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Cover: Coromandal Sacred Langur *Semnopithecus priam* - made with acrylic paint. © P. Kritika.



***Mantispa indica* Westwood, 1852 (Neuroptera: Mantispidae), a rare species with some morphological notes from Assam, India**

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Abstract: *Mantispa indica* (Westwood) is an insufficiently explored species under the family Mantispidae (Neuroptera) with limited understanding. Its presence has been documented in various regions of India and Nepal over time. Nevertheless, a comprehensive examination of its morphometric characteristics has been lacking. This research presents a novel morphological comparison of male and female specimens, accompanied by appropriate illustrations, from two distinct protected areas in Assam, India.

Keywords: Antenna, Chakrashila, morphological comparison, Neuropteridae, protected areas, sexes.

Abbreviations: OUMNH—Oxford University Museum of Natural History | NHMUK—Natural History Museum in London | ZSI—Zoological Survey of India.

Mantispidae (Leach, 1815) is one of the taxonomically complex, least studied families belonging to the highly diverse order Neuroptera. This group of insects is noteworthy because of their raptorial front legs attached to the anterior margin of an elongate prothorax, they resemble small praying mantids of the order Mantodea, for which they are popularly called false mantids or Mantidfly (Ohl 2007). The overall similarity between mantispids and mantids is clearly due to convergent evolution of morphological similarities of two unrelated insect groups (Cannings & Cannings 2006). In spite of their adaptive significance, this group of insects have

received relatively little attention, which is mainly due to less abundance, relatively small number of species and complicated life-cycle (Bhattacharjee et al. 2010). They show hypermetamorphic type of development where, the first instar larvae are campodeiform and quite mobile, and the last two instars are scarabaeiform and relatively immobile (Ghosh 2000; Ohl 2004). In addition, the biology of most species is unknown, those that are known have larvae that feed on Hymenoptera and spiders.

Worldwide, the family Mantispidae represents 410 species, of which 121 species belonging to the genus *Mantispa* are recorded from the Oriental region (Ohl 2007). The Indian Neuropteridae consists of 17 species under seven genera under a single subfamily Mantispinae (Ohl 2007; Chandra & Sharma 2009). The neuropteran fauna of northeastern India was catalogued by Ghosh (2000) represented by two genera: *Climaciella* Enderlein and *Mantispa* Illiger. Ghosh (2000) reported three species of *Mantispa* from the Indian subcontinent, viz.: *Mantispa nodosa* Westwood (present name *Euclimacia nodosa*), *Mantispa indica* Westwood, and *Mantispa rugicollis* Navas. Of late, Sharma & Talmale (2000) reported an unidentified species of *Mantispa* sp. from Tadoba-Andhari Tiger Reserve, Maharashtra,

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India. Bhattacharjee et al. (2010) reported the *Mantispa nodosa* (Westwood, 1847) from West Bengal of India. Ohl (2004) reported the distribution of *Mantispa indica* from Indian oriental, Calcutta, Nepalia. Ghosh (2000) reported distribution of *Mantispa indica* from Assam (Sibsagar), Calcutta, Darjeeling, Meghalaya, Sikkim, western Himalaya, and Karnataka. Very recently, Suryanarayanan & Bijoy (2021) reported *Mantispilla indica* from the Western Ghats in India. But its occurrence in Assam particularly in lower Assam is still doubtful as there is no sufficient supporting literature against it. Thus, the present paper provides first record from this area with some standard measurements of body parts following Ohl (2004) that facilitate future comparison with other species in *Mantispa*.

MATERIALS AND METHODS

Male and female individuals were collected from two different localities (Male 26.429°N and 90.444°E) Female (26.736°N & 90.472°E) during the year 2018 and 2020. The female was collected on a hot sunny day of June 2018, around 1400–1500 h in Ultapani Reserve under Haltugaon forest division while the male was collected by light trapping using a CFL bulb hung against a white sheet of cloth in August 2020 in Chakrashila Wildlife Sanctuary of Assam. The mantispid was hovering over the bulb at 1900–1930 h and captured by insect net. Both the samples were preserved in 80% ethanol following Ghosh (1998) and stored for future reference in the laboratory of Ecology and Wildlife, Department of Zoology, Bodoland University, Kokrajhar, Assam. The species was identified following available literature and comparing with the samples of Hope Entomological Collection, Oxford University Museum of Natural History (Tauber et al. 2019). Images were captured by Zoom Stereo Microscope LB-340 and Canon EOS 500D. The measurements are in millimetre made with an eyepiece graticule following the software MICAPS MICAPS-MicroView.

Nomenclature: The name is now the same as the original, and it is listed as such by Ohl (2004: 184). For a while, the species was known as *Mantispa* (*Mantispilla*) *indica* (Westwood) [combination by Enderlein (1910: 346)]. Later, the name *Mantispilla* was synonymized with *Mantispa* by Penny (1982: 217).

Type species: Westwood's description mentioned two depositories (British Museum and his own collection), and Ohl (2004: 184) reported seeing types at the OUMNH and the NHMUK. Two types (sexes unconfirmed, one probably female) are in the OUMNH (NEUR0005-01, -02; Figures 55, 56) (Tauber et al. 2019).

Distribution: *Mantispida indica* was previously recorded in some places in India and Nepal. Among these, Kolkata and Darjeeling of West Bengal, East Garo Hills of Meghalaya, Sikkim, Sibsagar of Assam, Mysore of Karnataka, Jodhpur of Rajasthan, Kangra Valley in Himachal Pradesh (Ghosh & Sen 1977; Ghosh 1998, 2000; Sharma & Chandra 2013). Very recently, it was also cited from Western Ghats (Suryanarayanan & Bijoy 2021).

Habit and Habitat: The female was reported while seating on a tender leaf of *Sida* sp. on the road side where the upper canopy was open. The individual was found immovable for about 10 minutes before capture. Perhaps the individual was waiting for its prey. On the other hand, male was attracted towards the CFL bulb while light trapping and hovering over the bulb. The habitat was mostly dominated by the Sal trees (*Shorea robusta*) along with bamboo patches. Flying and walking pattern was observed and recorded inside the rearing box (1.5 x 1.5 x 1.5 ft). They usually do not fly for long distance and while flying they resemble to the wasp species. Besides, they walk within a short distance with the help of meta and meso-thoracic pair of legs. Antennas are moving straight up and down movement. Like other neuropteran insects the mantispids are also solitary in nature. Besides, their peculiar lifecycle, solitary nature and extremely low abundance they are very difficult to recognise in nature.

Diagnosis of sexes

Female: Pronotum dorsally yellow but ventrolaterally dark brown. Black lines in the margin of preoxa and coxa are distinct. Abdomen eight segmented with dark brown lines at the junction of each tergite. Yellow band of antenna are absent. Underside of femur is blackish-brown. Abdomen is comparatively larger than the male (Image 1).

Wings: Hyaline; veins black; radius yellow; pterostigma elongate and red; with 7–8 oblique discoidal cells. In genus *Mantispa* only one row of discal cells presents in both wings (Aspöck & Aspöck 1994).

Measurements and ratios (in mm) of male and female: A few measurements were depicted of male and female for a more detailed description (Table 1). For convenience, Lambkin (1986) abbreviations are added in brackets after the descriptions (e.g., minimum frontal eye distance [WBE]).

Male: Body dark brown and slender. Lower part of the abdomen yellowish with eight abdominal segments. Abdomen dorso-ventrally flattened with prominent terminal gonocoxaite. Pronotum dark brown. Underside

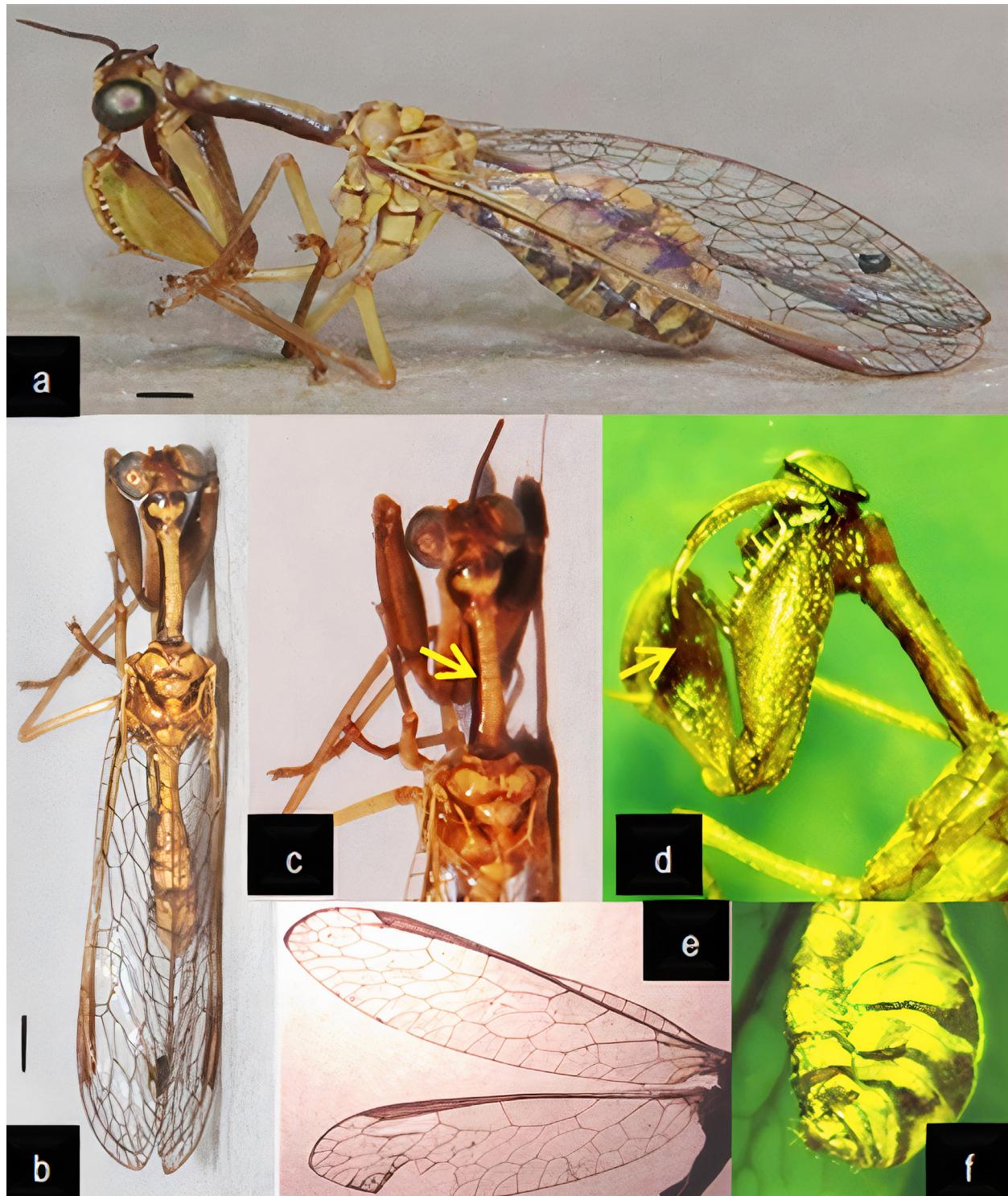


Image 1. Images of female *Mantispa indica* (a-f): a—General habitus from lateral | b—General habitus from dorsal | c—Head and thorax, from dorsal (presence of lateral line in thorax) | d—Left foreleg, from inner view (inside of the femur is blackish brown) | e—Left fore and hind wings | f—Abdomen, from ventral. Scale bar = 1.0 mm. © Kushal Choudhury.

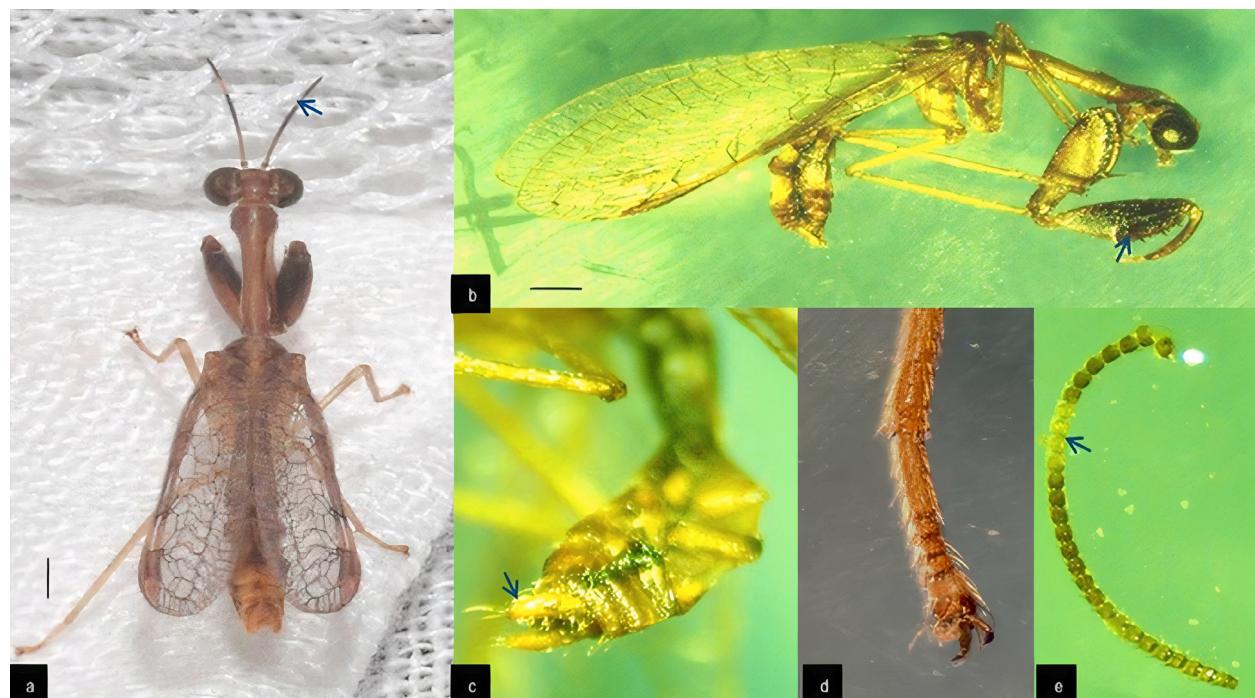
of femur is blackish-brown. Antenna consists of 28 articles with a distinct yellow band. Black line in the margin of preoxa and coxa are absent (Image 2).

Wings: Hyaline; veins black; radius yellow; pterostigma elongate and brown; with 7-8 oblique discoidal cells.

Table 1. Measurements and ratios of male and female *Mantispa indica*.

Parameters	Male (mm)	Female (mm)
Minimum frontal eye distance [WNE]	0.51	0.97
Maximum frontal head width including eyes [WAE]	2.06	2.22
Pronotal length, measured along dorsal midline [LP]	3.14	3.71
Maximum pronotal width: near head / near meso-thorax /middle at least thick part	1.03/ 0.62/0.46	1.13/0.81/0.41
Maximum fore femoral length [LFF]	4.39	3.19
Maximum fore femoral width [WFF]	1.45	1.24
Fore femoral ratio (length : width) [LFF : WFF]	3.02	2.56
Maximum mid femoral length [LMF]	2.79	2.29
Mid femoral ratio (mid femoral length: head width including eyes) [LMF : WAE]	1.35	1.03
Maximum forewing length [LFW]	10.16	11.46
Maximum forewing width (measured near pterostigma) [WFW]	3.06	3.02
Forewing ratio: (length : width) [LFW : WFW]	3.32	3.79
Maximum hind wing length	9.1	9.94
Maximum hind wing width	2.68	2.83
Hind wing ratio (length : width)	3.39	3.51
Total body length (excluding appendages)	10.45	11.28
Antenna segment	28	Damaged
Meso-thorax	1.29 (B)/1.02(L)	1.70 (B)/1.25 (L)
Meta-thorax	1.15 (L)/ 0.80 (B)	1.70 (B)/0.98 (L)
Spines	Long-1; Middium-3; Small-14	Long-1; Middium-3; Small-12

B—Breath | L—Length.

Image 2. Photographic images of male *Mantispa indica* (a–e): a—General habitus from the dorsal | b—General habitus from lateral (femur inside darker) | c—pointing out Gonocoxite | e—lighter region of antenna segments. Scale bar = 1.0 mm. © Kushal Choudhury.

CONCLUSION

Northeastern India is a biodiversity hotspot with a large number of endemic elements within its fauna and flora. But order Mantispidae was poorly documented from this region. Though the species are solitary, low abundance and obscure in nature, the occurrence of both male and female individuals from two different locations indicates the presence of more Mantispidae than presently known. Accordingly, extensive survey and collection is needed throughout the region so as to further expand our knowledge of the diversity, conservation status as well as to discover the biology of these fascinating species.

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