



Redescription of three antlions (Neuroptera: Myrmeleontidae) from Kerala part of the Western Ghats and key to antlion genera in tribe Palparini, India

Thangalazhi Balakrishnan Suryanarayanan

Shadpada Entomology Research Lab, Department of Zoology, Christ College (Autonomous), Irinjalakuda, Thrissur, 680125, Kerala, India, affiliated to University of Calicut, Thenhipalam, Malappuram, 673635, Kerala, India.

✉ suryantb1995@gmail.com <https://orcid.org/0000-0002-0679-6914>

Levente Ábrahám

Rippl-Rónai Museum H-7400 Kaposvár, P.O. Box 70, Hungary.

✉ labraham@smmi.hu <https://orcid.org/0000-0002-8007-7117>

Chenthamarakshan Bijoy

Shadpada Entomology Research Lab, Department of Zoology, Christ College (Autonomous), Irinjalakuda, Thrissur, 680125, Kerala, India, affiliated to University of Calicut, Thenhipalam, Malappuram, 673635, Kerala, India.

✉ bijoyc@christcollegeijk.edu.in <https://orcid.org/0000-0002-5016-0454>

Received:
October 26, 2024

Accepted:
February 16, 2025

Published:
July 22, 2025

Subject Editor:
Ehsan Rakhshani

ABSTRACT. *Indopalpares pardus* (Rambur, 1842), *Palpares contrarius* (Walker, 1853), and *Stenares harpyia* (Gerstaecker, 1863) are the species of the tribe Palparini which are recorded for the first time from the Kerala part of Western Ghats. All three taxa are redescribed and the genitalia features of *P. contrarius*, and *S. harpyia* are illustrated for the first time based on the freshly collected specimens. Lectotype and paralectotype specimens of *S. harpyia* are designated. The key to the genera of the tribe Palparini from India and the distribution of three species in India are also mapped. Moreover, their flight period in India is plotted.

Keywords: Distribution, *Indopalpares*, lectotype, *Palpares*, *Stenares*, Taxonomy

Citation: Suryanarayanan, T.B., Ábrahám, L. & Bijoy, C. (2025) Redescription of three antlions (Neuroptera: Myrmeleontidae) from Kerala part of the Western Ghats and key to antlion genera in tribe Palparini, India. *Journal of Insect Biodiversity and Systematics*, 11 (3), 663–691.

INTRODUCTION

Myrmeleontidae is the largest family of Neuroptera with 2138 species belonging to 299 genera (including both antlions and owlflies), of which, only 153 species belonging to 52 genera were reported from India (Ghosh, 2000; Chandra & Sharma, 2009; Machado et al., 2019; Suryanarayanan et al., 2022; Wachkoo et al., 2024). According to the recent classification by Machado et al. (2019), the status of the owlfly family (Ascalaphidae) was changed to the subfamily Ascalaphinae. It currently includes some antlion species and all the owlfly species.

Palparini is one of the principal antlion tribes of Ascalaphinae with 137 species under 20 genera, of which 14 species under 5 genera are known from India (Chandra & Sharma, 2009; Giaomino & Ábrahám, 2018; Machado et al., 2019; Hassan et al., 2023; Suryanarayanan & Bijoy, 2024a; Wachkoo et al., 2024; Oswald, 2025). However, there is another classification where the palparids are not considered as a tribe but as a family (Prost & Popov, 2021) or a subfamily (Aspöck et al., 2001; Stange, 2004; Hevin et al., 2023). In Palparini (or Palparinae, Palparidae), the cubitus posterior (Cup) and first anal vein (A₁) of forewing do not unite but run separately to posterior margin. *Palpares* Rambur, 1842, *Palparellus* Navás, 1912[a], *Stenares* Hagen, 1866, *Tomatares* Hagen, 1866 and *Indopalpares* Insom & Carfi 1988 are the five genera of the Palparini reported from India (Chandra & Sharma, 2009). Among these genera, *Palpares* includes five species reported from India (Chandra & Sharma, 2009; Hassan et al., 2023), namely *P. astarte* Banks, 1913, *P. contrarius* (Walker, 1853), *P. rajasthanicus* Ghosh, 1991, *P. tigroides* (Walker, 1860) and *P. zebratus* Rambur,

Corresponding author: Bijoy Chenthamarakshan, ✉ bijoyc@christcollegeijk.edu.in

Copyright © 2025, **Authors.** This is an open access article distributed under the terms of the Creative Commons NonCommercial Attribution License (CC BY NC 4.0), which permits Share - copy and redistribute the material in any medium or format, and Adapt - remix, transform, and build upon the material, under the Attribution-NonCommercial terms.

1842. There are five *Stenares* species (*S. acutus* Ghosh, 1990, *S. harpyia* (Gerstaecker, 1863), *S. hyaena* (Dalman, 1823), *S. improbus* (Walker, 1853) and *S. frazeri* Banks, 1931) reported from India. *Indopalpares* is a monotypic genus with *I. pardus* (Rambur, 1842) as the only species widely distributed in India.

In this study, we are reporting and redescribing one species from each genus i.e., *I. pardus* (Rambur, 1842), *P. contrarius* (Walker, 1853), and *S. harpyia* (Gerstaecker, 1863) for the first time from the Kerala part of Western Ghats, India. Since detailed illustrations of genitalia features of *P. contrarius* and *S. harpyia* are unavailable, as a part of this study, we are illustrating the same based on the freshly collected specimens. The distribution map and flight period of the three species from India are also plotted. Moreover, the key to the genera of the tribe Palparini from India is revised and updated.

MATERIAL AND METHODS

Adult antlion specimens were collected using a sweep net and light trap (160 W mercury vapour bulb). Later, specimens were transferred to a killing jar containing ethyl acetate. Killed specimens were mounted, stretched, dried, labelled, and preserved. The specimens were examined through a Labomed® Luxeo 6Z stereomicroscope and identified by their venation according to Banks (1913) and Ghosh (1990, 2000). Photographs were taken using a Canon® 7D Mark II digital camera with a 100 mm F/2.8L macro lens. For the preparation of male genitalia, the last 3–4 abdominal segments were removed and placed in 10% KOH overnight. These were then washed in distilled water and kept for observation in 80% ethyl alcohol with a drop of glycerol. Photographs were taken under a Leica® M205 stereomicroscope with LAS V3.7® software. After photography, the genitalia of each specimen were transferred to a glass vial containing 80% ethyl alcohol. The terminology for male and female genitalia follows Aspöck et al. (1980), Aspöck & Aspöck (2008) and Badano et al. (2017). The specimens were deposited in the insect collections of the Shadpada Entomology Research Lab (SERL), Kerala, India. In this study, we examined the type and non-type specimens based on the photos from the two museum collections (MHNG and MfNB). In the present study, the traditional classification based on Aspöck et al. (2001), and Stange (2004) was followed. The distribution map of the species in India was prepared using the software QGIS 3.28.1. The adult flight period in India is prepared based on the collection details of the present study and the data in published literature.

Abbreviation. **Comb** - Combination, **Dist** - Distribution, **Mon** - Monograph, **Nom** - Nomenclature, **Odescr** - Original description, **Syn** - Synonym, **Tax** - Taxonomy; **MHNG** - Museum d'Histoire Naturelle, Geneva, Switzerland; **MfNB** - Museum für Naturkunde Berlin, Germany. **C** - Costa, **Sc** - Subcosta, **R** - Radius, **Mp** - Media posterior, **Mp₁** - Media posterior 1, **Mp₂** - Media posterior 2, **Cua** - Cubitus anterior, **Cua₁** - Cubitus anterior 1, **Cua₂** - Cubitus anterior 2, **Cup** - Cubitus posterior, **A₁**, **A₂** and **A₃** - Anal veins 1, 2 and 3, **oRs** - origin of Rs, **pt** - pterostigma, **ect** - ectoproct, **T8** and **T9** - tergite 8 and 9, **S8** - **S9** sternite 7, 8 and 9, **gx** - gonocoxites, **gx8** - gonocoxites 8 (posterior gonopophysis), **gx9** (lateral gonopophysis) in female, **gx9** and **gx11** - gonocoxite 11 (parameres and gonarcus complex in male).

RESULTS

Taxonomic hierarchy

Class Insecta Linnaeus, 1758

Order Neuroptera Linnaeus, 1758

Family Myrmeleontidae Latreille, 1802

Tribe Palparini Banks, 1911

Key to the genera of the tribe Palparini known from India

- 1 Double rows of cells in hindwing costal area, partial or whole length (Fig. 10C). **Stenares Hagen**
- Only single rows of cells in hindwing costal area (Figs 2C, 6D). **2**
- 2 Forewing membrane predominantly bright yellow with large brown marks. **3**

- Forewing membrane transparent with large brown marks. 4
- 3 Pronotum completely black. *Palparellus* Navás
- Pronotum yellow with black pattern, forms from three merging spots or transverse band.
..... *Tomatares* Hagen
- 4 Eye width almost equal with inter-ocular distance in frontal view (Fig. 6A). *Palpares* Rambur
- Eye width considerably longer (1.4×) than inter-ocular distance in frontal view (Fig. 2A).....
..... *Indopalpares* Insom & Carfi

Genus *Indopalpares* Insom & Carfi, 1988

Indopalpares Insom & Carfi, 1988:77 (Odescr), Hassan et al., 2023:567 (Redescr). Type species: *Palpares pardus* Rambur, 1842:375.

Remarks. The genus *Indopalpares* was described by Insom & Carfi (1988) in a partial revision of the genus *Palpares*. Since then, Hassan et al. (2023) provided new information regarding the diagnosis of the genus. It appears to be a monotypic genus in the Indian subcontinent.

Distribution. Southern Asia, India and surrounding countries.

Indopalpares pardus (Rambur, 1842) (Figs 1–4).

Palpares pardus Rambur, 1842:375 (Odescr), Needham, 1909:200 (Dist), Sala de Castellarnau, 1946:122 (Dist), Ghosh & Sen, 1977:316 (Chlist), Ghosh, 1977:313 (Dist), 1983:296 (Dist), 1984:12 (Mon). Type locality: India (Maharashtra: Mumbai); *Myrmeleon expertus* Walker, 1853:311 (Odescr), Banks, 1913:188 (Syn). Type locality: Unknown; *Myrmeleon nepalensis* Hagen, 1866:444 (Odescr), Stange, 2004:40 (Syn). Type locality: Unknown; *Palpares pardus partitus* Banks, 1911b:100 (Odescr), Stange, 2004:40 (Syn). Type locality: India (Bombay, Bassein Fort); *Palpares pardus asanai* Kuwayama, 1933:44 (Odescr), Stange 2004:40 (Syn). Type locality: India (Maharashtra; Mumbai); *Palpares pardus stellatus* Navás, 1912a:223 (Odescr), Stange, 2004:40 (Syn). Type locality: Sri Lanka; *Indopalpares pardus* (Rambur, 1842) – Insom & Carfi, 1988:77 (Comb), Ghosh, 1991:92 (Dist), 1998:134 (Dist), 2000:72 (Mon), Chandra & Sharma, 2009:14 (Chlist), Chandra & Thilak, 2009:72 (Dist), Chandra et al., 2011:156 (Dist), Sharma & Chandra, 2012:486 (Dist), Sharma & Chandra, 2013:164 (Dist), Chandra et al., 2014:71 (Dist), Singh et al., 2020:505 (Dist), Wachkoo et al., 2024:60 (Dist).

Materials examined. 4♂♂, 3♀♀, INDIA, Kerala State, Malappuram District, Vazhayur, 76 m, 11°12'23.24"N, 75°54'28.51"E, 21.XI.2020, 24.X.2021, 14.XI.2021. leg.: Suryanarayanan. T.B., Mohammed Ramees. K., SERLNR104, SERLNR209, SERLNR210, SERLNR211, SERLNR212, SERLNR232, SERLNR233.

Diagnosis. Male body length larger than female. Eyes remarkably large, width 1.4x longer than inter-ocular distance in frontal view. Palpimacula oval, not reaching tip of labial palp. Pronotum yellow, medially with a longitudinal dark-brown stripe. General colour of body brown. Sub-apical marking not reaching hind margin in hindwing. Legs yellow, tarsi dark-brown; tibial spur as long as tarsal segments 1–3 together.

Redescription. — Male (n=4): Body length: 41–42 mm; forewing length: 44–45 mm, width 14 mm; hindwing: length 42–43 mm, width 12 mm. Female (n=3): Body length: 35–36 mm; forewing length: 42–43 mm, width: 13 mm; hindwing length: 40–41 mm, width: 12 mm (Fig. 1A–B).

Head (Fig. 2A–C). Vertex yellow, medially divided by dark-brown line, short black setae. Frons brown with dark-brown transversal stripe below and above scapus, with black setae, inter-antennal marking dark-brown, anterior tentorial pits brown. Gena yellow with black setae. Clypeus yellow, covered with long black setae; labrum, mandible dark-brown with black setae; maxillary and labial palps light-brown with long black setae. Eyes brownish-black, large, wider than half of head width. Antenna black, longer than length of head and prothorax combined; scape dark-brown; pedicel reddish-brown with light-brown distal annulations; flagellomeres annulated with dark-brown black setae. Club black, thicker at apex than at base.

Thorax (Fig. 2B). Pronotum much wider than long, yellow, medially with longitudinal dark-brown stripe, covered with long black setae on anterior and posterior margins; mesonotum and metanotum subdominantly dark-brown with small yellow markings, covered with long yellow and brown hairs on distal margins.

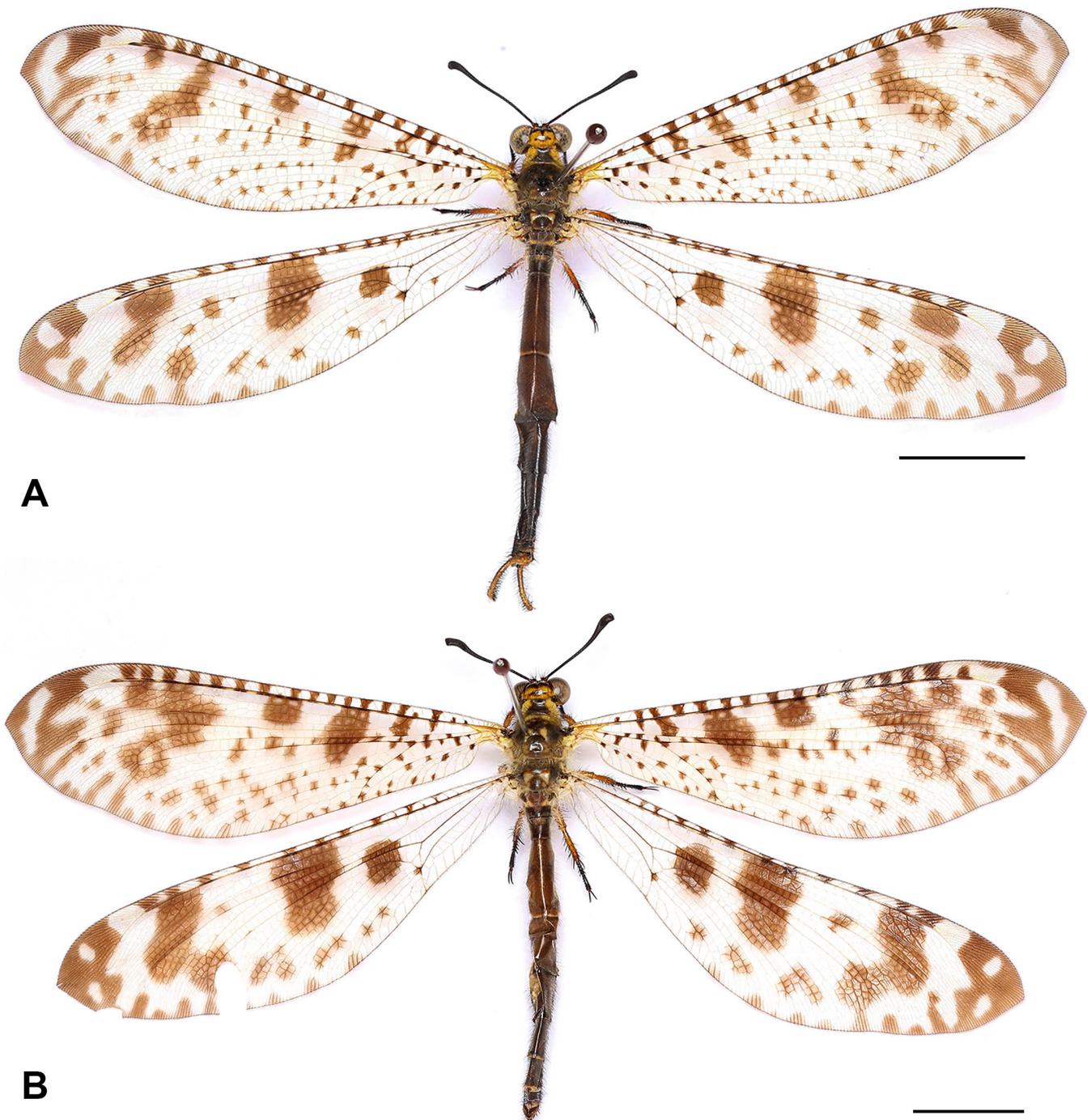


Figure 1. *Indopalpares pardus* (Rambur, 1842). **A.** Male habitus; **B.** Female habitus. Scale bar: 10 mm.

Wings (Fig. 2D). Forewing tips subacute and straight below, anal area obtuse, anal margin slightly concave, venation dense, scattered dark-brown spots throughout wing surface. Venation covered with short sparse brown setae. Costa dark-brown with short dense dark-brown setae. Costal area with single rows of cells, cells longer than wide, with discontinuous dark-brown shaded patches. Cross-veins simple near base, but 1-2 bifurcated cross-veins in front of pterostigma. Pterostigma with 9-10 veins, veins bifurcated basally and simple distally, pale basally, brown distally. Subcosta and R dark-yellow alternating dark-brown at cross-veins. 12 branches in radial sector, 5 cross-veins in front of origin of Rs. Mp , Mp_1 and Cua , Cua_1 also dark-yellow alternating dark-brown veins. Cross-veins dominantly yellow and highly shaded in basal medio-cubital area. Cubital fork ca. 30° , acute enough. A_1 , A_2 , and A_3 yellow basally and brown distally; between A_2 and A_3 with 2 cells, A_1 , A_2 , and A_3 bifurcated distally.

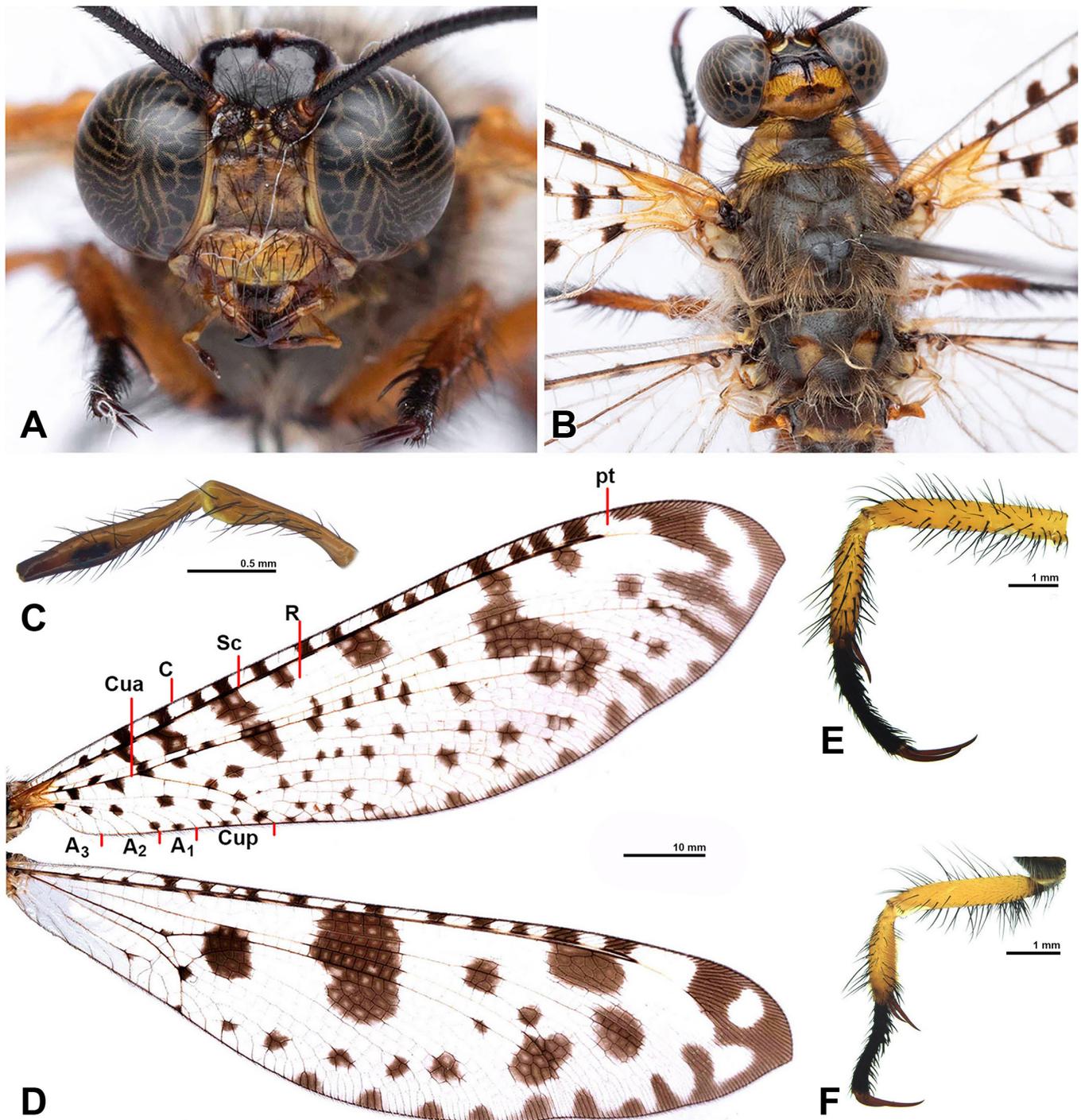


Figure 2. *Indopalpares pardus* (Rambur, 1842) male. **A.** Head in frontal view; **B.** Vertex and thorax in dorsal view, **C.** Labial palp, lateral view; **D.** Wing venation; **E.** Foreleg in lateral view; **F.** Hindleg in lateral view.

Membrane covered with scattered large dark-brown spots, relatively smaller spots than hindwing. Hindwing C yellow with short dark dense brown setae. 1 cross-vein bifurcated in front of pterostigma otherwise simple, both ends brown. Pterostigma with 2–3 bifurcated veins, dominantly faint yellow. Subcosta and R pale-yellow, with alternating dark-brown at cross-veins. 10–11 branches in radial sector, 6–7 cross-veins in front of origin of Rs. Media posterior, Mp_1 pale-yellow but small dark-brown sections at meeting points with cross-veins. Cua, Cua₁ dominantly dark-brown. Cross-veins dominantly brown basally yellow distally in medio-cubital area. Membrane covered with scattered large dark-brown bands, relatively much larger ones than on forewing.

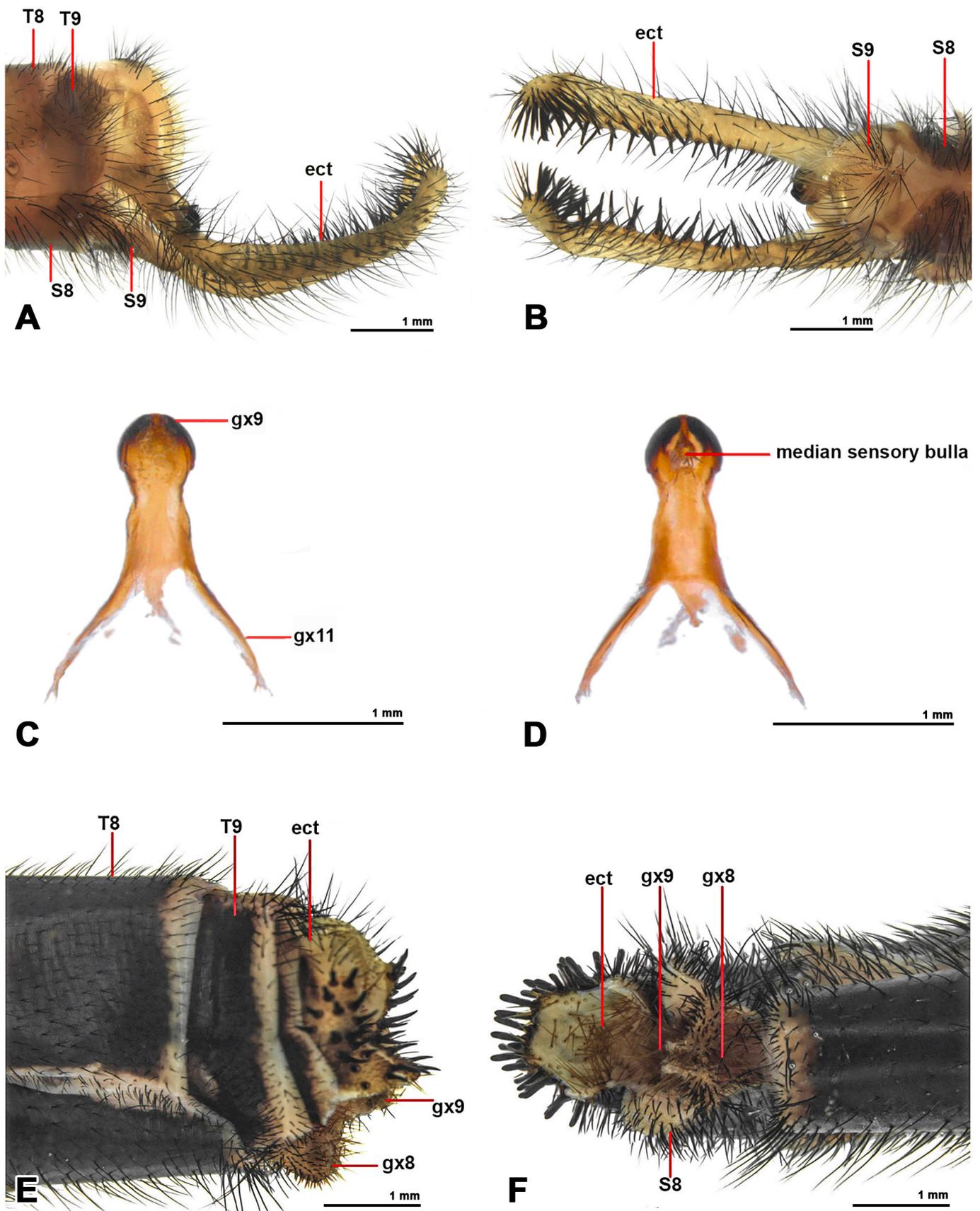


Figure 3. *Indopalpares pardus* (Rambur, 1842). **A.** Male terminalia in lateral view; **B.** The same in ventral view; **C.** Male genitalia: gonarcus and parameres complex (gonocoxites gx9 + 11) in dorsal view (in sense Aspöck et al., 1980; Aspöck & Aspöck, 2008; Badano et al., 2017); **D.** The same in ventral view; **E.** Female terminalia in lateral view; **F.** The same in the ventral view.



Figure 4. *Indopalpares pardus* (Rambur, 1842). **A.** Adult male in natural habitat; **B.** Habitat of species in Vazhayur, Kerala. [photo: Mohammed Ramees K.]

Legs (Fig. 2E–F). Foreleg long, hindleg short and strong. Legs dominantly brownish-yellow with black hairs. Coxae dark-brown densely covered with long black hairs. Trochanter light-brown. Fore, mid and hind femora yellow, covered with upstanding long black bristles and short black hairs. Femora longer than tibiae. Fore and mid tibiae generally yellow, covered with long black bristles and short black hairs. Hind tibia yellow, covered with long black hairs and short yellow hairs. Tibial spurs almost straight, reddish-brown, as long as tarsomeres 1–3 together. Tarsi black, covered with long black setae. Tarsal claws slightly curved, reddish-brown, half long as tarsal segment 5.

Abdomen. Shorter than hindwing, dark-brown, covered with short black setae and long black hairs. Posterior margin of each tergum with dark-brown and pale brown longitudinal rings. Sternites dark-brown with long black hairs.

Male terminalia and genitalia (Fig. 3A–D). In lateral view, tergum 9 subquadrate; ectoproct base oval with evenly arched cylindrical processus, covered with medium long black hairs; tip of processus blunt. In ventral view, sternite 9 triangular-shaped, covered with black hairs, at base of ectoproct processus one rigid black bristle directed inwards. Caudal part two-thirds of processus, covered with strong pointed black setae inwardly. Genitalia as in Figure 3C–D in dorsal and ventral views. In ventral view, special sensory bulla with short black hairs between gonocoxites 9.

Female terminalia (Fig. 3E–F). In lateral view, tergum 8 and 9 quadrate, ectoproct ovoid plate, covered with stout black setae caudo-ventrally. In ventral view, gonocoxite 8 short, covered with long black hairs; gonocoxite 9 club-shaped, covered with some stout setae on margins.

Distribution. For distribution data, we cite only the publication that first mentions the occurrence of the species in a country. India (Rambur 1842), Myanmar (New, 2003), Pakistan (Iqbal & Yousuf, 1990), Sri Lanka (Navás 1912a).

Flight period and habitat. Adults are active at night, attracted by artificial light. In the daytime, it sits on grass blades and bushes at rest (Fig. 4A–B). The habitat of the larva is surrounded by semi-closed grassland in laterite soil with an altitude below 100 m. It is not a pit-building species. The adult flight period in India is mainly observed during January, March, July, August, September, October, and November based on the present study and the data in published literature (Fig. 15).

Distribution in India (Fig. 16). Bihar (Purnia, Pusa), Chhattisgarh (Bilaspur, Kabirdham, Koriya, Raipur, Surguja), Goa (Mollem), Gujarat (Surat), Himachal Pradesh (Kinnaur), Karnataka (Bangalore), Kerala (Vazhayur), Madhya Pradesh (Balaghat, Bhopal, Chhindwara, Damoh, Hoshangabad, Khandwa, Khargone, Mandla, Narmadapuram, Shahdol, Umaria), Maharashtra (Mumbai, Palghar, Ratnagiri, Satara), Odisha (Angul, Dhenkanal, Ganjam, Kalahandi, Khordha, Puri, Sambalpur), Rajasthan (Chittorgarh), Sikkim, Uttarakhand (Almora, Dehradun), West Bengal (Bankura, Birbhum, Darjeeling, Jalpaiguri, Purulia), Himalayan and Peninsular sectors of India.

Genus *Palpares* Rambur, 1842

Palpares Rambur, 1842:365 (Odescr). Type species: *Hemerobius libelluloides* Linnaeus, 1764:401; *Negretus* Navás, 1912b:56 (Odescr), Stange, 2004:47 (Syn). Type species: *Negretus ertli* Navás, 1912b:57 (Odescr).

Remarks. The genus *Palpares* Rambur, 1942 was the first to be described in the tribe Palparini. Based on recent studies, some African species in *Palpares* were separated and placed into different genera (Insom & Carfi, 1988; Mansell, 1990, 1992a, 1992b, 1996, 2004, 2018; Hévin et al., 2023). *Indopalpares pardus* (Rambur, 1842) and *Palparellus astutus* (Walker, 1853) are the only included species in these studies from Indian fauna. *Palpares contrarius* (Walker, 1853) is morphologically very different from the type species *Palpares libelluloides* (Linnaeus, 1867). So it is likely that *Palpares contrarius* should be placed in a different genus. It will only be revealed by future revision on *Palpares* species. Therefore, we do not provide a genus-level diagnosis for the species, as this would only provide incorrect information.

Distribution. Palearctic, Afrotropical and Oriental regions (Stange, 2004; Machado et al., 2019).

***Palpares contrarius* (Walker, 1853) (Figs 5–8).**

Myrmeleon contrarius Walker, 1853:301 (Odescr). Type locality: Sri Lanka; *Palpares falcatus* McLachlan, 1867:236 (Odescr). Type locality: Myanmar (former Burma); *Symmalthetes contrarius* (Walker, 1853) – McLachlan, 1867:237 (Comb); *Symmalthetes falcatus* (McLachlan, 1867) – McLachlan, 1867:237 (Comb); *Lachlathetes contrarius* (Walker, 1853) – Navás, 1926:155 (Nom); *Lachlathetes falcatus* (McLachlan, 1867) – Navás, 1926:155 (Nom); *Palpares sinicus* C.-k. Yang, 1986:423 (Odescr), Giacomino & Abrahám, 2018 (Syn). Type locality: China (Yunnan); *Palpares contrarius* (Walker, 1853) – McLachlan, 1867 (Comb), Needham, 1909:200 (Dist), Ghosh & Sen, 1977:316 (Chlist), Ghosh, 1984:2 (Mon), 2000:73 (Mon), Chandra & Sharma, 2009:14 (Chlist), Chandra et al., 2011:157 (Dist), Sharma & Chandra, 2012:486 (Dist), Sharma & Chandra, 2013:164 (Dist), Anita & Tilak, 2024:26047 (Dist), Wachkoo et al., 2024:61 (Dist).

Diagnosis. Male (body length: 60 mm) larger than female (body length: 50 mm). Pronotum yellow, with a medial and two lateral dark-brown stripes. General colour of body brown. Tip of hindwing strongly concave below. Legs brown, tarsi dark-brown, tibial spurs as long as tarsal segments 1–2 together.

Materials examined. 2♀, INDIA, Kerala State, Palakkad District, Pudunagaram, 109 m, 10°40'57.72"N, 76°41'02.02"E, 20.X.2014, 22.X.2014, leg.: Bijoy. C., SERLNR034, SERLNR035; 1♀, Kerala State, Kollam District, Rose mala, 402 m, 8°54'54.00"N, 77°10'12.23"E, 28.III.2021, leg.: Suryanarayanan. T.B., SERLNR313; 1♀, Kerala State, Kollam District, Kattilapara, 315 m, 8°51'28.18"N, 77°13'03.08"E, 29.III.2021, leg.: Suryanarayanan. T.B., SERLNR314; 1♀, Kerala State, Kozhikode District, Payamthodu, 40 m, 11°42'22.10"N, 75°42'31.90"E, 02.IV.2021, leg.: Shahel. A Z., SERLNR123; 1♀, Kerala State, Kannur District, Kuthuparamba, 39 m, 11°49'54.78"N, 75°33'55.85"E, 08.IV.2021, leg.: Mohammed Anas. P. P., SERLNR128; 1♂, Kerala State, Wayanad District, Begur, 733 m, 11°52'56.80"N, 76°04'43.66"E, 12.III.2022, leg.: Abhin. M. Sunil. & Suryanarayanan. T. B., SERLNR265; 3♂, 2♀, Kerala State, Wayanad District, Thirunelly, 862 m, 11°54'40.17"N, 76°00'00.83"E, 21.III.2022, leg.: Suryanarayanan. T.B., SERLNR267, SERLNR268, SERLNR269, SERLNR270, SERLNR271; 1♂, Kerala State, Idukki District, Kolahalamedu, 1113 m, 09°39'03.96"N, 76°55'43.01"E, 12.III.2023, leg.: Mohammed Ramees K., SERLNR355.

Redescription. — Male (n=4). Body length: 59–60 mm; forewing length: 57–58 mm, width 18 mm; hindwing: length 56–57 mm, width 16 mm. Female (n=4). Body length: 49–50 mm; forewing length: 62–63 mm, width: 18 mm; hindwing length: 60–61 mm, width: 17 mm (Fig. 5A–B).

Head (Fig. 6A–C). Vertex yellow with dark-brown band proximally joined to distal dark-brown band by median dark-brown line. Frons yellow with pale brown transverse stripe below and above scapus, with white setae, inter-antennal mark dark-brown, anterior tentorial pits brown. Gena dark-brown dorsally and yellow basally. Eyes large, slightly wider than frons. Scape large, dark-brown with black hairs; pedicel reddish-brown with dark-brown annulation; flagellomeres annulated with dark-brown and pale rings. Club dark-brown, thicker at tip than at base. Clypeus yellow with row of long black setae on dorsal margin; labrum yellow with ochreous setae on ventral margin, maxillary palps, labial palps dark-brown, palpimacula reaching tip distally; mandible dark-brown with black apices and inner surface.

Thorax (Fig. 6B). Pronotum wider than long, yellow, with one longitudinal dark-brown band medially and two bands laterally, covered with brown hairs, especially on margins; mesonotum and metanotum generally yellow, medially with narrow dark-brown stripe, covered with long white and brown hairs on distal margin.

Wings (Fig. 6D). Forewing tip subacute and slightly concave below, anal area obtuse, hind margin concave, venation dense, covered with short sparse dark-brown setae. Costa brown with short dense dark-brown setae. Costal area with single rows of cells, cells longer than wide, with dark-brown shaded patches. Cross-veins simple near base, but bifurcated in front of pterostigma. Pterostigma indistinct reddish-brown with 5–6 cross-veins, veins bifurcated basally and simple distally. Subcosta and R yellow alternating dark-brown at cross-veins. 6–7 cross-veins in front of origin of Rs. Mp, Mp₁ and Cua, Cua₁ also dark-brown alternating light-brown sections at cross-veins. Cross-veins dominantly brown and highly shaded in basal medio-cubital area. Cubital fork ca. 30°, acute enough. Membrane with four dark-brown bands (Fig. 6D). Hindwing wide enough, tip acute, strongly falcate below, hind margin slightly concave. Costa yellow with short dark dense brown setae. 2–3 cross-veins bifurcated in front of pterostigma otherwise simple, both ends brown. Pterostigma indistinct reddish-brown. Subcosta brown with alternating dark-brown at cross-veins R predominantly brown. 3–4 cross-veins in front of origin of Rs. Mp, Cua, Cua₁, and Cup dominantly dark-brown with dark-brown sections at meeting points with cross-veins. Cross-veins dominantly dark-brown basally, brown distally in medio-cubital area. Membrane with three dark-brown bands (Fig. 6D).

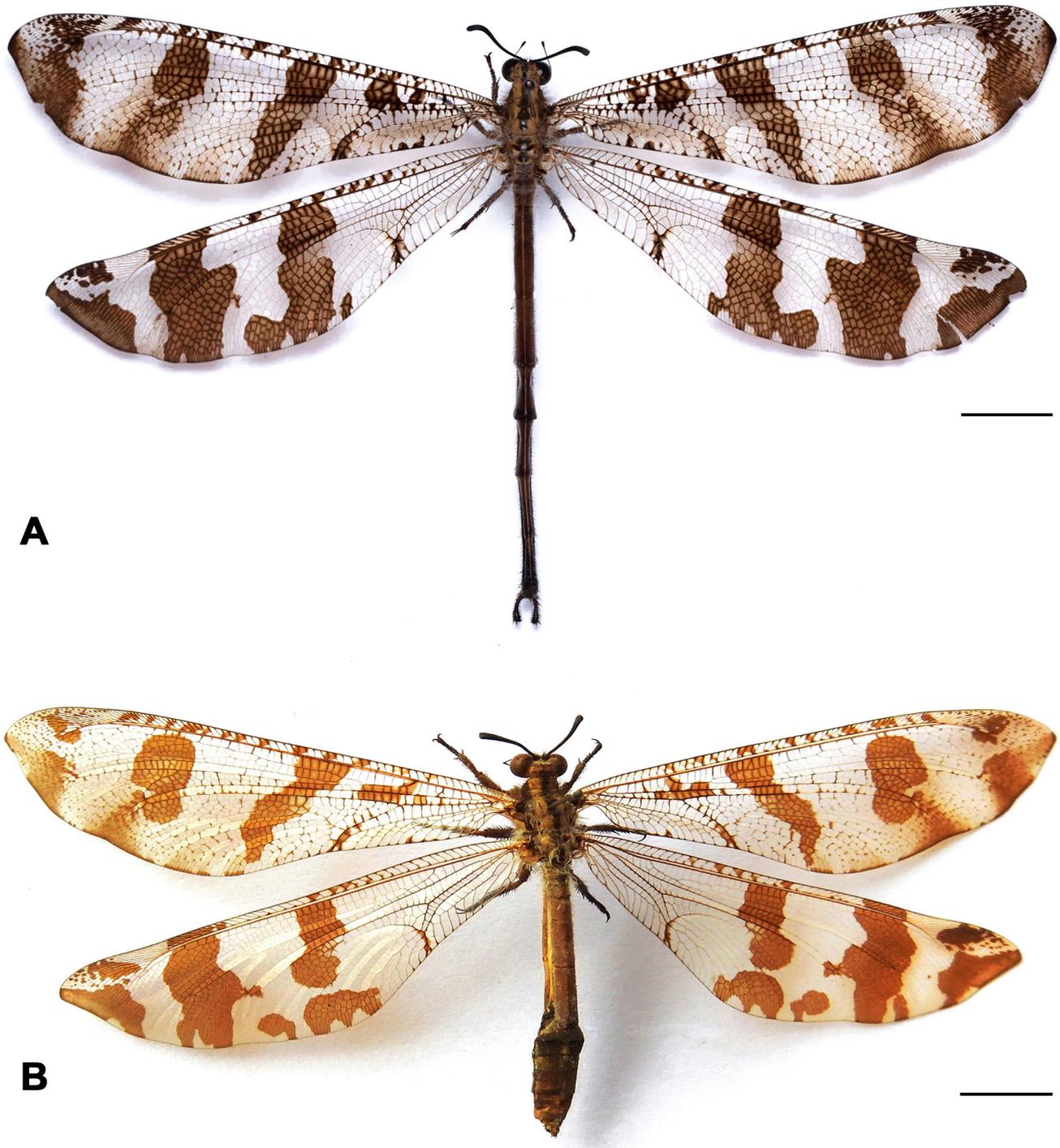


Figure 5. *Palpares contrarius* (Walker, 1853). **A.** Male habitus; **B.** Female habitus. Scale bar: 10 mm.

Legs (Fig. 6E-F). Short and strong, dark-brown with black bristles and short white hairs. Coxae dark-brown densely covered with long black bristles; trochanter dark-brown; mid and hind femur dark-brown, covered with long black bristles and short white setae laterally; tibiae generally dark-brown, covered with long black bristles and short brown and white setae; hind tibia dark-brown, covered with long black setae and short white setae, tibial spurs reddish-brown, as long as tarsomeres 1-2 together; tarsi dark-brown, covered with long black and short white setae; tarsal claws slightly curved, reddish-brown, $3/4$ as long as tarsal segment 5.

Abdomen. Shorter than hindwing, dark-brown, covered with short black setae. Distal margin of each tergum dark-brown with pale brown longitudinal line. Sternites dark-brown, with long black setae.

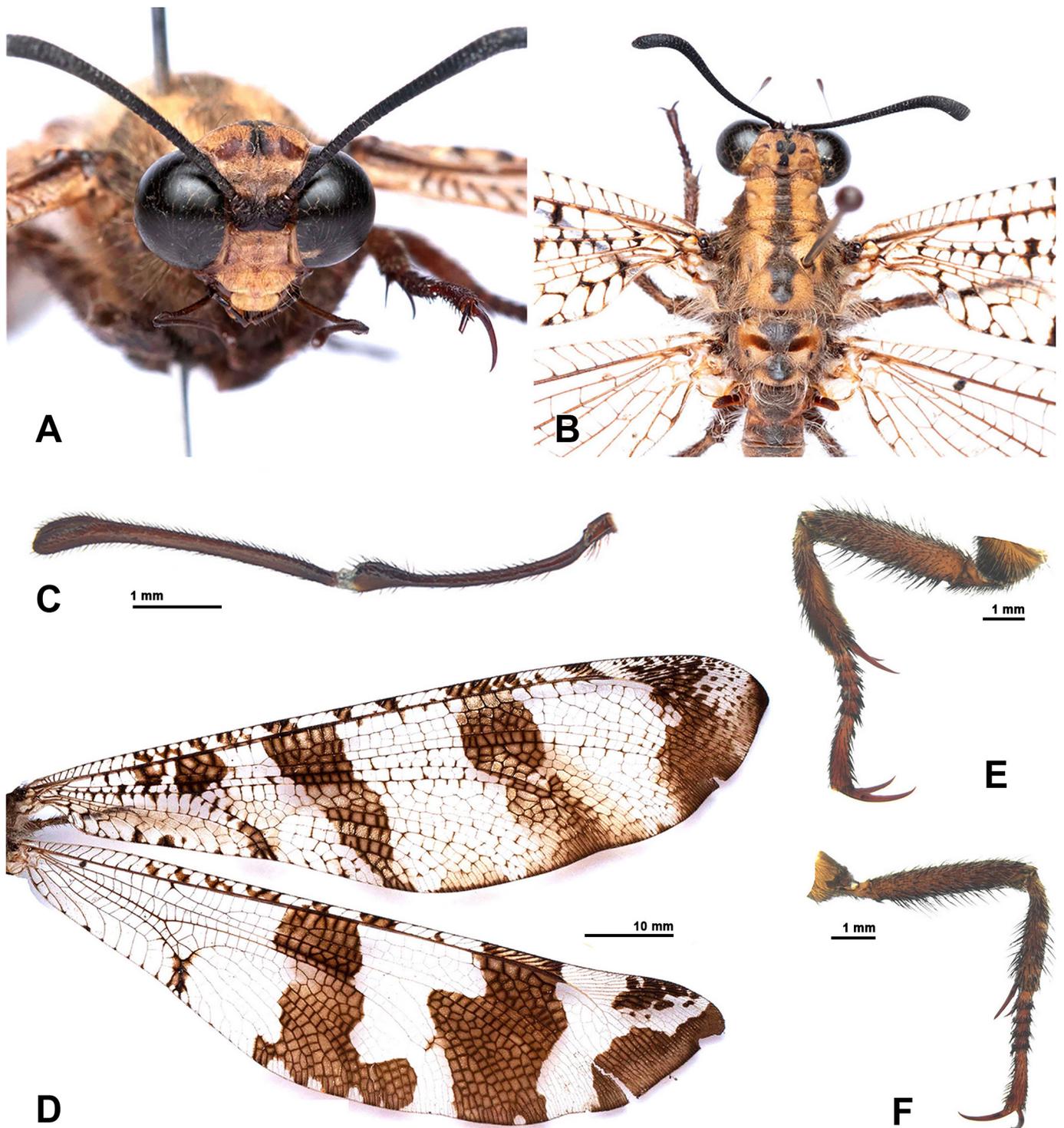


Figure 6. *Palpares contrarius* (Walker, 1853) male. **A.** Head in frontal view; **B.** Vertex and thorax in dorsal view; **C.** Labial palp in lateral view; **D.** Wing venation; **E.** Foreleg in lateral view; **F.** Hindleg in lateral view.

Male terminalia and genitalia (Fig. 7A-D). In lateral view, tergum 9 quadrate, ectoproct base oval with cylindrical, curved caudal-ventral processus, longer diagonal of base and length of processus almost equal. Ectoproct base covered with small black hairs, processus with dense, stiff, acute black setae. In ventral view, sternite 9 triangular, and covered with black hairs. Two or three strong acute bristles directed inwards on basal part of processus. Caudal part of processus also covered with strong short black bristles directed inwards. Genitalia as in Figure 7C-D in dorsal and ventral views.

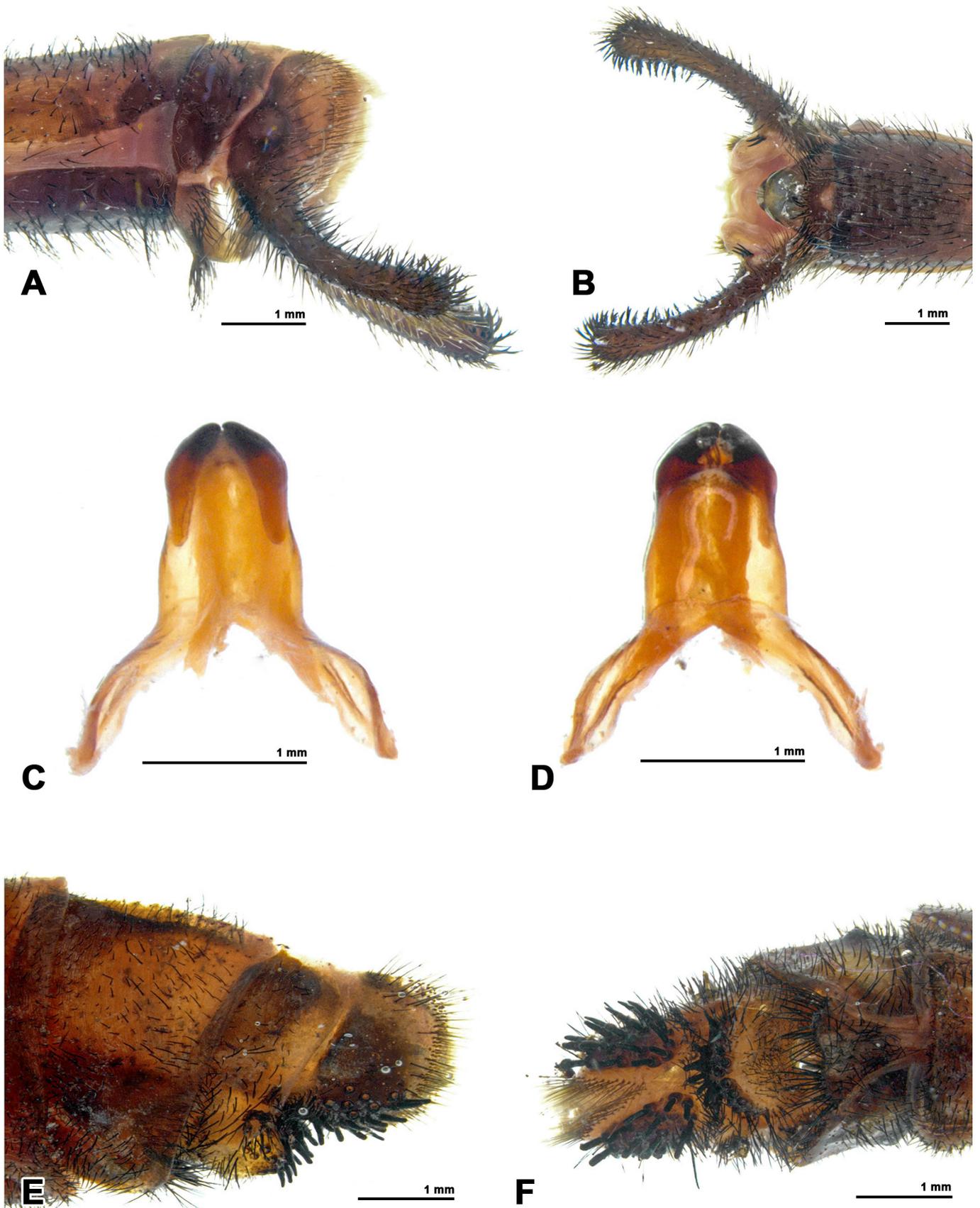


Figure 7. *Palpares contrarius* (Walker, 1853). **A.** Male terminalia, in lateral view; **B.** The same, in ventral view; **C.** Male genitalia: gonocoxites gx9 + 11 in dorsal view (in sense Aspöck et al., 1980; Aspöck & Aspöck, 2008; Badano et al., 2017); **D.** The same in ventral view; **E.** Female terminalia in lateral view; **F.** The same, in ventral view.



A



B

Figure 8. *Palpares contrarius* (Walker, 1853). **A.** Adult male in natural habitat [photo: Mohammed Ramees K.]; **B.** Habitat of species in Thirunelly, Kerala.

Female terminalia (Fig. 7E–F). In lateral view, tergum 8 quadrate; ectoproct semicircular, covered with black hairs and with prominent short stout setae caudal-ventrally. In lateral view, gonocoxite 8 short with some stout setae, and gonocoxite 9 club-shaped, caudally covered with stout black setae.

Distribution. Cambodia (Navás, 1914), China (Ábrahám & Giacomino, 2020), India (Needham, 1909), Laos (Giacomino & Ábrahám, 2018), Myanmar (McLachlan, 1867), Sri Lanka (Walker, 1853), Thailand (Giacomino & Ábrahám, 2018), and Vietnam (Krivokhatsky, 1997).

Flight period and habitat. Adults are active at night, and attracted by artificial light. In the daytime, it sits on dry bushes at rest (Fig. 8A–B), because of the colour and pattern of the wing, it looks like an old dry leaf and can easily camouflage from the surrounding environment. The habitat is surrounded by trees and bushes in the forest as well as in synanthropic ecosystems which are recorded from different altitudes. It is not a pit-building species. The adult flight period in India is mainly observed during March, April, and October based on the literature (Fig. 15). The same pattern was observed by Suryanarayanan & Bijoy (2023).

Distribution in India (Fig. 16). Karnataka (Coorg), Kerala (Kattilapara, Kolahalamedu, Kuthuparamba, Payamthondu, Pudunagaram, Rosemala, Thirunelly), Madhya Pradesh (Pachmarhi), Maharashtra (Koyana), Mizoram (Chhimtuipui), Odisha (Cuttack, Mayurbhanj, Khordha), Tamil Nadu (Tambaram), Uttarakhand (Mussoorie).

Comments. Mathew (1993) recorded *Palpares infimus* (Walker, 1853) from Malayattoor in Ernakulam district, Kerala. This was the only reported *Palpares* species from the Kerala state. As the above specimen was destroyed in the collection, the species of the specimen was not fully confirmed by us. It may be misidentified and may be *Palpares contrarius* (Walker, 1853). Still, Malayattoor was not added to the list of *P. contrarius* from Kerala.

Genus *Stenares* Hagen, 1866

Stenares Hagen, 1866:372, 460 (Odescr). Type species: *Myrmeleon hyaena* Dalman, 1823:89.

Remarks. In India, *Stenares* species were mainly reported by Navás (1932) and Ghosh (1990). Some African species were also included in their reports. According to Prost (2010), the presence of African species in the Indian fauna is based on an incorrect determination. We also agree with him because the West African *Stenares* species are distinct from the Pakistan, Indian, and Arabian species. They form separate groups within the genus *Stenares*. It is worth making a new diagnosis only on the basis of complete revision.

Distribution. This genus is spread from Sub-Saharan Western Africa to the Arabian Peninsula and the Indian subcontinent.

Stenares harpyia (Gerstaecker, 1863) (Figs 9–14).

Palpares harpyia Gerstaecker, 1863:180 (Odescr); *Stenares harpyia* (Gerstaecker, 1863) – Hagen, 1866:460 (Comb), Banks, 1913:190 (Tax), Esben-Petersen, 1931:445 (Dist), Kimmins, 1945:99 (Tax, Dist), Ghosh & Sen, 1977:317 (Chlist), Ghosh, 1990:455 (Tax, Dist), Whittington, 2002:385 (Dist), Stange, 2004:67 (Mon), Chandra & Sharma, 2009:14 (Chlist), Wachkoo et al., 2024:62 (Dist).

Diagnosis. General colour dark-brown. Eyes conspicuously large, palpmacula reaching tip of last labial segment. Pronotum yellow with a wide dark-brown longitudinal stripe and small dark-brown spot on either side of stripe. Cells in costal area of both wings divided into two rows. Hind wing tip rounded. A narrow transparent stripe extending from tip to base of hindwing between two broad brown spots. Legs dark-brown to black, tibial spurs as long as tarsal segments 1–3 combined.

Materials examined. 2♂♂, INDIA, Kerala State, Wayanad District, Thirunelly, 862 m, 11°54'40.17"N, 76°00'00.83"E, 09.IV.2021, 23.III.2022, leg.: Suryanarayanan. T.B., SERLNR132, SERLNR275; 1♀, Kerala State, Pathanamthitta District, Gavi, 1179 m, 9°26'03.82"N, 77°09'52.21"E, 11.IV.2021, leg.: Vishnu Das. E. H. & Suryanarayanan. T. B., SERLNR142; 1♂, Kerala State, Idukki District, Vallakkadavu, 806 m, 9°34'19.64"N, 77°05'22.43"E, 26.II.2022, leg.: Vishnu. R. & Suryanarayanan. T. B., SERLNR263.

Redescription. — Male (n=3). Body length: 51–52 mm; forewing length: 65–66 mm, width 15 mm; hindwing: length 63–64 mm, width 15 mm. Female (n=1). Body length: 52 mm; forewing length: 70 mm, width: 18 mm; hindwing length: 68 mm, width: 17 mm (Fig. 9A–B).

Head (Fig. 10A–D). In dorsal view, vertex divided by dark-brown line medially and with dark-brown spots at least five rows transversely. In frontal view, vertex yellow and strongly arched. Frons yellow with narrow brown transverse stripe below and above scapus, with white setae, inter-antennal spot dark-brown, anterior tentorial pits brown. Gena black dorsally and yellow basally. Eyes blackish-brown, large, slightly wider than frons width. Antenna black, longer than length of head and prothorax combined; scape dark reddish-brown with black hairs; pedicel dark-brown; flagellomeres dark-brown and annulated short white and black setae; club black. Clypeus yellow, covered with sparse brown setae; labrum yellow, maxillary and labial palps dark-brown. Mandible dark-brown to black.

Thorax (Fig. 10B). Pronotum wider than long, yellow, medially with a longitudinal dark-brown stripe and dark-brown spot on either side of stripe covered with long white hairs; mesonotum and metanotum generally dark-brown with small yellow marks covered with long dense white and brown hairs in lateral margins.

Wings (Fig. 10C). Forewing tip obtuse and with straight margin below, anal area obtuse, anal margin slightly concave, venation dense, cross veins marked with small dark-brown dots entirely. Venation covered with short sparse dark-brown setae. Costa dark-brown with short dense dark-brown setae. Costal area with two rows of cells, cells longer than wide. Costal cross-veins simple near base but bifurcated in front of pterostigma. Pterostigma indistinct, yellow with 4–5 veins. Subcosta and R dark yellow alternating dark-brown sections at cross-veins. 3–4 regular cells and 6–7 irregular cells in 2–3 rows in front of origin of Rs. Mp, Mp₁, Cua, and Cua₁ also dark-brown with alternating yellow sections. Cross-veins dominantly brown and strongly shaded in basal medio-cubital area. Cubital fork ca. 30°, acute enough. Dark-brown pattern as in Figure 9A, variable. A₁, A₂, and A₃ yellow basally and brown distally. Hindwing C dark-brown with short dark dense brown setae. Costal area with two rows of cells, cells longer than wide, with dark-brown shaded marks before pterostigma. Pterostigma indistinct, yellow with 4–5 bifurcated veins. Subcosta and R dark-yellow alternating dark-brown sections at cross-veins. 1–3 regular and 3–5 irregular cells in front of origin of Rs. Mp, Mp₁ and Cua, Cua₁ dominantly dark-brown. Cross-veins predominantly brown basally, and yellow distally in medio-cubital area. Pattern on membrane as in Figure 9B, variable.

Legs (Fig. 10E–F). Short, strong, and brown to dark-brown with dark-brown and black hairs and short rigid black bristles. Coxae brown densely covered with long black hairs; trochanters brown; mid and hind femora dark-brown covered with long black bristles and white setae; femora longer than tibiae. Fore and mid tibiae generally dark-brown, covered with long black bristles and small brown and white setae. Hind tibia dark-brown, covered with long black and short brown setae. Tibial spurs reddish-brown, as long as tarsomeres 1–3 together; tarsi dark-brown, covered with long black setae; tarsal claws slightly curved, reddish-brown, 1/2 as long as tarsal segment 5.

Abdomen. Shorter than hindwing, blackish-brown, covered with short black setae; Posterior margin of each tergum with shiny black rings. Sternites dark-brown, with long black setae.

Male terminalia and genitalia (Fig. 11A–D). Tergite 9 not fused. In lateral view, tergite 9 quadrate; ectoproct long oval, processus cylindrical, long, subacute at tip, covered with dense small black setae. Processus twice as long as base of ectoproct. In ventral view, sternum 9 subquadrate, covered with long black setae. Processus with prominent protuberance at base, covered with dense short setae. Dense short setae cover entire length of inner half of processus. Genitalia as in Figure 11C–D in dorsal and ventral views. Gonocoxites 9 less sclerotized, inclined outwards, and angular. Median bulla covered with very dense short setae in ventral view.

Female terminalia (Fig. 11E–F). In lateral view, tergite 8 almost trapezoidal; ectoproct ovoid, cauda-dorsally covered with black hairs and cauda-ventrally with short, strong, stout setae; gonocoxite 9 club-shaped, posteriorly covered with some stout setae. In ventral view, sternite 8 with stiff, acute bristles on caudal margin, gonocoxite 8 finger-shaped, covered with small black setae; gonocoxite 9 with stout and black setae, caudally.

Distribution. India (Esben-Petersen, 1931), Sri Lanka (Gerstaecker, 1863).



Figure 9. *Stenares harpyia* (Gerstaecker, 1863). **A.** Male habitus; **B.** Female habitus. Scale bar: 10 mm.

Flight period and habitat. Adults are active at night and attracted by artificial light. Some specimens are collected through this method. In the daytime, it sits on dry grass blades at rest and can easily camouflage from predators (Fig. 12A–B). The habitat is surrounded by grassland in the forest ecosystem which is recorded from above 800 m altitude. It is not a pit-building species. The adult flight period in India is mainly observed during February, March, April, and May based on this study and data in published literature (Fig. 15).

Distribution in India (Fig. 16). Kerala (Gavi, Thirunelly, Vallakkadavu), Tamil Nadu (Coimbatore), Telangana (Anantagiri Hills).

Wing pattern variability (Figs 9A–B; 13A–B; 14A–B). In the tribe Palparini, the pattern of the wings is usually variable. The variability of the forewing pattern is more significant than that of the hindwing pattern. We compared the wing pattern of the syntype specimens (2 females) from Sri Lanka (NfM, Berlin, Germany), the non-type specimens (MHNG, Geneva, Switzerland), which also come from Sri Lanka, and 3 males and 1 female collected in Kerala during the current study. We found that the wing patterns show significant differences on both wings and that the wing pattern is not gender-specific. The bands on the forewing are completely absent in one male and more or less visible in the other males. The apical mark is clearly visible and divided, and marginal spots are also visible on all specimens. The pattern on the hindwing is much more pronounced, the colour of the spots is basally dark brown, but depending on the storage conditions they can fade to reddish brown.

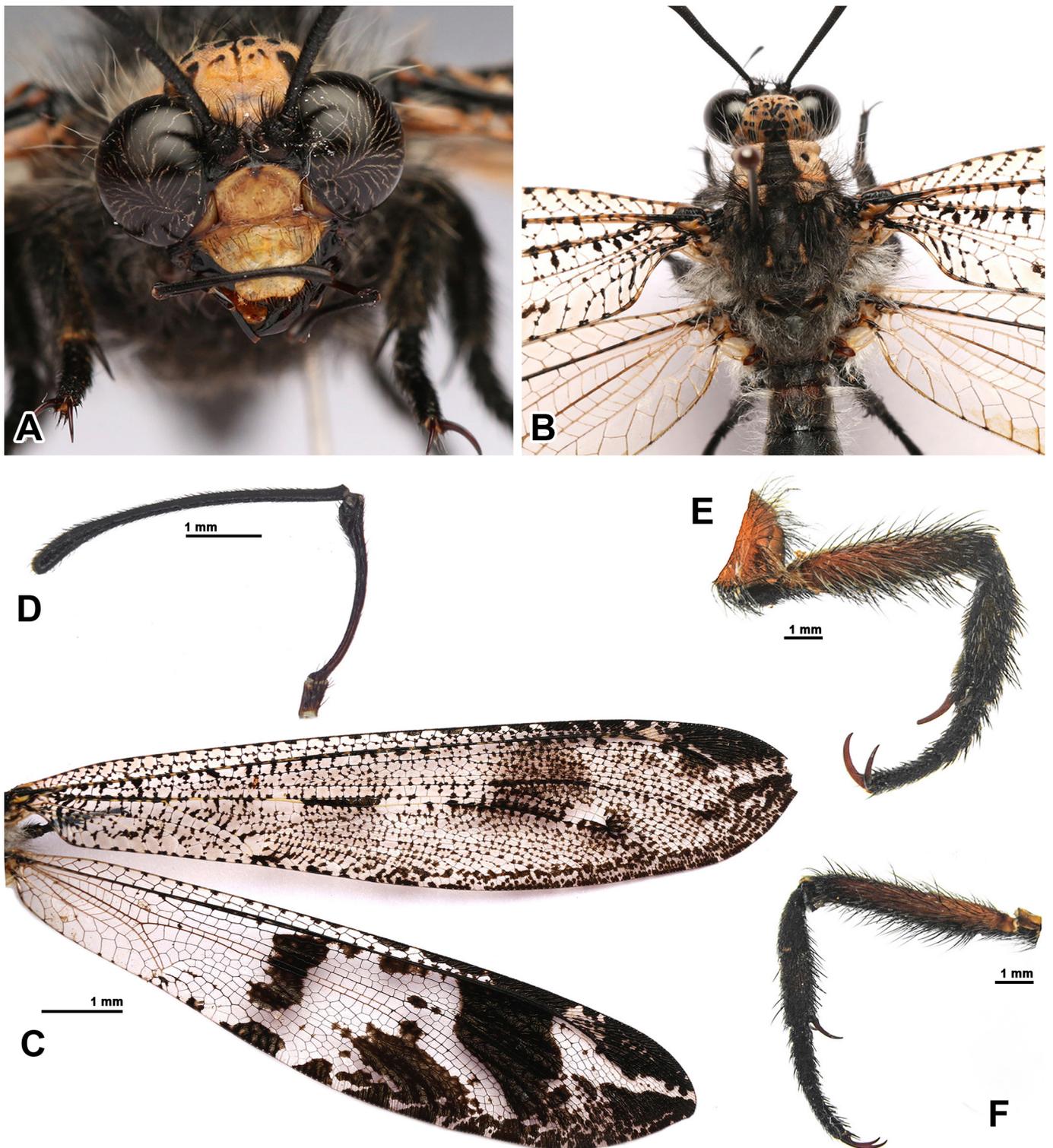


Figure 10. *Stenares harpyia* (Gerstaecker, 1863) male. **A.** Head in frontal view; **B.** Head and thorax in dorsal view; **C.** Wing venation; **D.** Labial palp in lateral view; **E.** Foreleg in lateral view; **F.** Hindleg in lateral view.

The basal band is missing on the hindwing, the medial band is divided into 2 or 3 parts. The shape of the prestigmal band can vary, in most cases, it reaches almost to the posterior margin. This band is separated from the marginal spot by a broad band extending towards the medial band. The apical mark is divided by a transparent narrow strip extending from the tip towards the wing base is also characteristic. The pattern of the hindwing of *S. harpyia* is typical of the species and can be easily distinguished. Previously published faunal data of *S. harpyia* from India need to be revised.

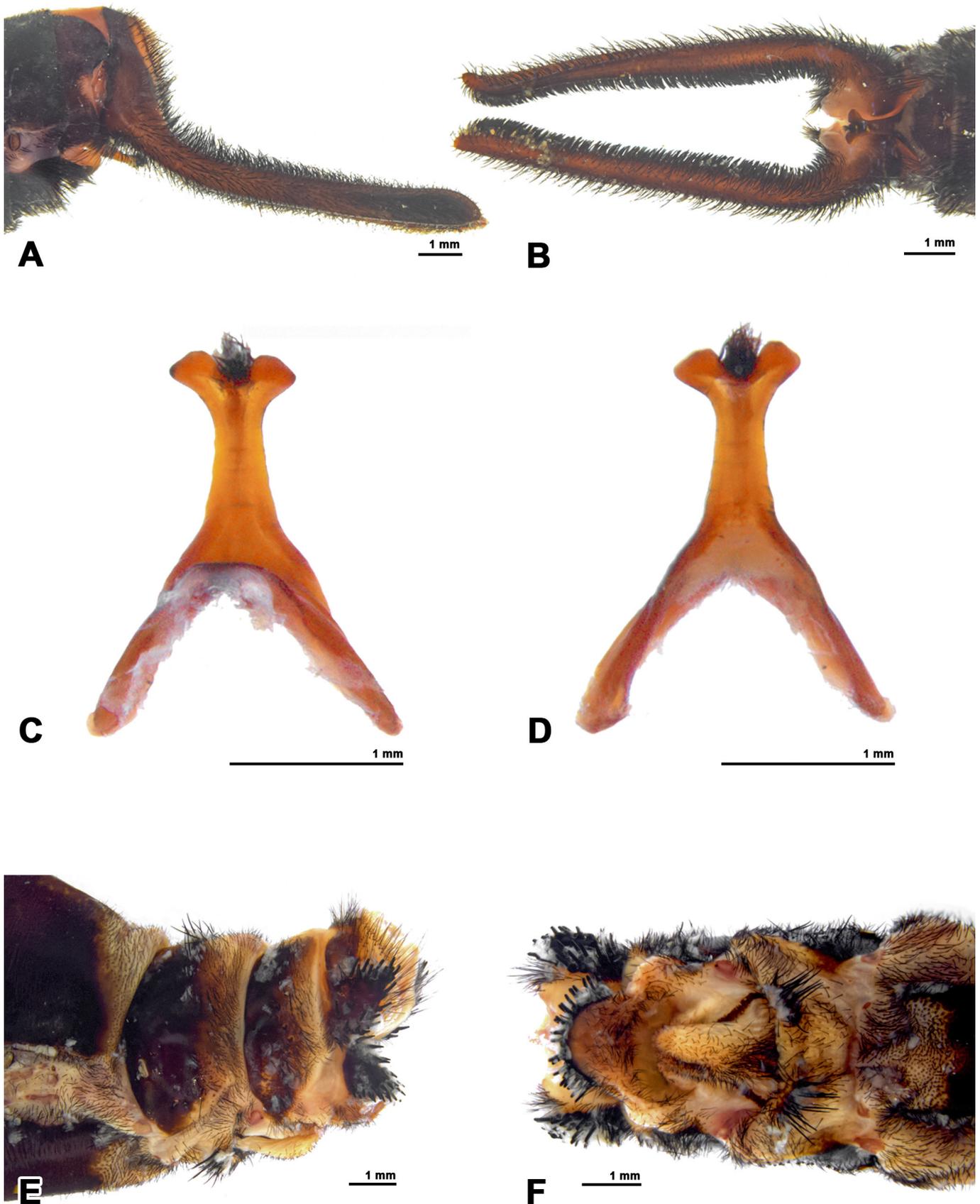


Figure 11. *Stenares harpyia* (Gerstaecker, 1863). **A.** Male terminalia, in lateral view; **B.** The same, in ventral view; **C.** Male genitalia: gonocoxites gx9 + 11 in dorsal view (in sense Aspöck et al., 1980; Aspöck & Aspöck, 2008; Badano et al., 2017); **D.** The same in ventral view; **E.** Female terminalia in lateral view; **F.** The same in ventral view.

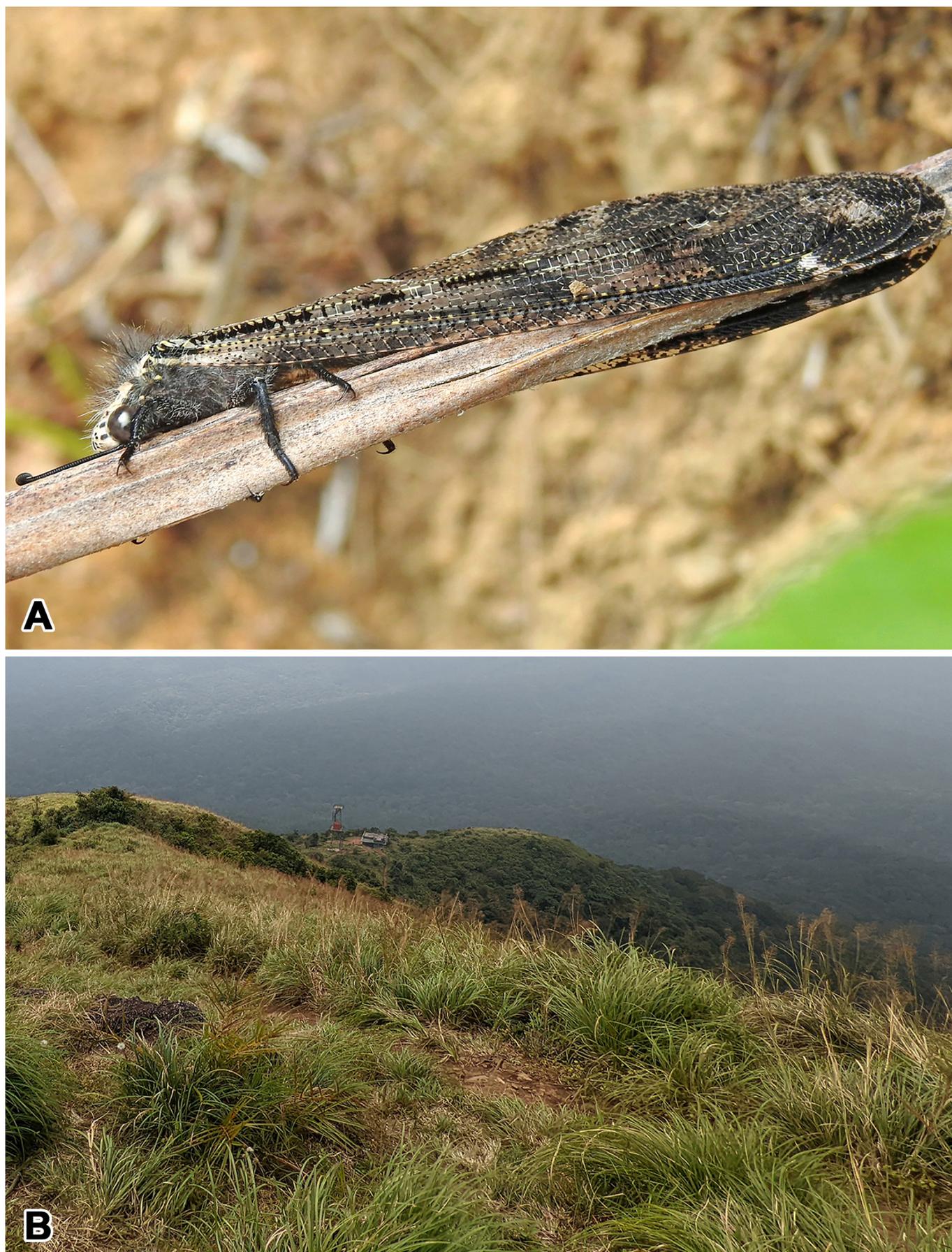


Figure 12. *Stenares harpyia* (Gerstaecker, 1863). **A.** Adult male in natural habitat; **B.** Habitat of species in Thirunelly, Kerala. [photo: Vivek Chandran A.]

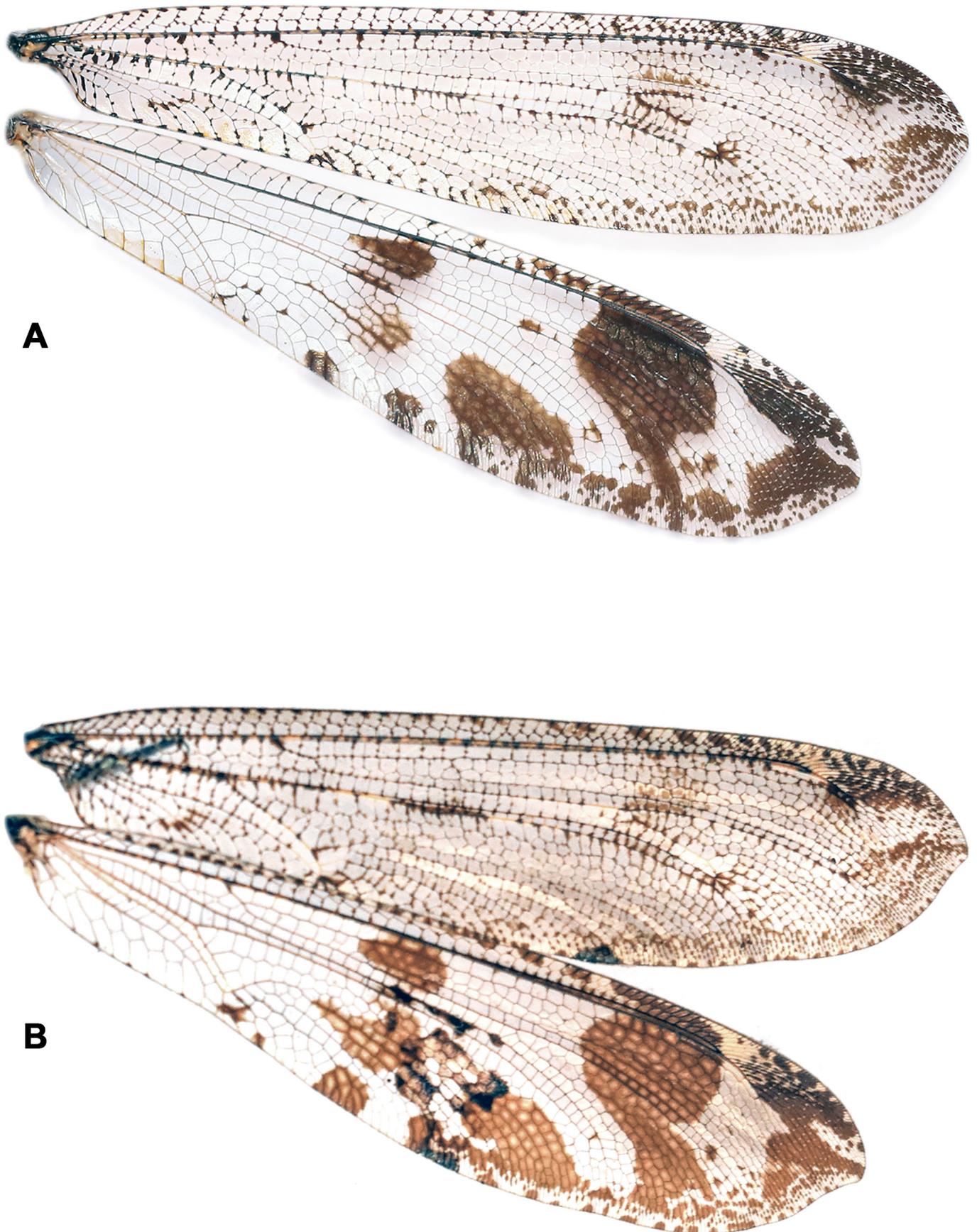


Figure 13. *Stenares harpyia* (Gerstaecker, 1863) pattern variability of the wings. **A.** Male from Thrunelly, India; **B.** Male from Vallakadavu, India.

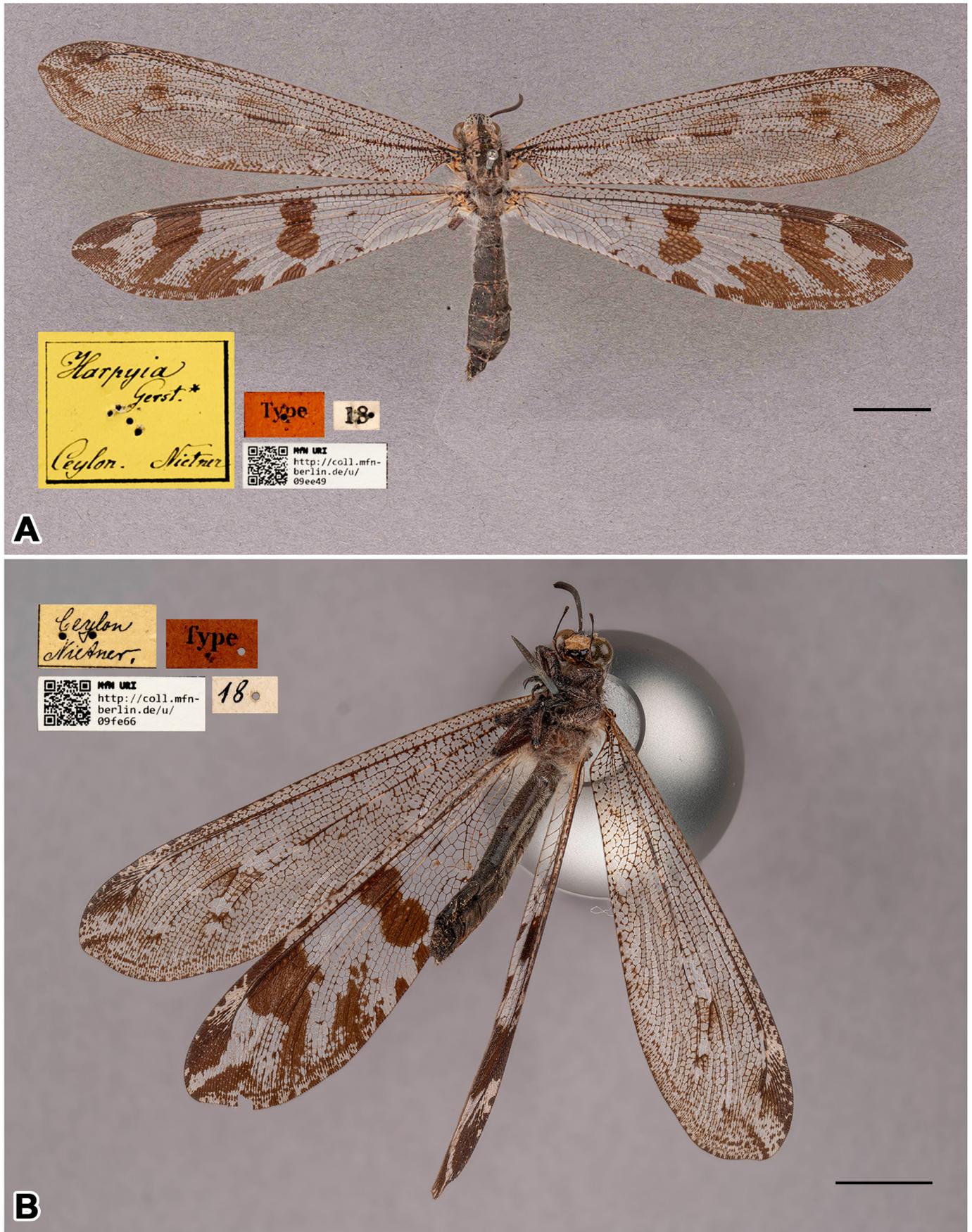


Figure 14. Female syntypes of *Palpares harpyia* Gerstaecker, 1863 (junior synonym of *Stenares harpyia*) in MfNB. **A.** Designated lectotype specimen in dorsal view; **B.** Designated paralectotype in ventral view. Scale bar: 10 mm.

Comments. *Stenares harpyia* specimens collected in Kerala are morphologically conspecific with the syntype specimens from Sri Lanka (Fig. 14A–B). However, other *Stenares* species reported from India require revision as they are characterised by sexual dimorphism and a high degree of variability between specimens. The known *Stenares* species require a complete morphological revision and their genetic examination is also essential.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
<i>Indopalpares pardus</i>												
<i>Palpares contrarius</i>												
<i>Stenares harpyia</i>												

Figure 15. The flight period of *Indopalpares pardus* (Rambur, 1842), *Palpares contrarius* (Walker, 1853), and *Stenares harpyia* (Gerstaecker, 1863) from India, based on new faunistic data and details from published literature.

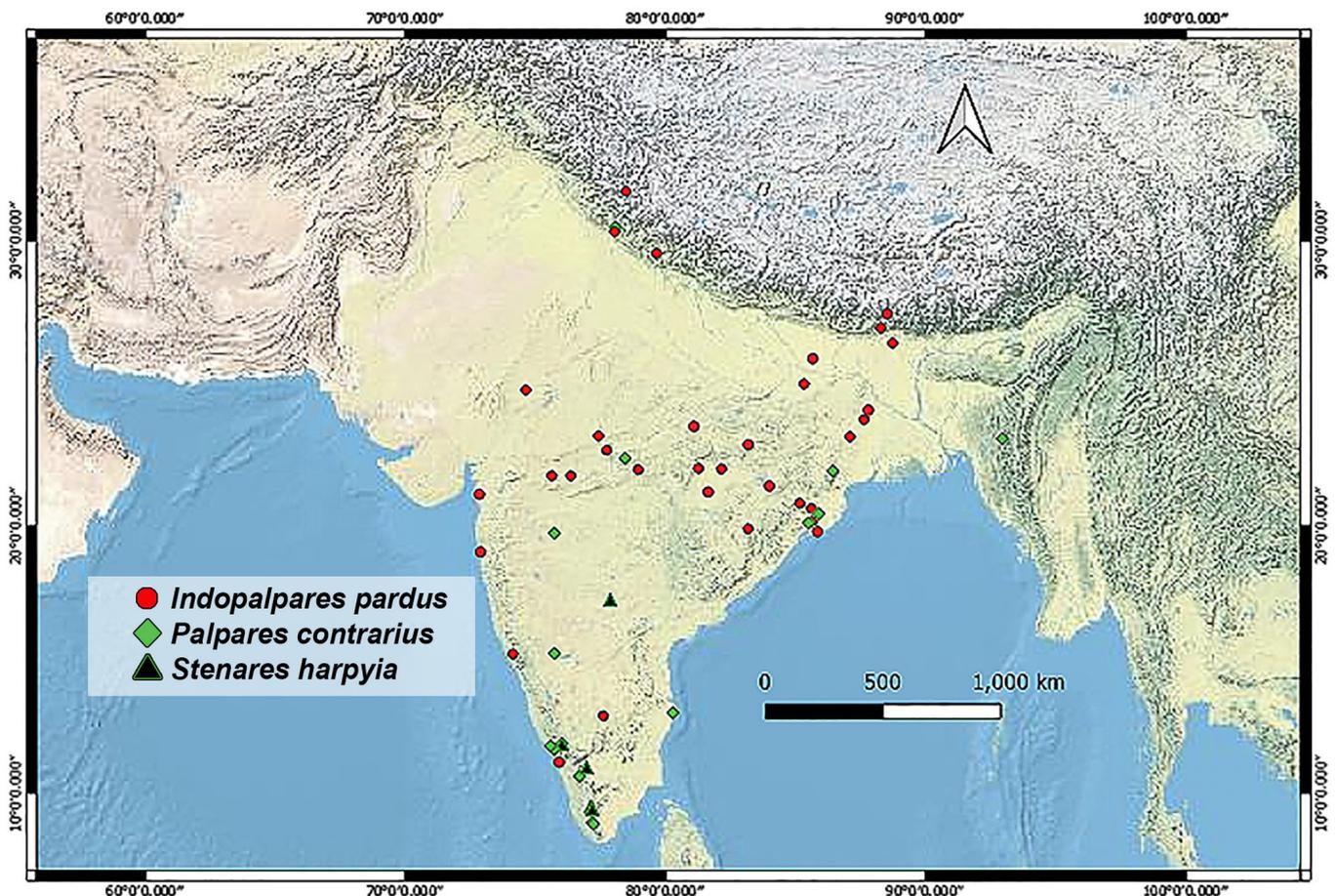


Figure 16. Distribution of *Indopalpares pardus* (Rambur, 1842), *Palpares contrarius* (Walker, 1853), and *Stenares harpyia* (Gerstaecker, 1863) from India, based on new faunistic data and published literature.

DISCUSSION

Palparids belong to the ancient type of antlions, wings have dense venation and are morphologically distinct (cubitus posterior [Cup] and first anal vein [A₁] of the forewing do not unite but run separately to posterior margin) from other groups of antlions. Their taxonomic classification (tribe, subfamily, family) seems to be contradictory (Mansell, 1992b; Machado et al., 2019; Prost & Popov, 2021; Hevin et al., 2023).

Most species of the Gondwanan origin group are still found in Africa (Mansell, 1990, Stange, 2004), but many species occur in the Palearctic, Europe, and southern Asia, especially in the Eremial area. In the Oriental area, the highest species richness is found in the Indian subcontinent (Hölzel, 1986). Although, India has the highest species richness, there may be some synonym species and incorrectly identified specimens. In the literature review, it became clear that the occurrence of several mentioned taxa from India seems impossible, e.g. *S. hyaena* native to West Africa (Prost & Popov, 2021). This is also confirmed by our observations and examination so far. However, we have not yet completed the full revision of the group. This revision covers not only the taxonomic status of the species but also the redetermination of the species kept in the collections to get a realistic picture of the distribution of the species in India. Previously, most of the species were classified in the genus *Palpares* based on morphological grounds, and now also with the help of genetic samples, the phylogenetic relationships are becoming more and more refined. The survey of the Indian fauna from this point of view has not yet begun.

The taxonomic studies and documentation of adult antlions from India are very minimal, due to the lack of neuropteran experts. There are many unidentified and uncatalogued antlion specimens in Indian museums. In recent years, there has been notable taxonomic revisions and distributional records in Neuroptera by Kaur et al. (2019a, 2019b, 2021); Winterton & Gupta (2020); Winterton et al. (2021); Suryanarayanan & Bijoy (2021a, 2021b, 2021c, 2021d, 2022, 2024b, 2024c); Suryanarayanan et al. (2022, 2023a, 2023b, 2024a, 2024b, 2024c, 2024d) based on comprehensive research on Indian Neuroptera fauna. These Neuroptera studies from India are necessary to identify the synonymous and misidentified species on the basis of type specimens. This will give a clear idea of the species diversity as well as their distribution in the country, which will ultimately help in identifying and describing many new species and genera.

AUTHOR'S CONTRIBUTION

The authors confirm their contribution to the paper as follows: T.B. Suryanarayanan: Collecting and identification of specimens, writing the original manuscript; L. Ábrahám: Review and editing; B. Chenthamarakshan: Research supervisor, Review and editing. The authors read and approved the final version of the manuscript.

FUNDING

The first author was funded by Council of Scientific & Industrial Research (CSIR), Government of India, in the form of Senior Research Fellowship (SRF) (08/376(0010)/2019-EMR-I).

AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in the insect collections of the Shadpada Entomology Research Lab (SERL), Kerala, India; Museum d'Histoire Naturelle, Geneva, Switzerland; Museum für Naturkunde Berlin, Germany, and are available from the curator, upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

ACKNOWLEDGMENTS

We are grateful to the Principal, Christ College (Autonomous), Irinjalakuda, Kerala for providing us with the facilities for undertaking this work. We thank Sudhikumar A.V., head of the Department of Zoology and Centre for Animal Taxonomy and Ecology, Christ College (Autonomous), Irinjalakuda for allowing us to use the facilities of his lab to take microscopic images of the specimens. The first author offers sincere gratitude to the Council of Scientific & Industrial Research (CSIR), Government of India, for financial support in the form CSIR Senior Research Fellowship (08/376(0010)/2019-EMR-I). We are thankful to the Chief Wildlife Warden, Kerala, for the collection permit to the forest (KFDHQ-6559/2019-CWW/WL10). Special thanks for Stefanie Krause (Curator of MfN - Museum für Naturkunde Berlin, Germany) and Peter Schwendinger (Curator of MHNG - Museum d'Histoire Naturelle, Geneva, Switzerland) for sharing excellent type photos. The authors are thankful to Government College, Chittur, Palakkad, for providing the specimens for the taxonomic study. Thanks to Mohammed Ramees K., Shahel A.Z., Vishnu Das E.H., Mohammed Anas P.P., Abhin M. Sunil., Vivek Chandran A., Vishnu R., Nidheesh K.B., Adarsh P.K., Athira K.K., and Aswathi P.G. for field assistance in collecting and photographing the specimens. The authors are also grateful to the reviewers of the manuscript because their critical comments and suggestions significantly increased its value.

REFERENCES

- Ábrahám, L. & Giacomino, M. (2020) A little known and synonym ant-lions 2 (Neuroptera: Myrmeleontidae). *Natura Somogyiensis*, 34, 21–72. <https://doi.org/10.24394/NatSom.2020.34.21>
- Anita, P.E. & Tilak, J.L. (2024) New record of the antlion *Palpares contrarius* Walker, 1853 (Insecta: Neuroptera: Myrmeleontidae) in Tamil Nadu, India. *Journal of Threatened Taxa*, 16 (10), 26046–26048. <https://doi.org/10.11609/jott.9351.16.10.26046-26048>
- Aspöck, U. & Aspöck, H. (2008) Phylogenetic relevance of the genital sclerites of Neuropterida (Insecta: Holometabola). *Systematic Entomology* 33, 97–127. <https://doi.org/10.1111/j.1365-3113.2007.00396.x>
- Aspöck, H., Aspöck, U. & Hölzel, H. (1980) *Die Neuropteren Europas, Eine zusammenfassende Darstellung der Systematik, Ökologie und Chorologie der Neuropteroidea (Megaloptera, Raphidioptera, Planipennia) Europas*. Vols. 1 & 2. Goecke & Evers, Krefeld. 495 & 355 p.
- Aspöck, U., Plant, J.D. & Nemeschkal, H.L. (2001) Cladistic analysis of Neuroptera and their systematic position within the Neuropterida (Insecta: Holometabola: Neuropterida: Neuroptera). *Systematic Entomology*, 26, 73–86. <https://doi.org/10.1046/j.1365-3113.2001.00136.x>
- Badano, D., Aspöck, H. & Aspöck, U. (2017) Taxonomy and phylogeny of the genera *Gymnocnemia* Schneider, 1845, and *Megistopus* Rambur, 1842, with remarks on the systematization of the tribe Nemoleontini (Neuroptera, Myrmeleontidae). *Deutsche Entomologische Zeitschrift, Berlin*, 64, 43–60. <https://doi.org/10.3897/dez.64.11704>
- Banks, N. (1911a) Notes on African Myrmeleontidae. *Annals of the Entomological Society of America*, 4, 1–31. <https://doi.org/10.1093/aesa/4.1.1>
- Banks, N. (1911b) Notes on Indian neuropteroid insects. *Proceedings of the Entomological Society of Washington*, 13, 99–106.
- Banks, N. (1913) The neuropterous genus *Palpares*. *Annals of the Entomological Society of America*, 6 (2), 171–191. <https://doi.org/10.1093/aesa/6.2.171>
- Banks, N. (1931) Some oriental neuropteroid insects. *Psyche*, 38, 56–70. <https://doi.org/10.1155/1931/90982>
- Chandra, K. & Sharma, R.M. (2009) *Checklist of Indian Neuropterids (Insecta: Megaloptera; Raphidioptera; Neuroptera)*. Zoological Survey of India, Central Zone Regional Centre Jabalpur, Madhya Pradesh. 22 p.
- Chandra, K. & Thilak, J. (2009) Insecta: Neuroptera, In: Director (ed.) *Fauna of Bandhavgarh Tiger Reserve, Conservation Area Series*. Zoological Survey of India, Kolkata, 40, 71–73.
- Chandra, K., Thilak, J. & Sidhu, A. K. (2011) Neuroptera In: Director (ed.) *Fauna of Madhya Pradesh (including Chhattisgarh)*. State Fauna Series, Vol. 15, part 3. Zoological Survey of India, Kolkata, pp. 151–165.
- Chandra, K., Majumder, A., Raha, A. & Halder, S. (2014) New records of antlions (Neuroptera: Myrmeleontidae) from Chhattisgarh, India. *Entomology and Applied Science Letters*, 1 (4), 70–74.
- Dalman, J.W. (1823) *Analecta Entomologica*. Typis Lindhianis, Holmiae. vii + 104 p. <https://doi.org/10.5962/bhl.title.66069>

- Esben-Petersen, P. (1931) Myrmeleontiden aus Süd-Indien. *Revue Suisse de Zoologie*, 38, 445–448.
<https://doi.org/10.5962/bhl.part.117649>
- Gerstaecker, A. (1863) Ueber einige neue Planipennien aus den familien der Hemerobiiden und Panorpiden. *Stettiner Entomologische Zeitung*, 24, 168–188.
- Ghosh, S.K. (1977) Fauna of Rajasthan, India-Neuroptera. *Records of the Zoological Survey of India*, 72, 309–313.
<https://doi.org/10.26515/rzsi/v72/i1-4/1977/161939>
- Ghosh, S.K. (1983) Notes on the biogeography of Neuroptera: Planipennia from certain areas of the north-west Himalayan and northern peninsular sector of India. *Records of the Zoological Survey of India*, 80, 291–300.
<https://doi.org/10.26515/rzsi/v80/i3-4/1982/161194>
- Ghosh, S.K. (1984) Contribution to the taxonomical studies of Neuroptera (Suborder Planipennia) from eastern India. 1. Family Myrmeleontidae. *Records of the Zoological Survey of India*, 52, 1–63.
- Ghosh, S.K. (1987) Insecta: Neuroptera. In: Director (ed.) *Fauna of Orissa*. State Fauna Series 1. Zoological Survey of India, Kolkata, pp. 183–192
- Ghosh, S.K. (1990) On new and little-known species of *Stenares* Hagen (Myrmeleontidae: Neuroptera) from India. *Records of the Zoological Survey of India*, 86 (3), 453–459. <https://doi.org/10.26515/rzsi/v86/i3-4/1990/161547>
- Ghosh, S.K. (1991) Interesting species of Neuroptera from Himachal Pradesh. *Records of the Zoological Survey of India*, 89, 89–94. <https://doi.org/10.26515/rzsi/v89/i1-4/1991/160994>
- Ghosh, S.K. (1998) Insecta: Neuroptera, In: Director (ed.) *Fauna of West Bengal*. State Fauna Series 3 (Part 8). Zoological Survey of India, Kolkata, pp. 111–148.
- Ghosh, S.K. (2000) Neuroptera fauna of north-east India. *Records of the Zoological Survey of India, Miscellaneous Publications, Occasional Paper*, 184, xiii, 1–179.
- Ghosh, S. K. & Sen, S. (1977) Check-list of Indian Planipennia (Order Neuroptera). *Records of the Zoological Survey of India*, 73 (1–4), 277–326. <https://doi.org/10.26515/rzsi/v73/i1-4/1977/161921>
- Giacomino, M. & Ábrahám, L. (2018) Little-known and synonymous antlions (Neuroptera, Myrmeleontidae). *Bulletin de la Société Entomologique de France*, 123, 85–101. https://doi.org/10.32475/bsef_1967
- Hagen, H.A. (1866) Hemerobidarum Synopsis synonymica. *Stettiner Entomologische Zeitung*, 27, 369–462.
- Hassan, M.A., Akhtar, S., Zheng, Y. & Liu, X. (2023) Taxonomic notes on the antlion tribe Palparini Banks (Neuroptera: Myrmeleontidae) from Pakistan. *Zootaxa*, 5256 (6), 565–588.
<https://doi.org/10.11646/zootaxa.5256.6.3>
- Hévin, N.M.-C., Kergoat, G.J., Clamens, A.-L., Le Ru, B., Mansell, M.W. & Michel, B. (2023) Evolution, systematics and historical biogeography of Palparini and Palparidiini antlions (Neuroptera: Myrmeleontidae): old origin and in situ diversification in Southern Africa. *Systematic Entomology*, 48 (4), 600–617.
<https://doi.org/10.1111/syen.12593>
- Hölzel, H. (1986) Biogeography of Palearctic Myrmeleontidae (Neuropteroidea: Planipennia). In: Gepp, J., Aspöck, H. & Hölzel, H. (eds) *Recent Research in Neuropterology. Proceedings of the 2nd International Symposium on Neuropterology*. August 21–23, 1984. Hamburg, Germany. Graz, Austria, pp. 53–70.
- Insom, E. & Carfi, S. (1988) Taxonomic studies on Palparini (sensu Markl, 1954). I: The genus *Palpares* Rambur, 1842 partim (Neuroptera: Myrmeleontidae) with the proposal of its division and description of new genera. *Neuroptera International*, 5, 57–78.
- Iqbal, M. & Yousuf, M. (1990) The genus *Palpares* Rambur (Myrmeleontidae: Neuroptera) with new records from 3 species from Pakistan. *Proceedings of Pakistan Congress of Zoology*, 10, 55–59.
- Kaur, S., Pandher, M.S. & Chandra, K. (2019a) Description of the male of *Distoleon sambalpurensis* Ghosh, 1984 (Neuroptera: Myrmeleontidae) from India. *Zootaxa*, 4661 (3), 587–593.
<https://doi.org/10.11646/zootaxa.4661.3.11>
- Kaur, S., Rajmohana, K. & Pandher, M.S. (2019b) Morphological studies on male and female genitalia of *Myrmecaelurus acerbus* (Walker, 1853) (Neuroptera: Myrmeleontidae). *Records of the Zoological Survey of India*, 119, 438–443. <https://doi.org/10.11646/zootaxa.5068.3.2>
- Kaur, S., Pandher, M.S., Chandra, K. & Dubey, A.K. (2021) Subfamily Mantispinae Enderlein, 1910 (Insecta: Neuroptera) in India. *Zootaxa*, 5068 (3), 355–377. <https://doi.org/10.26515/rzsi/v119/i4/2019/145451>
- Kimmins, D.E. (1945) A note on some specialized hairs in the Palparinae (Neuroptera, Myrmeleontidae). *Entomologist*, 78, 97–99.
- Krivokhatsky, V.A. (1997) [New and little-known species of ant-lions (Neuroptera, Myrmeleontidae) from Indo-China]. *Entomological Review*, 76, 631–640, 731.

- Kuwayama, S. (1933) Notes on two species of the family Myrmeleontidae. *Proceedings of the Imperial Academy of Japan*, 9, 446–449. <https://doi.org/10.2183/pjab1912.9.446>
- Latreille, P.A. (1802) *Histoire naturelle, générale et particulière des Crustacés et des insectes* Vol. 3. Dufart: Paris. 467 p. <https://doi.org/10.5962/bhl.title.15764>
- Linnaeus, C. (1764) *Museum S:ae R:ae M:tis Ludovicae Ulrica Reginae Svecorum, Gothorum, Vandalorumque, & c. In quo animalia rariora, exotica, imprimis. Insecta & Conchilia describuntur & determinantur. Prodromi instar.* Laurentii Salvii, Holmiae. 720 p. <https://doi.org/10.5962/bhl.title.119811>
- Machado, R.J.P., Gillung, J.P., Winterton, S.L., Garzón-Orduña, I.J., Lemmon, A.R., Lemmon, E.M. & Oswald, J.D. (2019) Owlflies are derived antlions: anchored phylogenomics supports a new phylogeny and classification of Myrmeleontidae (Neuroptera). *Systematic Entomology*, 44, 418–450. <https://doi.org/10.1111/syen.12334>
- Mansell, M.W. (1990) The Myrmeleontidae of southern Africa: tribe Palparini. Introduction and description of *Pamares* gen. nov., with four new species (Insecta: Neuroptera). *Journal of the Entomological Society of Southern Africa*, 53, 165–189. <https://doi.org/10.1111/syen.12334>
- Mansell, M.W. (1992a) The ant-lions of southern Africa: genus *Pamexis* Hagen (Neuroptera: Myrmeleontidae: Palparinae: Palparini). *Systematic Entomology*, 17, 65–78. <https://doi.org/10.1111/j.1365-3113.1992.tb00322.x>
- Mansell, M.W. (1992b) Key characters in the phylogeny and classification of Palparini (Insecta: Neuroptera: Myrmeleontidae). In: Canard, M., Aspöck, H. & Mansell, M.W. (eds) *Current Research in Neuropterology. Proceedings of the Fourth International Symposium on Neuropterology*. June 24–27, 1991. Bagnères-de-Luchon, Haute-Garonne, Toulouse, France, pp. 243–254.
- Mansell, M.W. (1996) The antlions of southern Africa (Neuroptera: Myrmeleontidae): genus *Palparellus* Navás, including extralimital species. *African Entomology* 4, 239–267.
- Mansell, M.W. (2004) Antlions of southern Africa: *Annulares* nov. gen. (Neuroptera, Myrmeleontidae, Palparini) including two new species, with comments on the tribe Palparini. *Denisia*, 13, 201–208.
- Mansell, M.W. (2018) Antlions of southern Africa: genus *Crambomorphus* McLachlan, 1867, including extra-limital species (Neuroptera: Myrmeleontidae: Palparinae: Palparini). *Zootaxa*, 4382, 465–500. <https://doi.org/10.11646/zootaxa.4382.3.3>
- Mathew, G. (1993) *A status survey of insect fauna of Malayattoor*. Baseline Studies for the Proposed Nature Study Centre at Kalady in Malayattoor Forest Division. New Delhi. KFRI Research Report, pp. 135–158.
- McLachlan, R. (1867) New genera and species, etc., of Neuropterous insects; and a revision of Mr. F. Walker's British Museum Catalogue, part ii (1853), as far as the end of the genus *Myrmeleon*. *Journal of the Linnean Society of London, Zoology*, 9, 230–281. <https://doi.org/10.1111/j.1096-3642.1867.tb00195.x>
- Navás, L. (1912a) Myrméléonides nouveaux ou peu connus (Ins. Névr.). *Annales de la Societe Scientifique de Bruxelles*, 36, 203–248.
- Navás, L. (1912b) Bemerkungen über die Neuropteren der Zoologischen Staatssammlung in München. III. *Mitteilungen der Münchener Entomologischen Gesellschaft*, 3, 55–59.
- Navás, L. (1914) Névroptères de l'Indo-Chine. 1re série. *Insecta, Rennes*, 4, 133–142.
- Navás, L. (1926) El género *Symmalthetes* MacLachl. (Neuropt. Mirmeleónidos). *Boletín de la Sociedad Entomologica de España*, 9, 155.
- Navás, L. (1932) Insecta orientalia. XI series. *Memorie della Pont Accademia delle Scienze Nuovi Lincei, Serie II*, 16, 951–956.
- Needham, J.G. (1909) Notes on the Neuroptera in the collection of the Indian Museum. *Records of the Indian Museum, Calcutta*, 3, 185–210. <https://doi.org/10.26515/rzsi/v3/i3/1909/163272>
- New, T.R. (2003) *The Neuroptera of Malesia*. Fauna Malesiana. Vol. 4. Brill, Leiden. viii + 204 p. <https://doi.org/10.1163/9789004474611>
- Oswald, J.D. (2025) Neuropterida Species of the World. Lacewing Digital Library, Research Publication No. 1. <https://lacewing.tamu.edu/speciescatalog/main> [Accessed October 03, 2024]
- Prost, A. (2010) Patterns of distribution of the Palparini (Neuroptera: Myrmeleontidae: Palparinae) in the northern half of Africa: faunal transitions and regional overlaps. In: Devetak, D., Lipovšek, S. & Arnett, A.E. (eds) *Proceedings of the 10th International Symposium on Neuropterology*. June 22–25, 2008. University of Maribor, Maribor, Slovenia. pp. 257–266.
- Prost, A. & Popov, A. (2021) A first comprehensive inventory of Ascalaphidae, Palparidae, and Myrmeleontidae (Insecta: Neuroptera) of Northeastern Nigeria with description of two new species and an overview of genus *Bankisus* Navás. *Historia Naturalis Bulgarica*, 43 (5), 51–77. <https://doi.org/10.48027/hnb.43.051>
- Rambur, M.P. (1842) *Histoire Naturelle des Insectes. Neuropteres*. Fain et Thunot, Paris. 534 p.

- Sala de Castellarnau, I. (1946) Catálogo de neurópteros de la India. *Brotéria (Ciências Naturais)*, 15, 114–128.
- Sharma, R. & Chandra, K. (2012) Insecta: Neuroptera, In: Director (ed.) *Fauna of Maharashtra*. State Fauna Series 20 (Part-2). Zoological Survey of India, Kolkata, pp. 485–488.
- Sharma, R. & Chandra, K. (2013) Insecta: Neuroptera, In: Director, *Zoological Survey of India (editor)*. *Fauna of Karnataka*. State Fauna Series 21. Zoological Survey of India, Kolkata. 163–165.
- Singh, L.R.K., Ahmed, I., Chandra, K. & Gupta, D. (2020) Insecta: Neuroptera and Megaloptera. In: Director (ed.) *Faunal Diversity of Biogeographic Zones of India: Western Ghats*. Zoological Survey of India, Kolkata. pp. 501–508.
- Stange, L.A. (2004) A systematic catalog, bibliography and classification of the world antlions (Insecta: Neuroptera: Myrmeleontidae). *Memoirs of the American Entomological Institute*, 74, 1–565.
- Suryanarayanan, T.B. & Bijoy, C. (2021a) First Record of *Croce filipennis* Westwood, 1841 (Neuroptera: Nemopteridae) from Kerala. *Records of Zoological Survey of India*, 121 (2), 257–260.
<https://doi.org/10.26515/rzsi/v121/i2/2021/151758>
- Suryanarayanan, T.B. & Bijoy, C. (2021b) First record of *Mantispilla indica* (Westwood, 1852) (Neuroptera: Mantispidae) from the Western Ghats, India. *Journal of Threatened Taxa*, 13 (9), 19376–19379.
<https://doi.org/10.11609/jott.6827.13.9.19376-19379>
- Suryanarayanan, T.B. & Bijoy, C. (2021c) Record of *Apochrysa evanida* Gerstaecker, 1893 (Neuroptera: Chrysopidae) from the Western Ghats, India. *Entomon*, 46 (3), 255–258. <https://doi.org/10.33307/entomon.v46i3.612>
- Suryanarayanan, T.B. & Bijoy, C. (2021d) First Record of *Italochrysa japonica* (McLachlan, 1875) (Neuroptera: Chrysopidae) from India. *Halteres*, 12, 22–24. <https://doi.org/10.5281/zenodo.5528715>
- Suryanarayanan, T.B. & Bijoy, C. (2022) First report of lance lacewing, *Spilosmylus tuberculatus* from the Western Ghats. *Taprobanica*, 11, 38–39. <https://doi.org/10.47605/tapro.v11i1.277>
- Suryanarayanan, T.B. & Bijoy, C. (2023) Flight Period of Antlion Genera (Neuroptera: Myrmeleontidae) of Kerala. In: Poovoli, A., Mumthaz, T.M.V. & Bushra, N. (eds) *Proceedings of the International Seminar: Conference on Faunal diversity Climate | Global warming | Human interference*. March 10–12 2022. Sir Syed College, Taliparamba, Kannur, Kerala, India. pp. 156–161.
- Suryanarayanan, T. B. & Bijoy, C. (2024a) Review on Antlions (Neuroptera: Myrmeleontidae) of India. In: Hajam, Y.A., Parey, S.H. & Bhat, R.A. (eds) *Insect Diversity and Ecosystem Services*. Volume 1. *Importance, Threats, Conservation, and Economic Perspectives*. Apple Academic Press, USA. pp. 201–216.
<https://doi.org/10.1201/9781003467205-10>
- Suryanarayanan, T. B. & Bijoy, C. (2024b) Taxonomic Insight on *Indophanes barbara* (Walker, 1853) (Neuroptera: Myrmeleontidae) Recorded from Kerala, India. *Journal of the Entomological Research Society*, 26 (3), 439–449.
<https://doi.org/10.51963/jers.v26i3.2698>
- Suryanarayanan, T.B. & Bijoy, C. (2024c) A new record of *Glenochrysa zeylanica* (Banks, 1913) (Neuroptera: Chrysopidae) from India. *Natura Somogyiensis*, 44, 115–124. <https://doi.org/10.24394/NatSom.2024.44.115>
- Suryanarayanan, T.B., Bijoy, C. & Ábrahám, L. (2022) Redescription of *Banyutus cubitalis* (Navás, 1914) (Neuroptera, Myrmeleontidae) and key to antlion genera in tribe Nemoleontini from India. *Zootaxa*, 5182 (1), 64–74.
<https://doi.org/10.11646/zootaxa.5182.1.4>
- Suryanarayanan, T. B., Ábrahám, L. & Bijoy, C. (2023a) Revision on the genus *Bubopsis* MacLachlan, 1898 known in India (Neuroptera: Myrmeleontidae: Ascalaphinae). *Natura Somogyiensis*, 40, 31–46.
<https://doi.org/10.24394/NatSom.2022.40.31>
- Suryanarayanan, T.B., Ábrahám, L. & Bijoy, C. (2023b) Description of two new species of *Nemoleon* Navás, 1909 (Neuroptera, Myrmeleontidae) from India. *Zootaxa*, 5339 (6), 547–561.
<https://doi.org/10.11646/zootaxa.5339.6.4>
- Suryanarayanan, T.B., Ábrahám, L. & Bijoy, C. (2024a) Contribution to the knowledge of the genus *Pseudoformicaleo* van der Weele, 1909 (Neuroptera: Myrmeleontidae) and new records from India and Thailand. *Journal of Insect Biodiversity*, 50 (1), 1–13. <https://doi.org/10.12976/jib/2024.50.1.1>
- Suryanarayanan, T.B., Ábrahám, L. & Bijoy, C. (2024b) Revision of the species of *Creoleon* Tillyard, 1918 (Neuroptera: Myrmeleontidae) known from India. *Oriental Insects*, 58 (4), 679–707.
<https://doi.org/10.1080/00305316.2024.2355248>
- Suryanarayanan, T.B., Ábrahám, L. & Bijoy, C. (2024c) Taxonomic revision of the owlfly genus *Glyptobasis* McLachlan, 1873 (Neuroptera: Ascalaphidae) from India and its adjacent countries. *Zootaxa*, 5486 (3), 388–418.
<https://doi.org/10.11646/zootaxa.5486.3.4>

- Suryanarayanan, T.B., Bijoy, C., Sathian A. & Rathish, R.L. (2024d) Range extension and first distribution record of *Stiphoneura inclusa* (Walker, 1853) (Neuroptera: Myrmeleontidae: Acanthaclisini) from Western Ghats. *Munis Entomology & Zoology*, 19, 2665–2672.
- Wachkoo, A.A., Kaur, S., Akbar, S.A., Hassan, M.A., Pandher, M.S. & Oswald, J.D. (2024) Catalog of the Neuropterida of India (Insecta: Neuroptera, Megaloptera, Raphidioptera). *Zootaxa*, 5544 (1), 1–128. <https://doi.org/10.11646/zootaxa.5544.1.1>
- Walker, F. (1853) *Catalogue of the specimens of neuropterous insects in the collection of the British Museum. Part II (Sialidae- Nemopterides)*. Newman, London. 284 p.
- Walker, F. (1860) Characters of undescribed Neuroptera in the collection of W. W. Saunders. *Transactions of the Entomological Society of London*, 10, 176–199. <https://doi.org/10.1111/j.1365-2311.1860.tb01844.x>
- Whittington, A.E. (2002) Resources in Scottish Neuropterology. *Acta Zoologica Academiae Scientiarum Hungaricae*, 48 (Suppl. 2), 371–387.
- Winterton, S.L. & Gupta, A. (2020) Review of the green lacewing genus *Apochrysa* Schneider (Neuroptera: Chrysopidae). *Zootaxa*, 4729 (3), 329–346. <https://doi.org/10.11646/zootaxa.4729.3.2>
- Winterton, S.L., Suryanarayanan, T.B. & Bijoy, C. (2021) A new species of *Joguina* Navás, 1912 from India (Neuroptera: Chrysopidae). *Zootaxa*, 4970 (3), 577–585. <https://doi.org/10.11646/zootaxa.4970.3.9>
- Yang, C.-K. (1986) Thirty new species and four new genera of Neuroptera from Yunnan, and the family Nemopteridae new to China. *Acta Agriculturae Universitatis Pekinensis*, 12, 153–166, 423–434.

توصیف مجدد سه گونه شیرمورچه (Neuroptera: Myrmeleontidae) از کرالا در ناحیه گهات غربی، هند و کلید شناسایی جنس‌های قبیله Palparini

تانگالازی بالا کریشنا سوریا نارایانان^۱، لونت آبرهام^۲، چنتاماراکشان بیجوی^{۱*}

۱ آزمایشگاه تحقیقات حشره‌شناسی شادپادا، گروه جانورشناسی، کالج کریست (خودمختار)، ایرینجالاکودا، تریسور، وابسته به دانشگاه کلکته، تنهپالم، مالاپورام، کرالا، هند
۲ موزه ریپل-رونای، کاپوشوار، صندوق پستی ۷۰، مجارستان

* پست الکترونیک نویسنده مسئول مکاتبه: bijoyc@christcollegeijk.edu.in

| تاریخ دریافت: ۰۵ آبان ۱۴۰۳ | تاریخ پذیرش: ۲۸ بهمن ۱۴۰۳ | تاریخ انتشار: ۳۱ تیر ۱۴۰۴ |

چکیده: سه گونه شیرمورچه شامل *Palpares contrarius* (Walker, 1853) و *Indopalpares pardus* (Rambur, 1842) متعلق به قبیله Palparini برای اولین بار از بخش کرالا در ناحیه گهات غربی هند گزارش شده‌اند. هر سه آرایه مجدداً توصیف شده و ویژگی‌های بخش جنیتالیا در *Palpares contrarius* و *Stenares harpyia* برای اولین بار بر اساس نمونه‌های تازه جمع‌آوری شده مستندسازی شد. نمونه‌های لکتوتیپ و پارالکتوتیپ برای گونه *Stenares harpyia* تعیین شدند. کلید شناسایی جنس‌های قبیله Palparini و محدوده انتشار سه گونه در هند نیز ارائه شد. علاوه بر این، دوره فعالیت و پرواز این گونه‌ها آن‌ها در هند نیز مشخص شد.

واژگان کلیدی: انتشار، *Indopalpares*، لکتوتایپ، *Palpares*، *Stenares*، تاکسونومی