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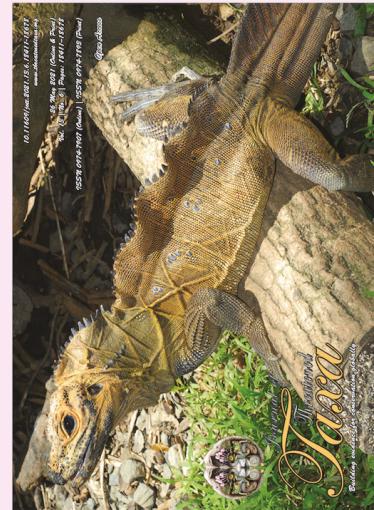
COMMUNICATION

MANTIDS (INSECTA: MANTODEA) OF UTTAR PRADESH, INDIA

Ramesh Singh Yadav & G.P. Painkra

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Mantids (Insecta: Mantodea) of Uttar Pradesh, India

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Abstract: Several surveys of mantid fauna from eastern Uttar Pradesh, India were carried out during the period 2017–2019. The collected materials include 21 species of 17 genera from six families and nine subfamilies. The Family Mantidae contributed the highest numbers of mantid fauna. In total, 10 species of mantis are reported for the first time from the present Uttar Pradesh (after division of the state) while *Tenodera costalis* (Blanchard, 1853) is recorded for the first time from the country.

Keywords: Insecta, Mantidae, new country record.

Hindi: सन् 2017 से 2019 की अवधि के दौरान पूर्वी उत्तर प्रदेश, भारत में मैंटिड जीवों के लिए कई सर्वेक्षण किए गए। सर्वेक्षण के दौरान एकत्रित सामग्रियों में छ: कुलों और नौ उपकुलों से 17 वंशों की कुल 21 प्रजातियां प्राप्त हुईं। मैनटीडी कुल में सबसे अधिक संख्या में मैंटिड जीवों ने योगदान दिया। कुल मिलाकर, वर्तमान उत्तर-प्रदेश (राज्य के विभाजन के बाद) राज्य से पहली बार मैंटिस की 10 नई प्रजातियां रिकॉर्ड की गई हैं, जबकि टेनोडेरा कोस्टेलिस (ब्लांकार्ड, 1853) देश में पहली बार उत्तर-प्रदेश से दर्ज की गई है।

Editor: Anonymity requested.

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Author contributions: RSY involved in survey, fauna collection, captured photographs and identification as well as write up of the manuscript. GPP participated in design of the research, supervision of research activities and overview the manuscript.

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INTRODUCTION

Mantids are one of the important groups of predatory insects of different agroecosystems. Mantids are also called preying mantids due to their preying ability. They are sometime confused with the mantisflies of the order Neuroptera. Mantids are grouped in the superorder Dictyoptera because of their more closeness to cockroaches and termites while forelegs of mantids are raptorial type which is not identical to the forelegs of cockroaches and termites. Globally, 2,384 species under 434 genera of 15 families are known (Ehrmann & Roy 2002) while Otte et al (2020) listed 2,400 species from 430 genera; in which more than 169 species, 71 genera, and 11 families are known from India of which 60 species are endemic to the country (Mukherjee et al. 2014). Mantids are a key agent of natural and biological control in most of the terrestrial ecosystems due to their sophisticated behaviour and modifications. They are easily identified by their raptorial forelegs, triangular head, visible eyes, and large cerci.

Probably, first taxonomic work on mantids was initiated by Linnaeus (1758) while in India, remarkable contribution to mantids came in light when the Wood-Mason joined as director of Indian Museum, Kolkata (Yadav 2017) and published a Catalogue of the Mantodea of Indian Museum collections by Wood-Mason (1889 & 1891). Subsequently Bolivar (1899) and Werner (1931, 1933 & 1935) contributed to the Indian mantids. Kirby (1904) has created a synonomic catalogue of the 82 species of mantids from India whereas, Nadkerni (1965) amassed 55 more mantids. Some notable works on the taxonomy and distribution of mantids were done by Mukherjee & Hazra (1983), Mukherjee et al. (1992, 1995, 2014, 2015, 2017), Mukherjee & Shisodia (1999 & 2000), Chaturvedi & Hedge (2000), Rao et al. (2005), Sureshan et al. (2006), Jadhav et al. (2006), Mukherjee & Hazra (2007), Vyjayandi (2007), Jadhav (2008), Chandra (2009), Sureshan (2009), Sureshan & Sambath (2009), Mukherjee & Ghate (2010), Vyjayandi et al. (2010), Ghate et al. (2012), and Chatterjee & Mukherjee (2013). The most remarkable work on Indian mantids was presented by Mukherjee et al. (1995) which was more consolidated account on this group till date. Uttar Pradesh has remained less studied for Mantodea. More recently Yadav et al (2018) have recorded some mantids from this state. More diversity of the mantids remain unexplored. Therefore, we explored the mantid fauna extensively from Uttar Pradesh after the division of Uttarakhand.

Table 1. Coordinates of the survey sites.

	Site	Coordinates
1	Karmahari, Ghazipur	25.3514°N & 82.6481°E
2	Chahaniya, Chandauli	25.4189°N & 83.2118°E
3	Chakka bandh Dam, Ghazipur	25.4204°N & 83.5574°E
4	Rohuna, Ghazipur	25.4159°N & 83.5598°E
5	Maujhi, Chandauli	25.4255°N & 83.5580°E
6	Mohammadabad, Ghazipur	25.6168°N & 83.7531°E
7	Dehariya, Ghazipur	25.2991°N & 83.6562°E

MATERIALS AND METHODS

The present exploration was made from a series of surveys of the several locations in Uttar Pradesh, India from 2017 to 2019. The study sites were located in different areas of eastern Uttar Pradesh (Table 1). The mantids were collected by sweeping net, light trap, and hand-picking methods. After photography, most of the mantids were released to avoid the loss of biodiversity issue. The collections were made during morning and night hours, i.e., 07.00–10.00 h and 20.00–22.00 h, respectively. Some of the collected materials were killed in the killing bottle containing ethyle acetate. Subsequently, materials were cleaned with hair brush, pinned and relaxed (as per need) on the handmade stretching board of thermocol. It was kept for more than 60–72 hours for drying to avoid spoilage of the specimens. The identification was made based on the morphological and genitalic features. The specimens collected were deposited in the Department of Agricultural Entomology, R.M.D. College and Research Station, Ambikapur, Chhattisgarh, India. The classifications were made according to Mukherjee et al. (2014). The coordinates of the survey sites are presented in Table 1.

RESULTS

Biodiversity of surveyed mantids from Uttar Pradesh are presented here in figure 1 and their checklist is as below.

Systematic checklist of the mantids studied from Uttar Pradesh

Systematic account

Class: Insecta

Order: Mantodea Latreille, 1802

A. Family: Hymenopodidae Giglio-Tos, 1915

Subfamily: Acromantinae Giglio-Tos, 1915

Tribe: Anaxarchini Giglio-Tos, 1919

1. *Euantissa pulchra* Fabricius, 1787*

2. *Odontomantis montana* Giglio-Tos, 1915*

Tribe: Hymenopodini Giglio-Tos, 1915

3. *Creobroter apicalis* Saussure, 1869*

Tribe: Acromantini Runner De Wattenwyl, 1893

4. *Ephestiasula pictipes* (Wood-Mason, 1879)**

5. *Hestiasula brunneriana* Saussure, 1871*

B. Family: Liturgusidae Giglio-Tos, 1915

Subfamily: Listurgusinae Giglio-Tos, 1915

Tribe: Humbertiellini Brunner De Wattenwyl, 1893

6. *Humbertiella ceylonica* Saussure, 1869

7. *Humbertiella similis* Giglio-Tos, 1917

C. Family: Tarachodidae Handlirsch, 1930

Subfamily: Schizocephalinae Saussure, 1869

8. *Schizocephala bicornis* (Linné, 1758)**

D. Family: Mantidae Latreille, 1802

Subfamily: Amelinae Westwood, 1889

9. *Amantis saussurei* (Bolivar, 1897)*

10. *Elmantis trincomaliae* (Saussure, 1869)*

Subfamily: Tenoderinae Brunner De Wattenwyl, 1893

11. *Tenodera fasciata* (Oliver, 1792)*

12. *Tenodera costalis* (Blanchard, 1853) ¶

13. *Hierodula coarctata* Saussure, 1869

Subfamily: Mantinae Burmeister, 1838

14. *Mantis religiosa religiosa* Linnaeus, 1758**

15. *Statilia maculata continentalis* Werner, 1935

16. *Statilia nemoralis* (Saussure, 1870)

E. Family: Toxoderidae Saussure, 1869

Subfamily: Oxythespinae Giglio-Tos, 1916

17. *Cheddkulama straminea* Henry, 1932**

Subfamily: Toxoderinae Saussure, 1869

18. *Aethalochroa ashmoliana* (Westwood, 1841)*

19. *Toxoderopsis taurus* Wood-mason, 1889*

F. Family Empusidae Burmeister, 1838;

Subfamily Empusinae Burmeister, 1838

20. *Empusa (Empusa) guttula* (Thunberg, 1815)

21. *Empusa spinosa* Krauss, 1902 *

Note: Asterisk marks (*), (**) and (¶) indications are indicated as species firstly recorded from Uttar Pradesh, probably earlier recorded from Uttar Pradesh and species first time recorded from country respectively.

Family: Hymenopodidae Giglio-Tos, 1915

Subfamily: Hymenopodinae, Giglio-Tos, 1915

Tribe: Anaxarchini Giglio-Tos, 1919

***Euantissa pulchra* Fabricius, 1787 (Image 1)**

1927. *Euantissa pulchra* Giglio-Tos, Das Tieriech 50

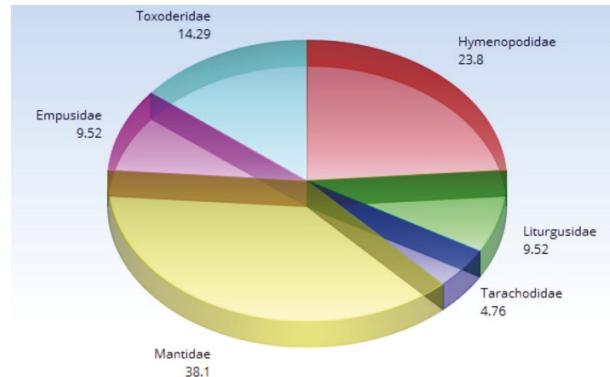


Figure 1. Biodiversity of mantids of Uttar Pradesh. Relative abundance (in percentage)

:541.

2002. *Euantissa pulchra* Ehrmann, Mantodea der Welt 244.

2014. *Euantissa pulchra* Mukherjee et al. Priamus 30: 7.

Materials examined: RMDCRS 001-002, 1 male, 1 female, 21.x.2017, Udharpur (Ghazipur) Uttar Pradesh, India; on *Thevetia peruviana*, coll. R.S. Yadav.

Diagnosis: Vertex without protuberance; eyes oblong; pronotum broad, fore femur simple with four sharp-long external and four discoidal spines; mid and hind legs have without lobes; wings brightly coloured, longer than abdomen, with dark line along the outer border (Vijayandi 2007).

Distribution: India (Andhra Pradesh, Tamil Nadu, West Bengal, & Uttar Pradesh (new record)), China, and Sri Lanka (Mukherjee et al. 2014).

Measurement: Body length 25mm

Remark: The species is more common in bushes but not frequent in my collection.

***Odontomantis montana* Giglio-Tos, 1915 (Image 2 & 3)**

1915. *Odontomantis montana* Giglio-Tos. Bull. Soc. Ent. Ital. 46: 100.

2002. *Odontomantis montana* Ehrmann. Mantodea der Welt 244.

2014. *Odontomantis montana* Mukherjee et al. Priamus 30: 8.

Materials examined: RMDCRS 003, 1 female, 09.ix.2017, Chakka bandh Dam (Ghazipur) Uttar Pradesh, India; on broad leaved shrub, coll. R.S. Yadav.

Diagnosis: Vertex without protuberance; frontal sclerite narrowed in the form of a groove, superior border wavy, a little arched in the middle; inferior border with a slightly elevated ridge; margin of pronotum bearing small tubercular spines. In forelegs external spines of femora blackish near their tips and proximal two of them closer, tibiae with 10



internal spines of same colour (Sureshan et al. 2006).

Distribution: India (Odisha & Uttar Pradesh (new record)), Malaysia, and Sumatra (Mukherjee et al. 2014).

Measurement: Immature mantid (nymph)

Remark: The species was rare in the collection.

Tribe: Hymenopodini Giglio-Tos, 1915

Creobroter apicalis Saussure, 1869 (Image 4)

1869. *Creobroter apicalis* Saussure Mill. Schweiz. Entomol. Ges., 3: 73.

1927. *Creobroter apicalis* Giglio-Tos Das Tierreich., 50: 558.

2014. *Creobroter apicalis*: Mukherjee et al., Priamus, 30: 9.

2017. *Creobroter apicalis* Mukherjee, Iyer & Chatterjee J. Threat. Taxa, 9(2): 9832.

Materials examined: RMDCRS 004-005, 2 female, 16.x.2017, Udharpur (Ghazipur) Uttar Pradesh, India; on *Thevetia peruviana*, coll. R.S. Yadav.

Diagnosis characters: Female: Body medium to large, body greenish with yellow spot on the fore wing; winged forms; head trapezoidal, vertex of head with a small mid dorsal spine, squarish with prominent lateral lobes; eyes conical, black band with white tips, projecting upwards; antennae slender, filiform; ocelli conspicuous; pronotum saddle shape, shorter than fore coxae, supra coxal dialation well pronounced, prozona laterally denticulated, spatulate with central indistinct carina, metazonal constriction well pronounced; Coxae of fore legs triangular dorsally with eight obtuse marginal spines, middorsal carina with spines, internal apical lobes converging; femur longer than coxa, with four external, four discoidal, (third longest and stoutest,) with six longer internal and seven shorter internal spines, two distal longer internal spines enclose two shorter spines; tibia with 16 smaller, depressed external spines, 14 longer internal closely arranged spines; metatarsus as long as all other tarsal segments together; middle and hind femur twice as long as mid tibia, with semi-circular, distal ventral lobe, with two genicular spines; tibia with three distal genicular spines; wings longer than abdomen; costal and anal areas of forewing transparent, forewing with yellow band bordered by two black semi-circular rings like an eye spot and placed in the middle of the both wings, this eye mark enclosed black dots, usually two; base of forewing with a yellow spot also, the hind wing with pink at base, yellowish in costal area and brownish in discoidal and anal areas.

Distribution: India (Andhra Pradesh, Arunachal Pradesh, Assam, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Sikkim, Tamil Nadu, West Bengal, & Uttar Pradesh (new record)), Bangladesh, China,

Java, Nepal, and Bhutan (Mukherjee et al. 2014, 2017).

Measurement: Body length 34mm

Remark: The species was very attractive and colourful.

Tribe: Acromantini Runner De Wattenwyl, 1893

Ephestiasula pictipes (Wood-Mason, 1879) (Image 5)

1879. *Hestias pitipes* Wood-Mason, Proc. Asiatic Soc. Bengal: 258.

1951. *Ephestiasula pictipes* Roonwal & Bhasin, Indian Forester, 77(5): 313-318.

1995. *Ephestiasula pictipes* Mukherjee et al., Oriental Insects 29(1): 217.

2014. *Ephestiasula pictipes* Mukherjee et al., Priamus, 30: 12.

2015. *Ephestiasula pictipes* Majumder et al. Zool. Surv. India, 115(4): 368

Materials examined: RMDCRS 006, 1 male, 23.ix.2017, Karmahari (Ghazipur) Uttar Pradesh, India; on bushes, coll. R.S. Yadav.

Diagnosis: External edge of fore femur denticulated, internal face of forefemur spines black, inferior internal lobes contain three yellow to white spots encased by black patch; black patch absents at upper border and very thin below near base; tarsi internally black; pronotum dorso-medially black,

Distribution: India (Chhattisgarh, Madhya Pradesh, Maharashtra, Odisha, Uttar Pradesh (earlier record from Dehradun, Uttarakhand) (Mukherjee et al. 1995, 2014), Uttar Pradesh, (new record)) and Nepal.

Measurement: Body length 34mm

Remark: The species was brown in colour.

Hestiasula brunneriana Saussure, 1871 (Image 6 & 7)

1871. *Hestiasula brunneriana* Saussure, Mem. Soc. Phys. Hist. Nat. Geneve, 21: 330.

2001. *Hestiasula brunneriana* Ghate, Ranade, Kaur and Marathe, J. Bombay

Nat. Hist. Soc. 98 (3): 473-476.

2007. *Hestiasula brunneriana* Vyjayandi. Zool. Surv. India, Occ. Paper .267: 39.

2014. *Hestiasula brunneriana* Mukherjee et al., Priamus, 30: 12.

Materials examined: RMDCRS 007-009, 1 male, 2 female, 09.ix.2017, Chakka bandh Dam (Ghazipur) Uttar Pradesh, India, on white colour flowering bushes, coll. R.S. Yadav.

Diagnosis: Vertex with protuberance; fore femur arched, foliaceous, external edge smooth with three black spots on superior margin and one near the spine in middle Mukherjee et al. 1995; Ghate et al. 2001; Vyjayandi 2007).

Distribution: India (Andhra Pradesh, Bihar, Maharashtra,

Meghalaya, Odisha, West Bengal, & Uttar Pradesh (New record)), Pakistan, and Sri Lanka (Mukherjee et al. 2014).

Measurement: Body length 29mm

Remark: Inner side of fore femur is orange in colour and ornamented with three inner black spots.

Family: *Liturgusidae* Giglio-Tos, 1915; **Subfamily:** *Listurgusinae* Giglio-Tos, 1915

Humbertiella ceylonica Saussure, 1869 (Image 8)

1869. *Humbertiella ceylonica* Saussure Mitt. Schweiz. Entomol. Ges., 3:62.

1891. *Theopompa sepentrionum* Wood-Mason. A catalogue of Mantblac 2:61.

2007. *Humbertiella ceylonica* Vyjayandi. Zool. Surv. India, Occ. Paper .267: 73.

2014. *Humbertiella ceylonica* Mukherjee et al., Priamus, 30: 14.

Materials examined: RMDCRS 0010-012, 3 female, 09.vi.2017, Zamania (Ghazipur) Uttar Pradesh, India, on light trap, coll. R.S. Yadav.

Diagnosis: Small black species with triangular head having five lobes in vertex and blackish frontal sclerite along with continuous black band; pronotum short and rhomboid in shape; fore femur slightly bulged, externally 4 discoidal and internally 5 large (completely black) and 5 short spines with three blackish band on inner side of femur as well as on tibia black; anal vein of fore wing three branched in female.

Distribution: India (Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal, & Uttar Pradesh (new record)), Myanmar, Nepal, and Sri Lanka (Mukherjee et al. 2014).

Measurement: Body length 34mm

Remark: Wood coloured black species.

Humbertiella similis Giglio-Tos, 1917 (Image 9)

1897. *Humbertiella indica* Bolivar Ann. Soc. Entomol. France, 66: 303.

2007. *Humbertiella similis* Vyjayandi. Zool. Surv. India, Occ. Paper .267: 70

1917. *Humbertiella similis* Giglio-tos Bull. Soc. Entomol. Ital., 48: 83.

2014. *Humbertiella similis* Mukherjee et al., Priamus, 30: 15.

Materials examined: RMDCRS 013-015, 1 male, 2 female, 23.vi.2018, Chahaniya, (Chandauli), Uttar Pradesh, India, on light trap, coll. R.S. Yadav.

Diagnosis: Small brown species with frontal sclerite brown with less arched superior edges; pronotum with less prominent protuberances; in fore femur internal spines

black at tips only. Irregular veinules in the costal area of fore wing, wings smoky and longer than body.

Distribution: India (Himachal Pradesh, Jammu & Kashmir, Kerala, Madhya Pradesh, Odisha, & Uttar Pradesh), Nepal, and Sri Lanka (Mukherjee et al. 2014).

Measurement: Body length 37mm

Remark: Brown coloured species.

Family: *Tarachodidae* Handlirsch, 1930; **Subfamily:** *Schizocephalinae* Saussure, 1869

Schizocephala bicornis (Linné, 1758) (Image 10&11)

1927. *Schizocephala bicornis* Giglio-Tos, Das Tierreich, 50: 237.

2007. *Schizocephala bicornis* Vyjayandi. Zool. Surv. India, Occ. Paper .267: 121.

2014. *Schizocephala bicornis* Mukherjee et al., Priamus, 30: 16.

Materials examined: RMDCRS 0016, 1 female, 07.vii.2018, Dehriya (Ghazipur), Uttar Pradesh, India, on grasses, coll. R.S. Yadav.

Diagnosis: Long and slender mantid, green coloured. Antenna thickened toward base; eyes anteriorly prolonged forming cone shape. Fore femur with four external and three discoidal in which second is longest one; tibia shortened with six external spines. Forewing very small and opaque in female (Majumder et al. 2015).

Distribution: India (Andhra Pradesh, Bihar, Chhattisgarh (Bilaspur Korba, Raipur, Koriya), Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, West Bengal, & Uttar Pradesh (new record)), Africa, Nepal, Thailand, Sri Lanka, and Sunda Island.

Measurement: Body length 145mm

Remark: Largest mantid in the collection looks like a stick insect.

Family: *Mantidae* Latreille, 1802, **Subfamily:** *Ameliniae* Westwood, 1889

Amantis saussurei (Bolivar, 1897) (Image 12)

1927. *Amantis saussurei* Giglio-Tos, Das Tierreich, 50: 171.

2014. *Amantis saussurei* Mukherjee et al. Priamus, 30: 25.

2015. *Amantis saussurei* Majumder et al. Zool. Surv. India, 115(4): 376.

Materials examined: RMDCRS 0017-0018, 2 female, 24.iii.2018, Maujhi (Chandauli), Uttar Pradesh, India, on grasses, coll. R.S. Yadav.

Diagnosis: Small in size, brown coloured mantis similar to bark with scattered black spots on vertex, frontal sclerite with two black spots; pronotum with black line. First tarsal



segment brown. Stigma with black spot at either ends (Majumder et al. 2015).

Distribution: India (Andhra Pradesh, Chhattisgarh, Maharashtra, Karnataka, Kerala, Tamil Nadu, & Uttar Pradesh (new record)).

Measurement: Body length 13mm

Remark: Smaller one mantid.

Elmantis trincomaliae (Saussure, 1869)

1869. *Gonypeta trincomaliae* Saussure, Mitt. Schweiz. Entomol. Ges., 3: 63-64.

1915a. *Elmantis trincomaliae* Giglio-Tos, Bull. Soc. Entomol. Ital., 46: 161.

2014. *Elmantis trincomaliae* Mukherjee et al. Priamus, 30: 25.

2015. *Elmantis trincomaliae* Majumder et al. Zool. Surv. India, 115(4): 377.

Materials examined: RMDCRS 0019, 1 male, 24.III.2018, Zamania (Ghazipur), Uttar Pradesh, India, on stones, coll. R.S. Yadav.

Diagnosis: Small brownish insect. In foreleg, proximal two external spines close beset; foretibia with 10 external spines. Hind metatarsus longer than rest segments together (Majumder et al. 2015).

Distribution: India (Andhra Pradesh, Chhattisgarh (Bastar), Karnataka, Kerala, Maharashtra, Tamil Nadu, & Uttar Pradesh (new record)) and Sri Lanka.

Measurement: Body length 14 mm

Remark: Smaller one mantid.

Tenodera fasciata (Oliver, 1792) (Image 13)

1912. *Tenodera fasciata* Giglio-Tos. Bull. Soc. Entomol. Ital., 43: 45.

2009. *Tenodera fasciata* Sureshan, Rec. Zool. Sur. India. Occasional Paper No. 305: 37.

2007. *Tenodera fasciata* Mandal et al. Zoos' Print Journal 22(6): 2719.

2014. *Tenodera fasciata* Mukherjee et al. Priamus, 30: 30.

2017. *Tenodera fasciata* Raut & Gaikwad, J. Threat. Taxa, 9(6): 10351-10354

Materials examined: RMDCRS 0020, 1 male, 10.iv.2018, Zamania (Ghazipur), Uttar Pradesh, India, on grasses, coll. R.S. Yadav.

Diagnosis: Body slender, much elongated; antenna very much elongated, pronotum nearly equal or longer than fore coxae. Fore femora with four discoidal and four external spines, laterally smooth; 1st discoidal spines shorter than 2nd. Both wings well developed; hind femora with apical spine; anal cerci conical and hind wing with reddish transverse veinlets in costal area (Raut & Gaikwad 2017).

Distribution: India (Arunachal Pradesh, Assam, Maharashtra, Manipur, Meghalaya, Odisha, West Bengal, & Uttar Pradesh (new record)), Borneo, China, Flores, Java, Malaysia, Moluccas, Myanmar, Philippines, Sri Lanka, Sumba, Sulawesi, Talaud Islands, and Thailand.

Measurement: Body length 87mm

Remark: Larger one mantid.

Tenodera costalis (Blanchard, 1853) (Image 14)

1853. *Mantis costalis* Blanchard, Voy. Pole Sud, Zool. IV(I): 353

1904. *Tenodera costalis* Kirby, Syn. Cat. Orth. 1: 238.

1927. *Tenodera costalis* Giglio-Tos, Orthoptera. Mantidae. Das Tierreich/animal kingdom, 414.

Materials examined: RMDCRS 0021-0022, 1 male, 1 female, 10.iv.2018, Karmhari (Ghazipur), Uttar Pradesh, India, on grasses, coll. R.S. Yadav.

Diagnosis: Body slender, soft green in colour, much elongated; frontal sclerite much wider, rather a double curved edge on the upper side; antennae medium-long, brownish to body colored; Fore coxae smooth or partial spines in male, In female finely denticulate, the apex of the femur spines black; fore femora with four discoidal and four external spines, laterally smooth; 1st discoidal spines shorter than 2nd. Both wings well developed, slightly longer than body; hind femora with apical spine. Pronotum little dilated anteriorly keeled in its middle, finely denticulate on its edges, especially in its anterior portion, metazona of the pronotum slightly longer or in similar length to the fore coxae; fore wing long, rather narrow, acuminate, all the anterior part slightly darker, discoidal area of male is hyaline, in female one third the densely veined, the hind wings are adorned with black basal spot, costal area blood-stained, discoidal area transverse venules dark/smoky, anal area dark/smoky, hyaline areas with irregular fenestrae (Giglio-Tos 1912 & 1927).

Distribution: India (Uttar Pradesh (new record)).

Measurement: Body length 89mm, pronotum 33.32mm; pronotum width 4.92mm; metazona 27.20mm; Fore wing 48.38mm.

Remark: First time recorded from India. More detail study and comparison is needed.

Hierodula coarctata Saussure, 1869 (Image 15)

1869. *Hierodula coarctata* Saussure, Mitt. schweiz. ent. Ges. 3:67

1927. *Parahierodula coarctata* Giglio-Tos. Tierreich 50:458 1935. Hierodula coarctata Beier. Genera Insect. 203: 84

2010. *Hierodula coarctata* Mukherjee and Ghate, J. Threat. Taxa, 2(9): 1167-1171.

2014. *Hierodula coarctata* Mukherjee et al. Priamus, 30: 30.

2018b. *Hierodula coarctata* Yadav et al., J. Exp. Zool. India Vol. 21, No. 2, pp. 745-747.

Materials examined: RMDCRS 0023-0025, 1 female, 12.iv.2019, Rohuna (Ghazipur), Uttar Pradesh, India, on light bulb. 2 male, 1 female, 07.ix.2019, Zamania (Ghazipur), on shrub plant, coll. R.S. Yadav.

Diagnosis: The prosternum and mesosternum with red coloured transverse band were found. The supra coxal dilation of pronotum was broader than male and prozonal tubercles on edges were comparatively stronger than the male. The metazona with distinct median carina was there. The forefemur was dark green with dark patches on inner side. The forefemur has black coloured larger spines and discoidal spines also. Wings were mostly similar with male. Male: The body colour of male was green. The head was triangular; eyes were rounded with prominent ocelli. The supra coxal dilation of the pronotum was somewhat wide. The prozona has some finer tubercles. The metazonal carination was not clear. Externally, forefemur was green in colour. Larger spines of forefemur were black in colour. The meso and meta thoracic legs are yellowish green in colour. The forewing was green in colour and veins were green with yellow coloured subcosta. There were yellowish to white colour stigma surrounded by brownish colour patches on the forewing.

Distribution: India (Andhra Pradesh, Bihar, Maharashtra, West Bengal, & Uttar Pradesh), Nepal, Java, Pakistan, & Australia? (Mukherjee et al. 2014; Yadav et al. 2018).

Measurement: Body length 47mm

Remark: Species may show gradual changes in their colouration.

Subfamily: Mantinae Burmeister, 1838

Mantis religiosa religiosa Linnaeus, 1758 (Image 16)

1758. *Gryllus (Mantis) religiosus* Linnaeus. Sys. Nat. 10: p.426

1927. *Mantis religiosa* Giglio-Tos, 1927. Das Tierreich, 50: 406.

2009. *Mantis religiosa* Sureshan, Rec. Zool. Sur. India. Occasional Paper No. 305: 30.

2014. *Mantis religiosa religiosa* Mukherjee et al. Priamus, 30: 37.

Materials examined: RMDCRS 0026-0027, 1 male, 1 female, 22.viii.2018, Rohuna (Ghazipur), Uttar Pradesh, India, on paddy, coll. R.S. Yadav.

Diagnosis: Pronotum a little longer than fore coxa, prosternum has two small tubercles just to the base; shorter when compared to that of *Statilia* Stal, fore coxa internally with a basal black spot which often encloses an oval yellow

spot, fore femora without black spot; a distinct transverse pink line on the vertex, prominent in fresh specimen. Claw groove of femora in the middle; fore wing semi-hyaline and both wings shorter to body.

Distribution: India (Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Odisha, Uttar Pradesh (new record), & West Bengal), Asia, Africa, Europe, North America, Canada, Jordan, Lebanon, and United Arab Emirates (Mukherjee et al. 2014).

Measurement: Body length 57mm

Remark: Species shows aggression when disturbed.

Statilia maculata (Thunberg, 1784)

1985. *Statilia maculata* Mukherjee & Hazra, Rec. zool. Surv. India, 82(1-4): 34.

1927. *Statilia maculata* Giglio-Tos. Das nerreich, 50: 410.

2014. *Statilia maculata* Mukherjee et al., Priamus, 30: 38

Materials examined: RMDCRS 0028-0030, 2 male, 1 female, 23.VI.2018, Chahaniya (Chandauli), Uttar Pradesh, India, on bushes, coll. R.S. Yadav.

Diagnosis: Body brownish, pronotum slender, longer than fore coxa, claw groove of fore femora situated above middle, four external and four discoidal spines, inner disc with pale yellow and black patches; tibiae with seven external spines; femora with shining yellow patch, often bordered by a black patch, larger internal spines of femora not entirely black, wings as long as abdomen.

Distribution: India (Andaman Island, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Himachal Pradesh, Madhya Pradesh, Maharashtra, Meghalaya, Kerala, Odisha, Sikkim, Uttar Pradesh, & West Bengal) Annam, Borneo, China, Japan, Java, Labuan, Myanmar, Malaysia, Maluku Islands, Nepal, New Guinea, Palawan, Sri Lanka, and Sumatra, (in Staatliches Museum fur Naturkunde, Karlsruhe, Germany (SMNK): Laos, Pakistan, Philippines, Thailand, & Vietnam) (Mukherjee et al. 2014).

Measurement: Body length 55mm

Remark: Brown coloured species, male & female are more or less same size.

Statilia nemoralis (Saussure, 1870)

1927. *Statilia nemoralis* Giglio-Tos. Das nerreich, 50: 411.

2014. *Statilia nemoralis* Mukherjee et al., Priamus, 30: 38

Materials examined: RMDCRS 0031-0032, 1 male, 1 female, 23.xi.2017, Rohuna (Ghazipur), Uttar Pradesh, India, on bushes, coll. R.S. Yadav.

Diagnosis: Body Straw yellow with grass green shade, pronotum a shorter than fore coxa, claw groove of fore



femora situated above middle, with yellow and a black patch in front of it, four external and four discoidal spines, inner disc with pale yellow and black patches; tibiae with seven external spines; prosternum without a black patch posteriorly, wings as long as abdomen.

Distribution: India (Arunachal Pradesh, Himachal Pradesh, Maharashtra, Manipur, Kerala, Tamil Nadu, West Bengal, & Uttar Pradesh (new record)), Borneo, China, Japan, Java, Korea, Myanmar, Malaysia, Philippines, Sumatra, Taiwan, and Vietnam (Mukherjee et al. 2014).

Measurement: Body length 58mm

Remark: Male & female were mostly similar.

Cheddikulama straminea Henry, 1932 (Image 17)

1995. *Cheddikulama straminea* Mukherjee et al., Oriental Insects 29(1): 202, 317, 320.

2007. *Cheddikulama straminea* Vyjayandi, (267): IX, 3, 134, 154.

2014. *Cheddikulama straminea* Mukherjee et al., Priamus, 30: 45

Materials examined: RMDCRS 0033-0034, 1 male, 1 female, 02.viii.2017, Dehariya (Ghazipur), Uttar Pradesh, India, on logs, coll. R.S. Yadav.

Diagnosis: Body straw yellow coloured, head pentagonal, flattened; occiput produced into two angular lobes; conical eyes with tubercle, pronotum slender as twice longer than fore coxa; hindlegs much longer than middle legs; wings ornate; forewing with parallel venation; hindwing with purple blotch and concentrically arranged purple patches; cerci short.

Distribution: India (Kerala and Uttar Pradesh) and Sri Lanka (Vyjayandi 2007; Mukherjee et al. 2014).

Measurement: Body length 59mm

Remark: Male & female were mostly similar.

Aethalochroa ashmoliana (Westwood, 1841) (Image 18)

1951. *Aethalochroa ashmoliana* Roonwal & Bhasin, Indian Forester, 77(5): 313-318.

1904a. *Aethalochroa ashmoliana* Kirby, 1904: Brit. Mus. (Nat. Hist.), Vol. 1 1: 308

2014. *Aethalochroa ashmoliana* syn. As *Loxomantis indica* Mukherjee et al., Priamus, 30: 2, 3, 47.

2015. *Aethalochroa ashmoliana* Majumder et al. Zool. Surv. India, 115(4): 382.

Materials examined: RMDCRS 0035-0036, 1 male, 23.XI.2017, 1 female, 12.X.2019 Dehariya (Ghazipur), Uttar Pradesh, India, on logs, coll. R.S. Yadav.

Diagnosis: Body dark in coloured middle and hind tibiae dorsally carinated, eyes prominent with a very small dorsal tubercle, upper edge of vertex concave, fore leg

external spines and eight internal spines, wing is shorter than abdomen, middle and hind femora without geniculare spines, cerci foliaceous, longer than wide.

Distribution: India (Andhra Pradesh, Chhattisgarh, Kerala, Maharashtra, Orissa, West Bengal, & Uttar Pradesh (new record)), Iran, Malaysia, and Sri Lanka.

Measurement: Body length 112mm

Remark: One of the larger species.

Toxoderopsis taurus Wood-mason, 1889

1927. *Toxoderopsis taurus* Giglio-Tos. Das Tierreich, 50: 569.

2009. *Toxoderopsis taurus* Sureshan, Rec. zool. Surv. India, Occ. Paper (305): 34.

2014. *Toxoderopsis taurus* Mukherjee et al., Priamus, 30: 2, 3, 47.

Materials examined: RMDCRS 0037, 1 female, 12.IX.2019, Dehariya (Ghazipur), Uttar Pradesh, India, on logs, coll. R.S. Yadav.

Diagnosis: Body black brown in colour, middle and hind tibiae not carinate; eyes with a distinctly projecting spine, median lobe of vertex higher than laterals, hind wings hyaline, middle and hind femora with geniculare spines; cerci long, flat, crested at tip.

Distribution: India (Andhra Pradesh, Bihar, Maharashtra, Madhya Pradesh, Odisha, & Uttar Pradesh (new record)) and Pakistan (Mukherjee et al. 2014).

Measurement: Body length 88mm

Remark: Sometime confuse with *Aethalochroa ashmoliana*.

Family Empusidae Burmeister, 1838; Subfamily Empusinae Burmeister, 1838

Empusa (Empusa) guttula (Thunberg, 1815) (Image 19)

1889. *Gongylus guttula* Thunberg, 1815: 5: 294.

2002. *Empusa (Empusa) guttula* Ehrmann, Mantodea der Welt: 127.

2009. *Empusa guttula* Sureshan, Rec. zool. Surv. India, Occ. Paper (305): 16

2014. *Empusa guttula* Mukherjee et al., Priamus, 30: 2, 3, 51.

Materials examined: RMDCRS 0038-0039, 1 female, 1 female, 05.viii.2019, Dehariya (Ghazipur), Uttar Pradesh, India, on paddy, coll. R.S. Yadav.

Diagnosis: Fore femora without lobe and superior edge almost straight; middle and hind femora without dorsal lobes, vertex prolonged into a conical protuberance, armed medially and laterally by triangular sharp spines, apex little expanded and biflag with a median carina extended into sharp point; antennae simple in female and pectinate in male; pronotum slender, slightly spined; forewing little

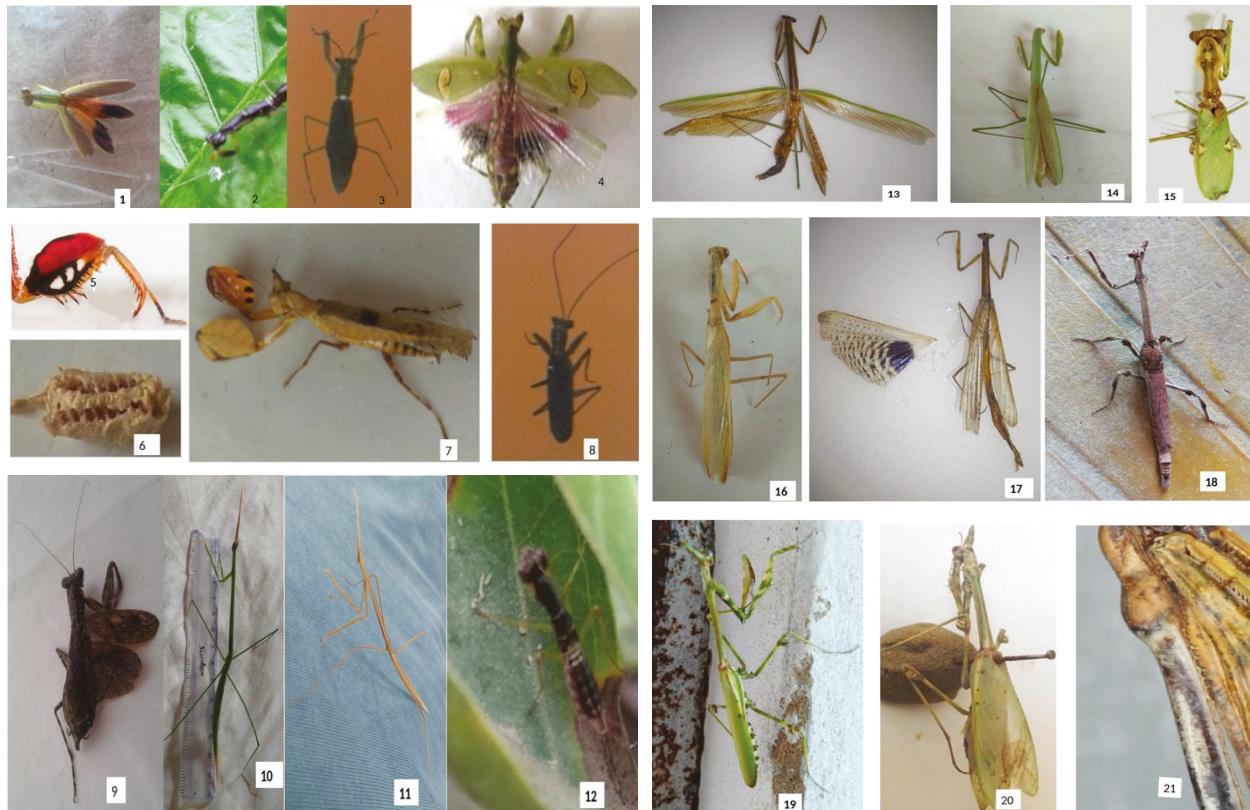


Image 1. Observed mantids during field surveys in the province of the Uttar Pradesh: 1—*Euantissa pulchra* | 2 & 3—*Odontomantis montana* nymph & adult | 4—*Creobroter apicalis* | 5—forefemur of *Ephestiasula pictipes* | 6 & 7—ootheca of *Hestiasula brunneriana* & adult | 8—*Humbertiella ceylonica* | 9—*Humbertiella similis* | 10 & 11—*Schizocephala bicornis* | 12—*Amantis saussurei* (nymph) | 13—*Tenodera fasciata* | 14—*Tenodera costalis* | 15—*Hierodula coarctata* | 16—*Mantis religiosa religiosa* | 17—*Cheddikulama straminea* | 18—*Aethalochroa ashmoliana* | 19—*Empusa (empusa) guttula* | 20 & 21—*Empusa spinosa*. © R.S. Yadav

longer than body, stigma with two brown spots at corner, costal area green, opaque.

Distribution: India (Andhra Pradesh, Odisha, Rajasthan, & Uttar Pradesh), Algeria, Angola, Cameroon, Egypt, Kenya, Libya, Madagascar, Mauritania, Morocco, Namibia, Senegal, Somalia, Tanzania, Transversal, Tunisia, Gambia, South Africa, and Tanzania (Mukherjee et al. 2014).

Measurement: Body length 58mm

Remark: Species recorded from the state previously.

Empusa spinosa Krauss, 1902 (Image 20 & 21)

1964. *Empusa spinosa* Gupta, Current Sci. 33: 370.

2002. *Empusa spinosa* Ehrmann, Mantodea der Welt, 130.

2014. *Empusa spinosa* Mukherjee et al., Priamus, 30: 2, 3, 51.

2015. *Empusa spinosa* Majumder et al. Zool. Surv. India, 115(4): 382.

Materials examined: RMDCRS 0040-0042, 1 male and 1 female, 15.x.2017, Udharanpur (Ghazipur), Uttar Pradesh, India, on *Tectona*. 1 female, 05.viii.2019, Dehriya (Ghazipur),

coll. R.S. Yadav.

Diagnosis: Longer than *Empusa guttula*, yellowish-green, slender body; vertex of head with a conical protuberance, bifurcated at top; pronotum slender, long with distinct spines, longer than fore coxae; upper edge of fore femur is straight, and simple fore femur (Majumder 2015); wing extended beyond the abdomen; abdominal segments usually expanded laterally.

Distribution: India (Chandigarh, Chhattisgarh, & Uttar Pradesh (new record)) (Mukherjee et al. 2014, Majumder et al. 2015)

Measurement: Body length 59mm

Remark: Very less studied species in the country.

CONCLUSION AND SUMMARY

The 21 species of mantids discussed here, 10 species are firstly recorded from Uttar Pradesh and one species first time reported from the country. Further more intensive field work may enrich mantid fauna of the Uttar Pradesh, India.



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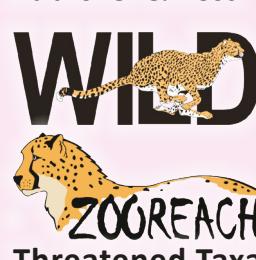
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