 1996). To date, a total of 173 species of *Idris* have been described (Johnson *et al.* 2018; Lomeli-Flores *et al.* 2019; Debnath *et al.* 2024; Patra *et al.* 2024; Rameshkumar *et al.* 2024). Of these, 41 species are recorded from India (Debnath *et al.* 2024; Patra *et al.* 2024; Rameshkumar *et al.* 2024).

Idris belong to the scelioninae tribe Baeini Ashmead, 1893 and can be distinguished from other baeine genera by antenna 7-merous in females with an abrupt clava usually lacking distinct segmentation, 12-merous in males with last two segments (A11 and A12) either fused or closely approximated, rarely distinctly separated, laterotergites narrow, incised into submarginal groove, first metasomal tergite (T1) visible dorsally, T1 in females usually without a horn, if with horn, it is not laterally compressed (Masner 1976; Austin 1988).

Nearly all members of *Idris* are solitary primary egg parasitoids of spiders (Masner & Denis 1996). However, an exception was documented by Lomeli-Flores *et al.* (2019), reporting *Idris elba* Talamas, 2019 as an egg parasitoid of *Bagrada hilaris* (Burmeister, 1835) (Hemiptera: Pentatomidae). Interestingly, gregarious parasitism was also documented in five morphospecies of *Idris* attacking spider eggs from India (Rajmohana *et al.* 2025). The present study provides a comprehensive taxonomic examination of these species and describes four species as new to science. The study is supplemented by molecular characterisation and phylogenetic analysis based on the barcode region of the mitochondrial cytochrome c oxidase I (mt COI) gene (Folmer *et al.* 1994). Species identification could not proceed for the fifth species, as it comprised only male specimens. Since DNA barcodes are available for only six of the 173 described species of *Idris*, molecular data alone are insufficient to conclusively establish the novelty of this species.

Material and methods

Field collection and rearing

Spider egg sacs, along with guarding mother spiders, whenever encountered were collected from different localities in West Bengal, which comprised both agroecosystems and seminatural habitats, from February 2021 to December 2023. Each spider egg sac was carefully placed in a labelled vial and covered by muslin cloth. These vials were kept at room temperature (24–25 °C) in the lab for one month to monitor the emergence of spiderlings and parasitoids. Emerged spiders and wasps were preserved in absolute alcohol and the parasitoids were mounted on point cards for detailed morphological studies.

Morphological studies

Morphological identification of *Idris* followed Masner (1976), Lê (2000) and Rajmohana (2014). Morphological terminology and measurements followed Masner (1980), Mikó *et al.* (2007, 2010) and Valerio *et al.* (2013) while terminology for surface sculpture followed Harris (1979). For comparison to the new species described herein, available type images of species of *Idris* were retrieved from the Museum of Biological Diversity database of the Ohio State University (MBD-OSU: https://mbd-db.osu.edu/). A Leica M205A stereo microscope (1× objective) equipped with a Leica DFC 500 digital camera was used for examination and to acquire images. The images were processed using Leica Application Suite ver. 3.6 extended focus software. Scanning electron microscopy (SEM) images were captured with a Zeiss EVO 18 special edition SEM, using Smart SEM ver. 5.09 software. Type material is deposited in the National Zoological Collections (NZC) at the Zoological Survey of India (ZSI), Kolkata.

Molecular and phylogenetic analyses

Molecular studies were conducted on all emerged parasitoid species, including a case where parasitoids reached the pupal stage but failed to emerge as adults. The Genomic DNA was extracted from the parasitoids and pupae using a DNeasy Blood and Tissue Kit (QIAGEN, Inc.) following the kit protocol. DNA quantitation was carried out using a Qubit 2.0 fluorometer. Polymerase chain reaction (PCR) amplification of mt COI was performed using LCO1490 and HCO2198 primer set (Folmer *et al.* 1994). The PCR reactions were set following Debnath *et al.* (2024). The thermal cycling profile followed Gariepy *et al.* (2014). Positive PCR products were confirmed on an agarose gel by electrophoresis and subsequently purified. The purified products were sequenced bidirectionally using Sanger's dideoxy method on an ABI 377 sequencer (Applied Biosciences). Obtained chromatogram files were manually

assessed for quality and the sequences were submitted to the National Centre for Biotechnology Information (NCBI) GenBank. A Basic Local Alignment Search Tool (BLAST) search was performed on 22nd October 2024 to check the similarity of the generated sequences with the available sequences in the public databases, NCBI and Barcode of Life Data System (BOLD).

For phylogenetic analyses of *Idris*, 402 sequences of the mt COI gene were downloaded from BOLD and GenBank on 22nd October 2024. The downloaded sequences were aligned with 19 sequences of *Idris* generated in this study (Supp. file 1) using MEGA X (Kumar *et al.* 2018). Pairwise nucleotide sequence distances within and among *Idris* spp. were calculated using the Kimura 2-parameter model (K2P) of substitution in MEGA X. The maximum likelihood tree was generated in IQ-TREE multicore ver. 1.6.12 (Trifinopoulos *et al.* 2016) web server for 1000 ultrafast bootstraps under TIM2+F+I+G4 substitution model, which was auto selected according to Bayesian Information Criterion with default parameters using 415 sequences (Supp. file 1). The consensus tree was visualized in FigTree ver. 1.4. *Trissolcus basalis* (Wollaston, 1858) was used as the sole outgroup (Johnson *et al.* 2018).

Abbreviations for morphological terms

A1–A12	=	antennomeres 1–12 (A1 = scape, A2 = pedicel)
HH	=	head height
HW	=	head width
IOS	=	interorbital space
L	=	length
LOL	=	lateral ocellar line
m	=	marginal vein
OD	=	ocellar diameter
OOL	=	ocular ocellar line
pm	=	post-marginal vein
POL	=	posterior ocellar line
st	=	stigmal vein
S1–S6	=	metasomal sternites 1–6
T1–T6	=	metasomal tergites 1–6
TSL	=	transscutal line
W	=	width

Results

Taxonomy

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Superfamily Platygastroidea Naumann, 1991
Family Scelionidae Haliday, 1839
Tribe Baeini Ashmead, 1893
Genus *Idris* Förster, 1856

Idris bianor Sushama, Rajmohana & Debnath sp. nov
urn:lsid:zoobank.org:act:4B1C4EEC-8F4A-4ECD-850E-9215E59A9586
Fig. 1

Diagnosis

Idris bianor Sushama, Rajmohana & Debnath sp. nov. can be distinguished from other Oriental species at once by the presence of black lateral patches on T1–T4. In the identification key for the species

of *Idris* in India (Rajmohana 2014), this species keys to *I. munnarensis* Mukerjee, 1978, but can be separated from the latter by its smaller A3 (0.3× of A2 length vs 0.6× of A2 length), longitudinal parallel costae extending to ¾ of T2 medially (in *I. munnarensis*, costate only basally) and by the presence of black lateral patches on metasoma (in *I. munnarensis*, absent). In the species identification key of Lê (2000), this species runs to *I. nautalis* Kozlov & Lê, 1987; however, *I. bianor* can be distinguished from the latter by the shorter metasoma (1.3× as long as wide vs 2× as long as wide), presence of black lateral patches on T1–T4 (in *I. nautalis*, absent), and the absence of longitudinal striae on T3 (in *I. nautalis*, present). While much similar to *I. javensis* (Girault, 1917), *I. bianor* differs mainly by the presence of black lateral patches on T1–T4 and the presence of a central keel on frons.

Etymology

The specific epithet is after spider host of genus *Bianor* G.W. Peckham & E.G. Peckham, 1886 (Araneae: Salticidae) and is intended as a noun in apposition.

Type material

Holotype

INDIA • ♀; West Bengal, East Burdwan, Kalna; 23.244° N, 87.897° E; 52 m alt.; 10 Oct. 2022; Rupam Debnath leg.; ex eggs of *Bianor angulosus* (Karsch, 1879); ZSI/34210/H3.

Paratypes

INDIA – **West Bengal** • 5 ♀♀; South 24 Parganas, Raidighi; 21.9965° N, 88.4365° E; 26 m alt.; 21 Nov. 2021; V. Sushama leg.; ex eggs of *Bianor angulosus* (Karsch, 1879); ZSI/34211/H3 to ZSI/34215/H3 • 2 ♀♀; South 24 Parganas, Patharpratima; 21.7355° N, 88.4102° E; 20 m alt.; 26 Nov. 2022; V. Sushama leg.; ZSI/34216/H3, ZSI/34217/H3 • 2 ♀♀; South 24 Parganas, Kakdwip; 21.8866° N, 88.1705° E; 13 m alt.; 9 Nov. 2023; V. Sushama leg.; ex eggs of *B. albobimaculatus* (Lucas, 1846); ZSI/34218/H3, ZSI/34219/H3 • 3 ♀♀; Murshidabad, Ekghoria; 23.9122° N, 87.96501° E; 42 m alt.; 24 Oct. 2022; Rupam Debnath leg.; ex eggs of *B. angulosus* (Karsch, 1879); ZSI/34220/H3 to ZSI/34222/H3 • 8 ♀♀; same data as for holotype; ZSI/34223/H3 to ZSI/34230/H3 • 3 ♂♂; same data as for holotype; ZSI/34231/H3 to ZSI/34233/H3.

Description

Female

Body length. 0.65–0.92 mm (n = 20).

Colour. Head light brown; mesoscutum, mesoscutellum brown except reddish brown mesoscutellar lateral margins; metasoma, mandibles, legs and antennae pale yellow except brownish black patches laterally on T1–T3 and posterolaterally towards median of T4; propodeum black; wings hyaline; setae on body white.

Head. 1.7× as wide as high; 1.1× as high as long; 2.0× as wide as long; HW/TSL= 1.4; IOS 0.5× HW; head including frons, vertex, gena reticulate with scattered setae; central keel incomplete, reaching up to lower eye margin; lagrimal small, smooth; facial striae absent; malar striae absent; eyes sparsely pubescent; mandible tridentate, upper tooth longest; lateral ocelli contiguous with orbital margin; POL > LOL in ratio of 2:1; POL 9.0× OD; hyper occipital carina absent; occipital carina complete; A1 4.0× as long as wide; A1 and clava subequal to equal in length; A2 2.7× A3 in length; A3 subequal in length and width; proportions of length to width of A1 to A6 (101:24), (48:24), (18:14), (10:15), (7:14), (5:22); clava 2.0× as long as wide.

Mesosoma. Mesoscutum and mesoscutellum 0.7× and 0.5× as long as wide respectively and with same sculpture as on vertex; notauli absent; mesoscutal suprahumeral sulcus and mesoscutal humeral

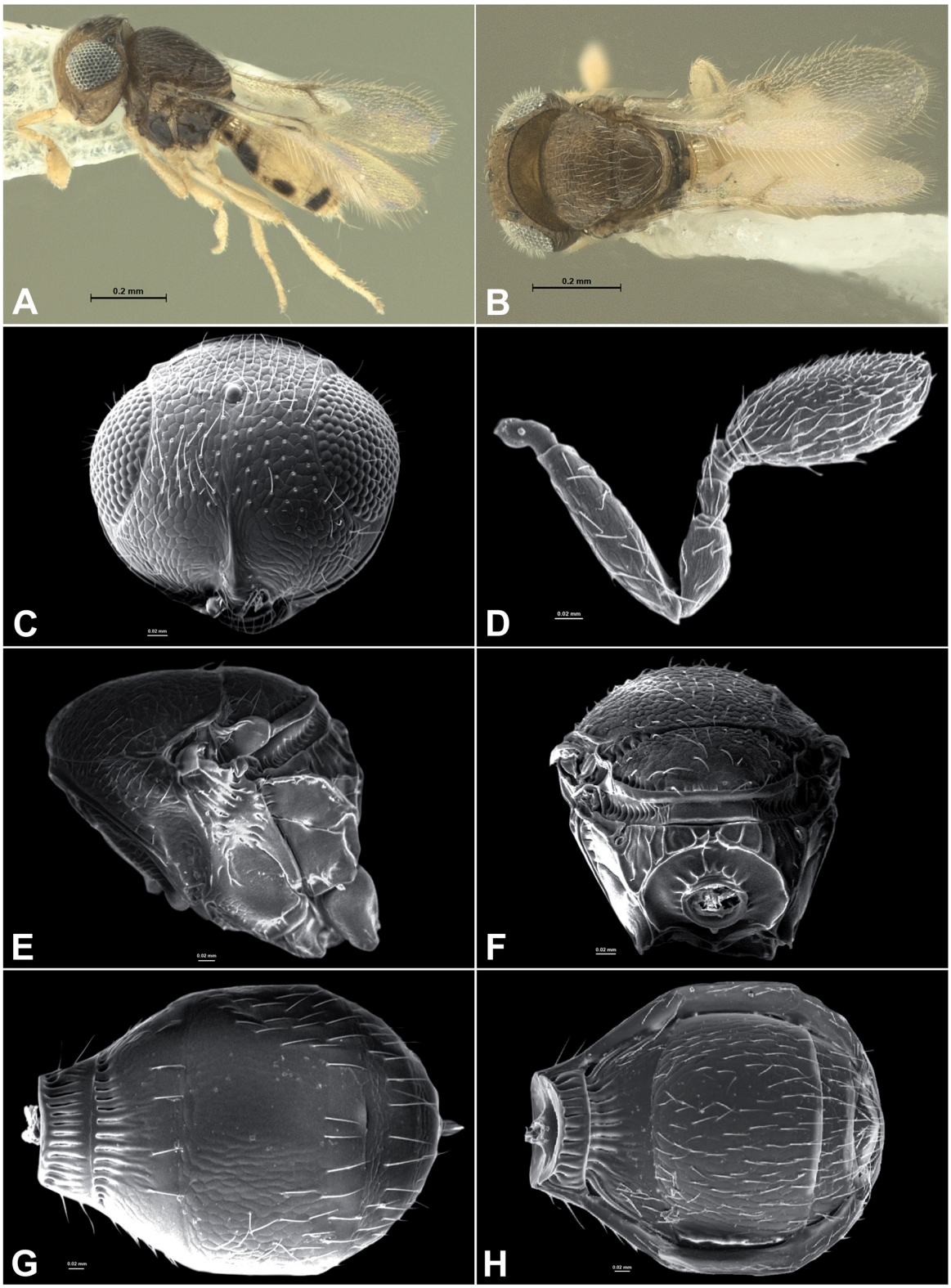

Fig. 1. *Idris bianor* Sushama, Rajmohana & Debnath sp. nov., holotype, ♀ (ZSI/34210/H3). **A**. Lateral habitus. **B**. Dorsal habitus. **C**. Frontal view of head. **D**. Antenna. **E**. Lateral view of mesosoma. **F**. Dorsal view of mesosoma and propodeum. **G**. Dorsal view of metasoma. **H**. Ventral view of metasoma. Scale bars: A–B = 0.2 mm; C–H = 0.02 mm.

sulcus absent; scutoscutellar sulcus foveolate laterally in axillar area and smooth medially; posterior mesoscutellar sulcus foveolate; metascutellum smooth; metanotal trough foveolate; propodeum longitudinally striated submedially, placed apart by 3.0× of its own width; pronotal suprahumeral sulcus absent; epomial carina absent; cervical pronotal area with same sculpture as on vertex; lateral pronotal area smooth; mesopleural pit present; mesopleural carina incomplete, restricted to anterior half; prespecular sulcus foveolate; mesepimeral sulcus foveolate up to mesopleural pit and then present as a strong carina towards mesocoxa; femoral depression smooth; dorsal and ventral metapleural area smooth; metapleural pit distinct, from which metapleural sulcus extends as a smooth furrow anteriorly towards posterior margin of mesopleuron and posteriorly towards posterior margin of metapleuron; metapleural sulcus foveolate anterodorsally; paracoxal sulcus present as a simple furrow.

Wings. Macropterous; forewing (L:W = 45:14), *m*:*pm*:*st* = 2:1:3; hindwing (L:W = 35:6).

Metasoma. 1.3× as long as wide. T1 with longitudinal parallel costae throughout; T2 longitudinally costate up to ¾ of its length medially and decreasing in length laterally, finely reticulate laterally, smooth apically; T3 longest and widest of all tergites, 2.1× as long as T2, with fine reticulation, sparsely setose laterally and sub laterally, smooth apically; T4 and T5 reticulate basally, smooth apically, sparsely setose; T6 and T7 not visible in dorsal view; proportions of width to length of T1 to T5 (102:42), (144:72), (241:156), (212:47), (134:18); S1 longitudinally costate; S2 longitudinally costate basally; S3–S6 uniformly reticulate and moderately setose.

Male

Body length = 0.79 mm (n = 3). Morphologically similar to females with the main exception of antenna. Antenna 11-merous, last two segments fused, length to width ratio of A1–A11 (10:3), (6:3), (2:2), (2:3), (2:3), (2:3), (2:3), (2:3), (2:3), (2:3), (7:3).

Biology

Reared from the eggs of *Bianor angulosus* and *B. albobimaculatus* (Salticidae: Araneae) (Rajmohana *et al*. 2025).

Distribution

West Bengal (India), Pakistan (based on BLAST search).

Variation

Difference in female body length (see the description above) and metasoma of some females comparatively short, 1.1× as long as wide.

Molecular characterization

The mt COI sequences of *I. bianor* (GenBank: OR621048, OR621049, OR699988–OR699993, PP417915, PP426041) show a minimum genetic distance of 11.4% to an unidentified species of *Idris* from Canada (GenBank: MG514562). The intraspecific genetic distance ranged from 0.0 to 0.3% (Supp. file 2). Interestingly, the BLAST search of *I. bianor* sequence retrieved 100% similarity to a sequence of an unpublished scelionid specimen from Pakistan (BOLD: GMPJA9337-21).

Idris furvus Sushama, Rajmohana & Debnath sp. nov
urn:lsid:zoobank.org:act:806816B7-BE04-44CD-A3E6-0EEF6B7707CD
Fig. 2

Diagnosis

Following Rajmohana (2014), *I. furvus* Sushama, Rajmohana & Debnath sp. nov. comes close to *I. dubarensis* Mukerjee, 1981 but can be separated from the latter by sculpture of head (imbricate vs

coriaceous), body colour (black vs brownish yellow), smaller T3 (< 2.0× T2 length vs > 2.5× of T2 length) and absence of a transverse darker band in the forewing (in *I. dubarensis*, present). Based on the body colour, sculpture of head and other morphological characters, this species resembles *I. hirsutus* Sunita & Rajmohana, 2024. However, *I. furvus* can be distinguished from *I. hirsutus* by its complete mesopleural carina (in *I. hirsutus*, restricted to anterior half), wider head (2.3× as wide as long vs 1.8× as wide as long) and shorter T3 (1.9× of T2 length vs 2.5× of T2 length). In the species identification key of Lê (2000), this species runs to *I. denkis* Kozlov & Lê, 1987; however, *I. furvus* can be distinguished from the latter by metasomal sculpture. In *I. furvus*, T2 is with longitudinal costae up to ¾ of its length (in *I. denkis*, T2 with only a row of basal fovea), T3 finely striated medially and reticulate laterally (in *I. denkis*, T3 entirely finely reticulate) and lacks facial striae (in *I. denkis*, present). While much similar to *I. luteipes* (Crawford, 1910) from the Oriental region, *I. furvus* can be distinguished mainly by pleural sculpture. In *I. furvus*, the episternal foveae are absent (present in *I. luteipes*), the posterodorsal metaplural sulcus present as a simple furrow (foveolate in *I. luteipes*) and the paracoxal sulcus is smooth (foveolate in *I. luteipes*).

Etymology

The specific epithet is after the Latin word '*furvus*' = 'black', due to the black body colour. It is intended as an adjective in apposition.

Type material

Holotype

INDIA • ♀; West Bengal: South 24 Parganas, Raidighi; 21.9965° N, 88.4365° E; 26 m alt.; 28 Nov. 2022; V. Sushama leg.; ZSI/34234/H3.

Paratype

INDIA • 1 ♀; same data as for holotype; ZSI/34235/H3.

Description

Female (holotype)

Body length. 1.23 mm.

Colour. Head, mesosoma black; legs and antennae honey brown except dark brown tip of clava; metasoma brownish black except for reddish brown T1 and basal portion of T2; mandibles, posterior scutellar area reddish brown; wings hyaline; setae on body white.

Head. 1.1× as wide as high; 1.1× as high as long; 2.3× as wide as long; HW/TSL= 1.1; IOS 0.5× of HW; head including vertex, frons finely imbricate with dense setae; gena setigerous punctate; antennal scrobe with fine transverse reticulations ventrally, mildly smooth dorsally; central keel incomplete, reaching up to lower eye margin; lagrimal small, smooth; facial striae absent; malar striae absent; eyes densely pubescent; mandible tridentate, teeth of equal size; lateral ocelli contiguous with orbital margin; POL > LOL in ratio of 158:67; POL about 7.8× of OD; hyper occipital carina absent; occipital carina complete. A1 3.7× as long as wide, 1.1× of clava in length; A2 3.1× A3; A3 subequal in length and width; proportions of length to width of A1 to A6 (116:31), (59:27), (18:19), (13:19), (12:19), (9:23); clava 1.8× as long as wide.

Mesosoma. Mesoscutum and mesoscutellum 0.7× and 0.6× as long as wide respectively, with same sculpture as on vertex; notauli absent; mesoscutal suprahumeral sulcus and mesoscutal humeral sulcus absent; scutoscutellar sulcus foveolate laterally towards axillula and furrow like medially; posterior mesoscutellar sulcus foveolate; metascutellum smooth; metanotal trough foveolate; propodeum with irregular longitudinal striae dorsally, medially with 2 tooth-like projections; pronotal suprahumeral

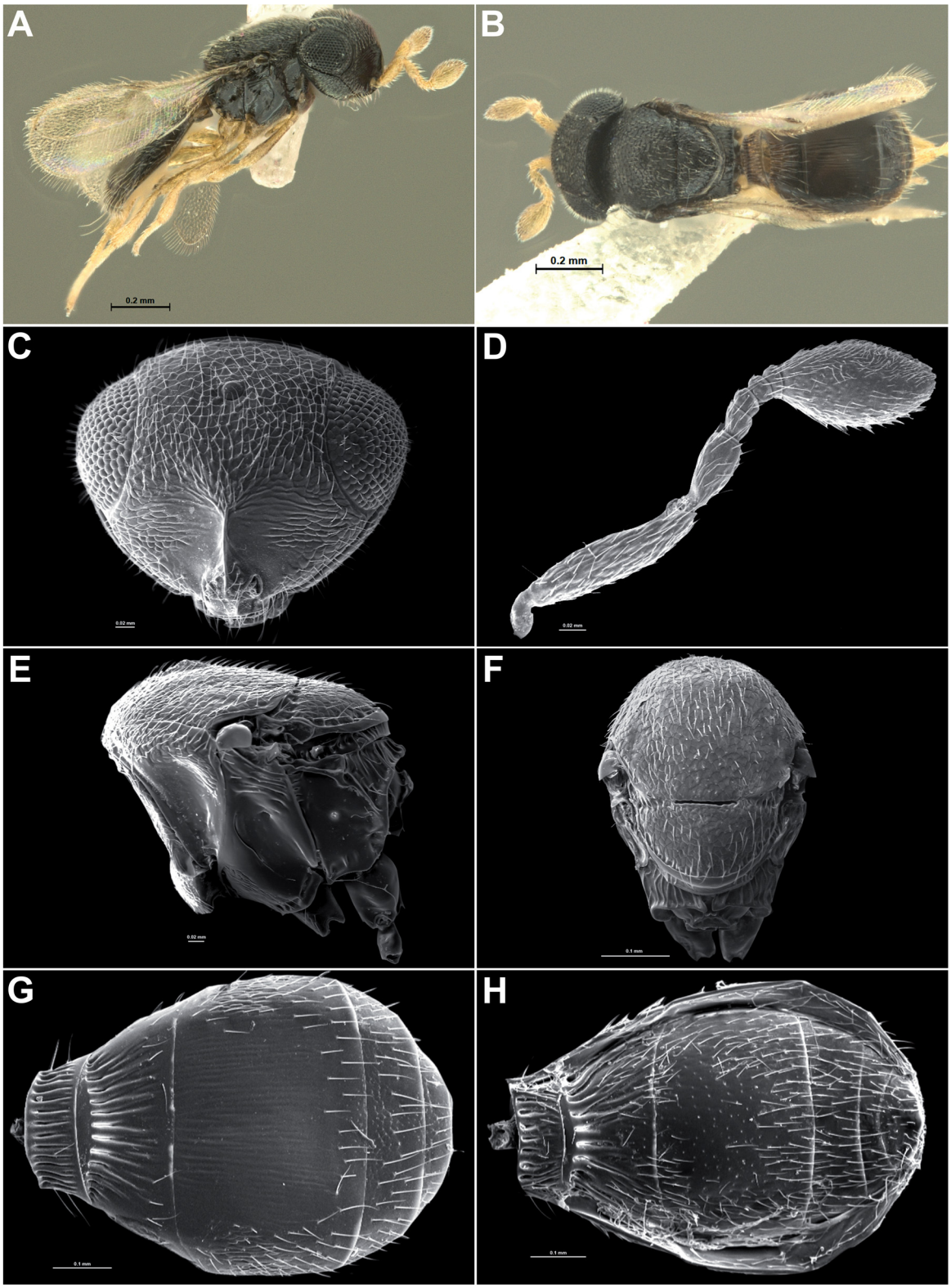

Fig. 2. *Idris furvus* Sushama, Rajmohana & Debnath sp. nov., holotype, ♀ (ZSI/34234/H3). **A**. Lateral habitus. **B**. Dorsal habitus. **C**. Frontal view of head. **D**. Antenna. **E**. Lateral view of mesosoma. **F**. Dorsal view of mesosoma and propodeum. **G**. Dorsal view of metasoma. **H**. Ventral view of metasoma. Scale bars: A–B = 0.2 mm; C–E = 0.02 mm; F–H = 0.1 mm.

sulcus absent; epomial carina absent; cervical pronotal area with same sculpture as on vertex; lateral pronotal area smooth; mesopleural pit present; mesopleural carina complete; prespecular sulcus and mesepimeral sulcus present as continuous transverse striae, extending up to mesopleural pit; femoral depression smooth; mesopleural epicoxal sulcus present; dorsal and ventral metapleural area smooth; metapleural pit distinct; metapleural sulcus foveolate anterodorsally; ventral portion of paracoxal sulcus present as a simple furrow.

Wings. Macropterous; forewing (L:W = 64:26); *m*:*pm*:*st* = 4:3:8; hindwing (L:W = 54:14).

Metasoma. 1.4× as long as wide; T1 concave anteriorly, with longitudinal parallel costae throughout and a pair of lateral setae; anteromedial portion of T2 smooth and convex, longitudinally costate up to ¾ of T2 length medially and decreasing in length laterally, apically smooth; T3 longest and widest of all tergites, 1.9× as long as T2, longitudinally striate up to ¾ of its length medially and finely reticulate laterally, sparsely setose in lateral, sublateral and apical portion; T4 and T5 finely intricate, moderately setose; T6 and T7 not visible dorsally; proportions of width to length of T1 to T5 (125:56), (165:103), (281:202), (284:62), (163:29); S1 longitudinally costate; S2 longitudinally costate basally, S3–S6 with moderately dense setae.

Male

Unknown.

Biology

Host unknown.

Distribution

West Bengal (India).

Variation

No variation was observed in the specimens examined.

Molecular characterization

The mt COI sequences of *I. furvus* (GenBank: OR960561, OR960564) show a minimum genetic distance of 7.8% to *I. hirsutus* (GenBank: OR699986).

Idris hyllus Debnath, Rajmohana & Sushama sp. nov.
urn:lsid:zoobank.org:act:66AF4D22-8F6C-49C0-AC38-3A1980EEDC8C
Fig. 3

Diagnosis

In the key to species of *Idris* known from India (Rajmohana 2014), *I. hyllus* Debnath, Rajmohana & Sushama sp. nov, comes close to *I. hunnaheus* (Mani, 1973), but can be separated from the latter by the shorter T3 (1.6× of T2 length vs 2.2× of T2 length), shorter scape (3.3× longer than wide vs 4.2× longer than wide), shorter pedicel (1.3× longer than wide vs 2.1× longer than wide) and by the presence of longitudinal parallel costae extending to the 3/4th of T2 medially (in *I. hunnahaeus*, T2 entirely longitudinally costate). In the species identification key of Lê (2000), this species runs to *I. nautalis* Kozlov & Lê, 1987; however, *I. hyllus* can be distinguished from the latter by shorter metasoma (1.4× as long as wide vs 2.0× as long as wide), T2 with longitudinal costate up to half of its length medially (in *I. nautalis*, T2 entirely longitudinally costate) and the absence of longitudinal striae on T3 (in *I. nautalis*, present). While much similar to *I. fasciatipennis* (Girault, 1917), *Idris hyllus* differs from the former by the longer A1 (4.8× in *I. hyllus* vs 3.4× in *I. fasciatipennis*) and shorter clava (1.8× as long as wide in *I. hyllus* vs 2.5× as long as wide *I. fasciatipennis*).

Etymology

The specific epithet is after its host, *Hyllus semicupreus* (Simon, 1885) and is intended as a noun in apposition.

Type material

Holotype

INDIA • ♀; West Bengal: Darjeeling, Hansqua; 26.63992° N, 88.310141° E; 150 m alt.; 14 Dec. 2022; Rupam Debnath leg.; ex eggs of *Hyllus semicupreus* (Simon, 1885); ZSI/34236/H3.

Paratypes

INDIA • 9 ♀♀; same data as for holotype; ZSI/34237/H3 to ZSI/34245/H3.

Description

Female

Body length. 0.85–0.90 mm (n = 10).

Colour. Head and mesosoma honey brown to yellow; antenna, metasoma, legs, mandibles pale yellow except for the reddish-brown mandible tip; wings hyaline except clouded behind the *st*; setae on body white.

Head. 1.6× as wide as high; 1.2× as high as long; HW/TSL= 1.1; IOS 0.5× HW; head including frons, vertex, gena evenly imbricate throughout, densely setose; central keel incomplete, extending hardly up to lower level of eye margin; lagrimal small, smooth; facial striae absent; malar striae absent; eyes densely pubescent; mandible tridentate, middle tooth smaller than upper and lower tooth; lateral ocelli contiguous with orbital margin; POL > LOL in ratio of 15:8; POL 7.5× of OD; hyper occipital carina absent; occipital carina complete; A1 4.7× as long as thick; A1 1.2× as long as clava; A2 2.7× of A3 in length; A3 subequal in length and width; proportions of length to width of A1 to A6 (144:30), (41:28), (15:20), (10:20), (9:19), (9:23); clava 1.8× as long as wide.

Mesosoma. Mesoscutum and mesoscutellum 0.8× and 0.6× as long as wide respectively, finely granulose and moderately setose; notauli absent; mesoscutal suprahumeral sulcus and mesoscutal humeral sulcus absent; scutoscutellar sulcus foveolate laterally in axillar area and smooth medially; posterior mesoscutellar sulcus foveolate; metascutellum smooth; metanotal trough foveolate; propodeum with irregular longitudinal striae; pronotal suprahumeral sulcus absent; epomial carina distinct; cervical pronotal area granulate; lateral pronotal area smooth; mesopleural pit present; mesopleural carina incomplete, restricted to anterior half; femoral depression smooth; prespecular sulcus foveolate; mesepimeral sulcus foveolate up to mesopleural pit and then present as a strong carina towards mesocoxa; episternal foveae present, one in number; dorsal and ventral metapleural area smooth; metapleural pit distinct, from which metapleural sulcus extends as a smooth furrow anteriorly towards posterior margin of mesopleuron and posteriorly towards posterior margin of metapleuron; metapleural sulcus foveolate anterodorsally; paracoxal sulcus present as a simple furrow.

Wings. Macropterous; forewing (L:W = 67:23), *m*:*pm*:*st* = 4:5:9; hindwing (L:W = 56:6).

Metasoma. 1.4× as long as wide. T1 with longitudinal parallel costae throughout, two lateral setae on each side; T2 longitudinally costate up to almost ¾ of its length medially and decreasing in length laterally, rest smooth, very sparsely setose laterally and sublaterally; T3 longest and widest of all tergites, 3.0× as long as T2, with fine coriaceous sculpture and irregular longitudinal rugulae extending almost ¾ of T3 medially, setose laterally and sub laterally, smooth apically; T4 and T5 imbricate and sparsely setose; T6 and T7 not visible in dorsal view; proportions of width to length of T1 to T5 being (124:51),

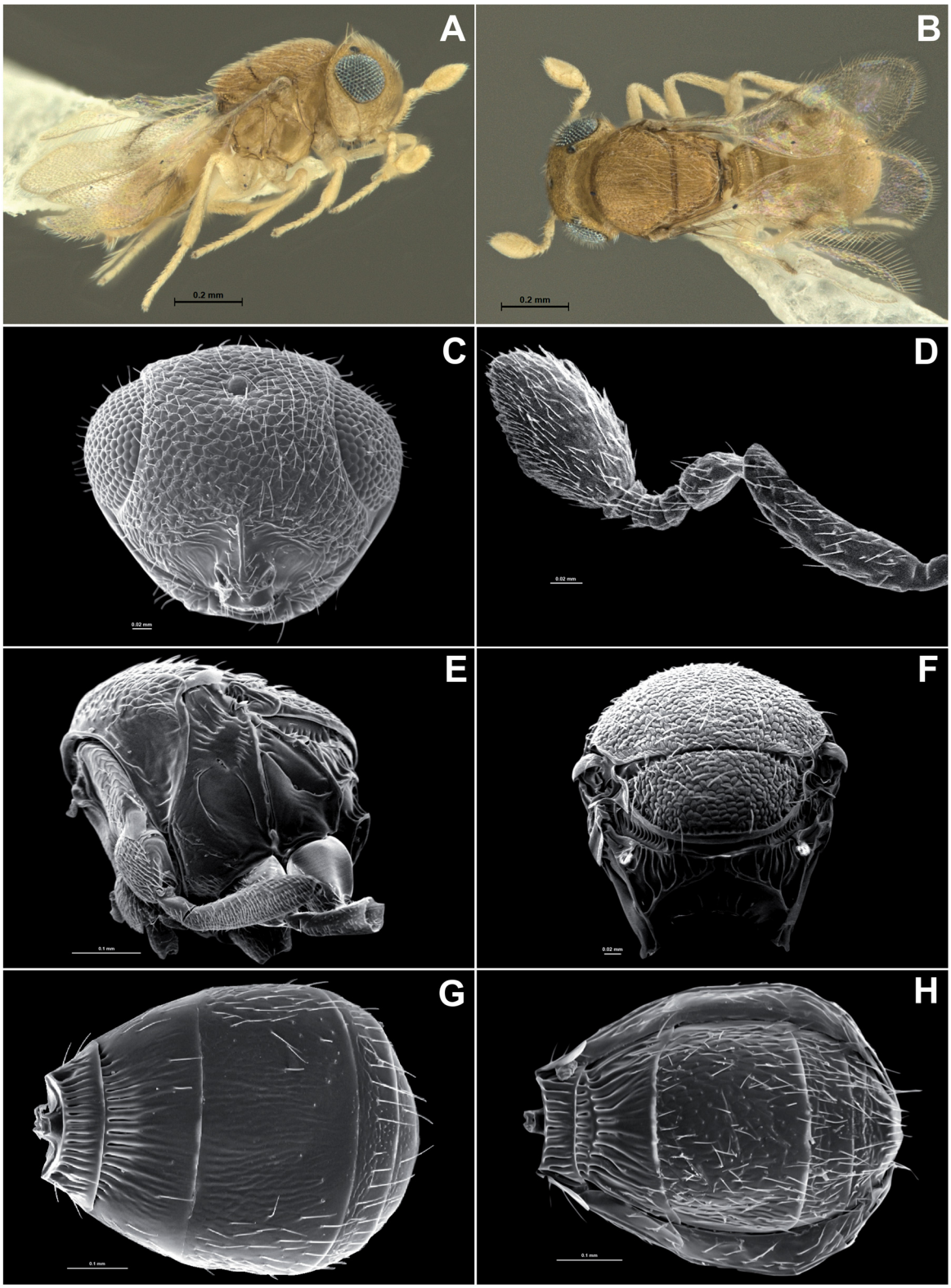

Fig. 3. *Idris hyllus* Debnath, Rajmohana & Sushama sp. nov., holotype, ♀ (ZSI/34236/H3). **A**. Lateral habitus. **B**. Dorsal habitus. **C**. Frontal view of head. **D**. Antenna. **E**. Lateral view of mesosoma. **F**. Dorsal view of mesosoma and propodeum. **G**. Dorsal view of metasoma. **H**. Ventral view of metasoma. Scale bars: A–B = 0.2 mm; C–D, F = 0.02 mm; E, G–H = 0.1 mm.

(204:110), (310:180), (312:50), (203:25); S1 longitudinally costate; S2 with a row of fovea basally, followed by longitudinal parallel costae throughout; S3–S6 reticulate, moderate to densely setose.

Male

Unknown.

Biology

Reared from the eggs of *Hyllus semicupreus* (Salticidae: Araneae) (Rajmohana *et al.* 2025).

Distribution

West Bengal (India).

Variation

Very little in the material examined, except for differences in female body length (see the description above).

Molecular characterization

The COI sequences (GenBank: PP081609, PP081610) of *I. hyllus* show a minimum genetic distance of 12.3% to an unidentified species of *Idris* from Costa Rica (BOLD: JCCCH685-16).

Idris longiscapus Debnath, Rajmohana & Sushama sp. nov.
urn:lsid:zoobank.org:act:B28FCAA7-B75F-4428-9ADD-637944507375
Fig. 4

Diagnosis

In the species identification key of Rajmohana (2014), *Idris longiscapus* Debnath, Rajmohana & Sushama sp. nov. comes close to *I. lakshmani* (Mani, 1939). Since the types of *I. lakshmani* could not be traced, species comparison was made using the original description. *Idris longiscapus* can be distinguished from the latter by the colour of the head (black vs honey brown to yellow), smaller HW/HH (1.4× vs 2.0×), and longer *pm* (equal to *m* vs half of *m*). In the species identification key of Lê (2000), this species runs to *I. hunnus* Kozlov & Lê, 1987; however, *I. longiscapus* can be distinguished from the latter by the colour of metasoma (pale yellow vs black), sculpture of metapleural epicoxal sulcus (smooth vs foveolate) and shorter T3 (1.6× of T2 length vs 2.2× of T2 length). Among the other Oriental species of *Idris*, *I. longiscapus* shows similarity to *I. fasciatipennis* in having the forewings clouded behind the *st*. Although the types of *I. fasciatipennis* are damaged and the species description is insufficient, the elongate scape provides an immediate distinguishing feature, with *I. longiscapus* having a scape 5.6× as long as wide compared to 3.4× as long as wide in *I. fasciatipennis*.

Etymology

The specific epithet '*longiscapus*' is derived from the Latin words '*longus*' (long) and '*scapus*' (scape), referring to the elongated scape characteristic of this species. It is intended as an adjective in apposition.

Type material

Holotype

INDIA • ♀; West Bengal: Bankura, Nobanda; 22.271164° N, 87.141502° E; 110 m alt.; 2 Nov. 2023; Rupam Debnath leg.; ex eggs of *Harmochirus brachiatus* (Thorell, 1877); ZSI/34246/H3.

Paratypes

INDIA • 8 ♀♀; same data as for holotype; ZSI/34247/H3 to ZSI/34254/H3 • 1 ♂; same data as for holotype; ZSI/34255/H3.

Description

Female

Body length. 0.88–0.94 mm (n = 9).

Colour. Head, mesosoma, lateral patches on T2 brownish black; metasoma honey brown except T4–T7 brown; mandibles, legs, antennae yellow; wings hyaline except slightly clouded behind the *st*; setae on body white.

Head. 1.2× as wide as high; 1.4× as high as long; 1.8× as wide as long; HW/TSL= 1.4; IOS 0.4× HW; head including vertex setigerous granulate except reticulate antennal scrobe; central keel incomplete, reaching up to mid-level of eye; lagrimal small, smooth; facial striae absent; malar striae absent; eyes densely pubescent; mandible tridentate, middle tooth longer than upper and lower tooth; lateral ocelli contiguous with orbital margin; POL > LOL in ratio of 2:1; POL 6.5× OD; hyper occipital carina absent; occipital carina complete; A1 5.6× as long as wide, 0.8× of clava in length; A2 2.5× of A3 in length; A3 1.2× as long as wide; proportions of length to width of A1 to A6 (113:20), (54:27), (21:17), (13:19), (12:20), (12:24); clava 2.1× as long as wide.

Mesosoma. Mesoscutum and mesoscutellum 0.7× and 0.5× as long as wide respectively; mesoscutum finely imbricate, densely setose; mesoscutellum granulose, sparsely setose; notauli absent; mesoscutal suprahumeral sulcus and mesoscutal humeral sulcus absent; scutoscutellar sulcus foveolate laterally in axillar area and smooth medially; posterior mesoscutellar sulcus foveolate; metascutellum smooth; metanotal trough foveolate; propodeum with longitudinal striae, placed apart by 3.0× of its own width, medially with 2 tooth-like projections; pronotal suprahumeral sulcus absent; epomial carina absent; cervical pronotal area granulose; lateral pronotal area smooth; mesopleural pit present; mesopleural carina incomplete, restricted to anterior half; prespecular sulcus foveolate; mesepimeral sulcus foveolate up to mesopleural pit and then present as a strong carina towards mesocoxa; femoral depression smooth; ventral and dorsal metapleural area smooth; metapleural pit distinct, from which metapleural sulcus extends as a smooth furrow anteriorly towards posterior margin of mesopleuron and posteriorly towards posterior margin of metapleuron; metapleural sulcus foveolate anterodorsally; paracoxal sulcus present as a simple furrow.

Wings. Macropterous; forewing (L:W = 67:24), *m*:*pm*:*st* = 2:2:9; hindwing (L:W = 64:8).

Metasoma. 1.4× as long as wide; T1 with longitudinal parallel costae throughout; T2 with longitudinal parallel costae extending to half of its length, finely reticulate laterally, smooth apically, moderately setose laterally. T3 longest and widest of all tergites, 2.2× as long as T2 with fine reticulation, smooth apically, sparsely setose laterally and sub laterally; T4 imbricate basally, smooth apically, sparsely setose; T5 smooth; T6 and T7 not visible in dorsal view; proportions of width to length of T1 to T5 (107:50), (147:81), (248:180), (213:36), (123:6); S1 longitudinally costate; S2 with a row of fovea basally followed by longitudinal parallel costae reaching up to ⅔ of its length, reticulate laterally, smooth apically; S3–S6 reticulate, moderate to densely setose.

Male

Body length = 0.84 mm. Morphologically similar to females with the main exception of antenna. Antenna 12-merous, length to width ratio of A1–A12 (13:3), (6:3), (4:3), (4:3), (4:3), (4:3), (4:3), (4:3), (4:3), (4:4), (3:3), (6:4).

Biology

Reared from the eggs of *Harmochirus brachiatus* (Salticidae: Araneae) (Rajmohana *et al.* 2025).

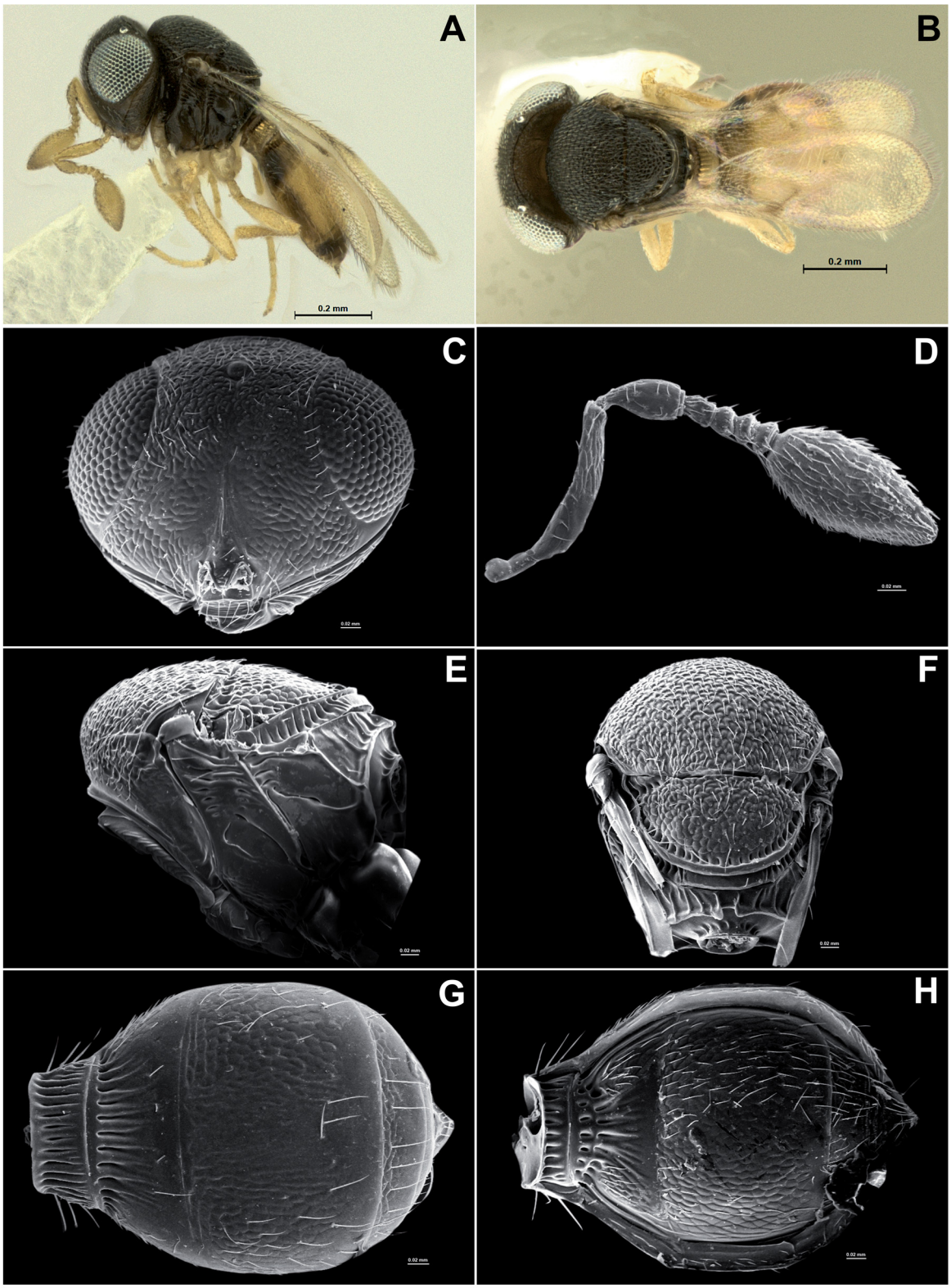

Fig. 4. *Idris longiscapus* Debnath, Rajmohana & Sushama sp. nov., holotype, ♀ (ZSI/34246/H3). **A**. Lateral habitus. **B**. Dorsal habitus. **C**. Frontal view of head. **D**. Antenna. **E**. Lateral view of mesosoma. **F**. Dorsal view of mesosoma and propodeum. **G**. Dorsal view of metasoma. **H**. Ventral view of metasoma. Scale bars: A–B = 0.2 mm; C–H = 0.02 mm.

Distribution

West Bengal (India), Pakistan (based on BLAST search).

Variation

Some of the females have T2 smooth basally and then entirely longitudinally costate. In addition, differences in female body length are noted (see description above).

Molecular characterization

The mt COI sequence of *I. longiscapus* (GenBank: PP574570) shows a minimum of 12.2% genetic distance to an unidentified species of *Idris* from Canada (GenBank: MG514562). Interestingly, the BLAST search of *I. longiscapus* sequence retrieved 99.8% similarity to a sequence of unpublished scelionid specimen from Pakistan (GenBank: KY842170).

Phylogenetic analysis

The maximum likelihood tree (Fig. 5) for the species of *Idris* has moderate bootstrap support for most of the larger sub-clades within *Idris*. Bootstrap support was comparatively good among the sister species and terminal nodes when compared to interspecies relationships and deeper nodes. In addition to the four new species, another lineage represented by male specimens was barcoded (GenBank accession nos. OR960562 and OR960563). This lineage appears to be distinct, comprising an undescribed species (Fig. 5). However, since morphological taxonomy in Scelionidae is predominantly based on females, this

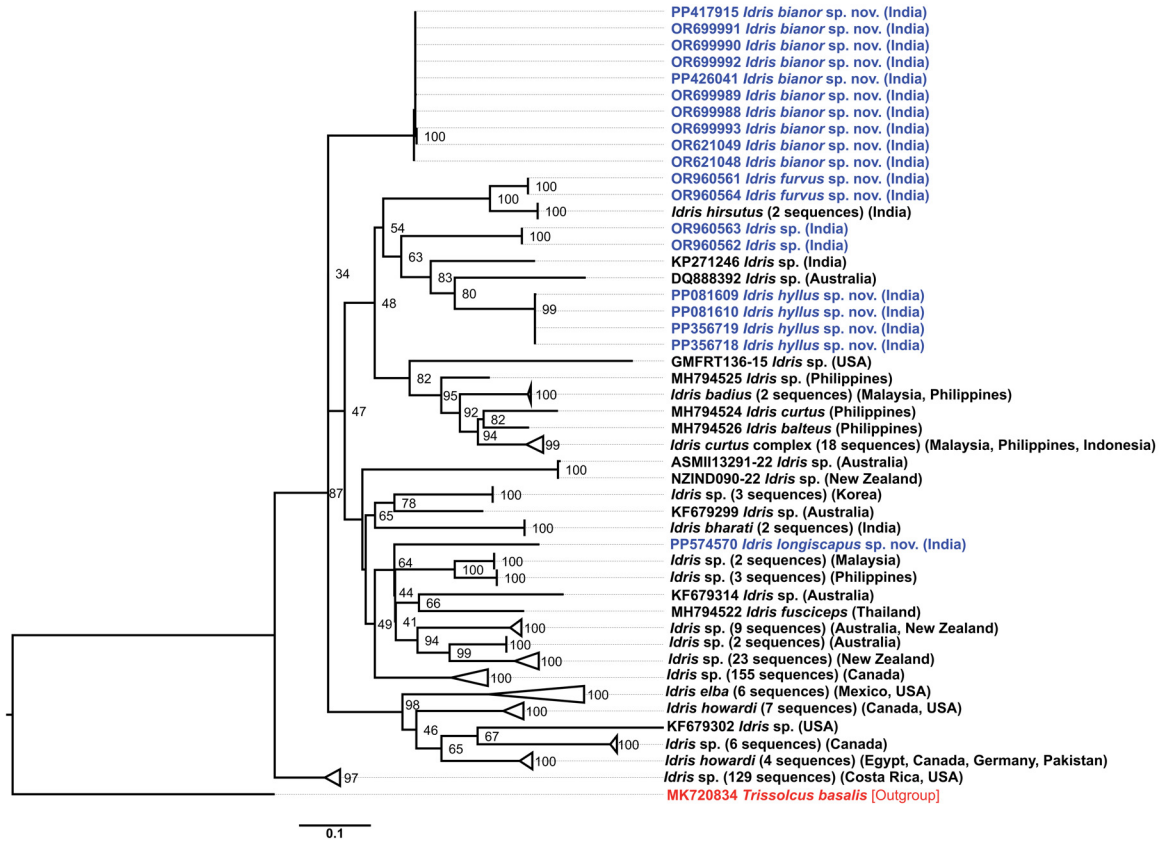

Fig. 5. Maximum likelihood tree for species of *Idris* Förster, 1856 based on 647 bp mt COI sequences. Bootstrap values are indicated on the nodes.

lineage could not be formally described. In another instance of gregarious development, the parasitoids failed to emerge from a spider egg sac. However, they were barcoded (GenBank accession numbers PP356719 and PP356718), and genetic analysis confirmed their conspecificity with *I. hyllus* sp. nov.

Discussion

The present study describes four new species of *Idris*, providing both morphological and molecular characterization. *Idris* is a megadiverse genus with a complex taxonomy (Johnson *et al.* 2018) and has a polyphyletic nature (Carey *et al*. 2006). Huggert (1979) classified *Idris* into two subgenera, *Idris* (*Idris*) and *Idris* (*Ceratobaeus*), based on the presence of a hump on the first metasomal tergite. Both *Idris* and *Ceratobaeus* Ashmead, 1893 are currently treated as valid genera (Carey *et al.* 2006). Huggert (1979) also assigned eight species groups in his revision of the western Palearctic species. However, this grouping lacks comprehensive diagnostic characters, making it difficult to assign additional species to them. None of the four species described here fall under any existing species groups including '*melleus*' species group (Masner & Denis 1996) from the Nearctic region and '*adikeshavus*' (Kamalanathan *et al.* 2015), '*benaka*' (Kamalanathan & Austin 2021) and '*brevioculus'* (Veenakumari *et al*. 2021) species groups from India. *Idris* is very diverse and has been reported from several states from India (Rajmohana 2014). Proper species grouping within *Idris*, a genus with a vast number of described species, requires an integrative taxonomic approach. Therefore, this study did not attempt to assign species groups to the described species. Instead, it focused on providing detailed morphological characterizations and generating voucher-based DNA barcodes to support future revisionary work (Johnson *et al.* 2018).

In order to address the polyphyletic condition of *Idris* and to give a reasonable conclusion to the internal phylogeny, comprehensive taxonomic efforts should be needed, particularly multigene phylogenetic analyses. Mostly originating from Canada and Costa Rica, the sequence data mined from GenBank and BOLD include only a limited number of *Idris* sequences from the Oriental region (Fig. 5, Supp. file 1). This bias hinders identifying region-specific clades, underscoring the need for improved sampling of Oriental fauna. Moreover, many *Idris* sequences represented in the tree (Fig. 5) are unnamed and unpublished, highlighting the need for integrated taxonomic studies.

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Supplementary files

Supp. file 1. List of mt COI sequences of *Idris* Förster, 1856 used in the phylogenetic analysis. https://doi.org/10.5852/ejt.2025.997.2937.13267

Supp. file 2. Pairwise genetic distance (in percentage) among the new species of *Idris* Förster, 1856 based on mt COI marker. https://doi.org/10.5852/ejt.2025.997.2937.13269