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## First report of *Empusa spinosa* Krauss, 1902 (Empusidae: Mantodea) from Uttar-Pradesh, India

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### Abstract

Mantids are key agent of Natural and Biological control. They are very diverse fauna. Their diversity in Uttar Pradesh is very negligible. The present study was based on the specimens collected of the subfamily Empusinae during the course of a field survey of the district Ghazipur, Uttar-Pradesh in the month of October 15, 2017. The Mantids were collected from the plantation of the *Tectona* by hand picking. One female and one male mantids fauna have recorded and identified as *Empusa spinosa* Krauss, 1902. The fauna have firstly recorded from the district Ghazipur as well as Uttar-Pradesh also. The descriptions of the species have made based on the morphological characters. The identifying features of species were Vertex of head prolonged into a more or less conical protuberance, divided at apex. Antenna of male was pectinate and female filiform; internal spines of fore femur with each long spine alternating with 3-4 short spines. The Pronotum was slender and long. Fore coxa with prolonged spiniform process at distal end and fore femur without dialation and mid as well as hind femora without ventral lobes.

**Keywords:** empusidae, *Empusa spinosa*, ghazipur, mantids, survey, Uttar-Pradesh

### 1. Introduction

Mantids belong to the order Mantodea which are the very sophisticated insect fauna in the terrestrial ecosystem. There are 2,300 species of 434 genera from 15 families under Mantodea known throughout the world [1] while Otte [2] compiled taxonomic information for over 2,400 species of mantids from their globally distribution and about 162 species under 68 genera and 6 families from India [3] whereas, Ghate *et al.* [4] compiled 184 species belonging to 73 genera under 11 families of Indian Mantids. Some earlier and notable works were carried out by Laidlaw (1937) [5] and Nandkerni (1965, 1974) [6, 7] on this group from Ranchi and Maharashtra respectively, are much helpful for Indian mantids. The credit of extensive work for Indian mantids goes to the Mukherjee *et al.* [3]. Thereafter, some studies came from some regional mantid fauna of various Indian states are by Mukherjee and Shishodia (1999, 2000) [8, 9], Chaturvedi & Hegde, 2000) [10], Rane *et al.* [11], Ghate *et al.* [12, 13], Ghate and Ranade (2002) [14], Vyjayandi & Narendran (2003) [15], Ghate & Mukherjee (2004) [16], Ranade *et al.* [17], Sureshan *et al.* [18, 19, 20], Chaturvedi *et al.* [21], Thulsi Rao *et al.* [22], Sureshan *et al.* [23, 24, 25], Ghate *et al.* [26], Jadhav *et al.* [27], Vyjayandi *et al.* [28], Mukherjee and Hazra (2007a, 2007b) [29, 30], Roy (2007) [31], Roy & Svensen (2007) [32], Vyjayandi (2007) [33], Jadhav (2008a, 2008b) [34, 35], Sureshan (2008) [36], Chandra (2009) [37], Jadhav (2009) [38], Vyjayandi *et al.* [39], Mukerjee and Ghate (2010) [40], Mukherjee *et al.* [41], Vyjayandi *et al.* [42] and Chandra *et al.* [43]. In spite of these work, there is not any consolidated reports of mantids from Uttar Pradesh. From compilation of scattered report by Ghate *et al.* [4] stated that about 55 species of 29 genera of mantids are recorded from Uttar Pradesh. The genus *Empusa spinosa* Krauss, 1902 is an important member of the family Empusidae (Empusinae). The subfamily Empusinae consisting of about 2 tribes and 51 species from 9 genera globally whereas, 8 species of 3 genera from India only [4]. Family Empusidae also called as plant mimicking mantid. They are predacious in both stage, nymphal and adult of life to the varieties of insect pests and even mantid also. They are very potential predator due to their peculiar habits of prey capture, camouflage and reproductive behavior. The Tribe Empusini have 4 genera namely, *Dilatempusa* Roy, 2004, *Empusa* Illiger, 1798, *Gongylus* Thunber, 1815 and *Hypsicorypha* Krauss, 1892 globally [2]. Ghate *et al.* (2015) [4] listed 5 species under genus *Empusa* (*Empusa*) Illiger, 1798 of Tribe Empusini namely, *Empusa* (*E.*) *fasciata* Brulle, 1832, *E.* (*E.*) *guttula* (Thunberg, 1815), *E.* (*E.*) *pauperata* (Fabricius, 1781), *E.* (*E.*) *unicornis* (Linnaeus,

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1763) and *E. (E.) uvarovi* Chopard, 1921 from India. The distribution of The *Empusa spinosa* Krauss, 1902 is not very well known from India. More recently, species has been recorded from Chhattisgarh and Chandigarh<sup>[50]</sup>. The fauna is representing to the adjoining district of Uttar Pradesh. Therefore, the present investigation was carried out to explore the Empusini from the Ghazipur district of the Uttar-Pradesh, India.

## 2. Materials and Methods

**i) Study sites and collection:** The district Ghazipur is a known district of the eastern Uttar-Pradesh. The district share its border with the state of Bihar to the east, Azamgarh (district of Uttar-Pradesh) to the west, Maunath Bhanjan and Ballia (district of Uttar-Pradesh) to the north and Chandauli and Varanasi (district of Uttar-Pradesh) to the South. The survey site situated between 25.415961° N latitudes and 83.559818° E longitudes in the Ghazipur district. The Collections were made from *Tectona* plantation is situated very nearer to the bank of the river *Karmanash*. The site is moderately rich in floral diversity. The Edaphic system of locality is sandy loam soil having different grasses, pearl millet, *Bambusa* and forest trees. The specimens were collected by hand picking in the month of the October 15, 2017 and collected specimens were killed into jars containing ethyl acetate soaked cotton and they were prepared, stretched and pinned for study. The specimens to be deposited to the Department of Entomology and Agricultural Zoology, Faculty of Agriculture, Rajiv Gandhi South Campus, Banaras Hindu University, Mirzapur, U.P. (India).

**ii) Species identification:** The adult specimens of the species were carefully studied for all details of morphological characters under high magnification hand lens. The species was separated from others with the help of available literatures and keys<sup>[3, 33, 44, 45, 46]</sup>. The specimens were also confirmed to follow the Giglio-Tos<sup>[47]</sup>. The photographs were taken of the major parts of the identified species.

## 3. Results

In the present study *Empusa spinosa* Krauss, 1902 has recorded the first time from district Ghazipur as well as Uttar-Pradesh. The details of the species are discussed below-

### i) Systematic Account

Order: Mantodea  
Family: Empusidae  
Subfamily: Empusinae  
Tribe: Empusini  
Genus: *Empusa* Illiger, 1798

### ii) *Empusa spinosa* Krauss, 1902

1902. *Empusa spinosa* Krauss, *Anz. Ak. Wien.* 39 (7): 53-54.  
2014. *Empusa spinosa* Mukherjee *et al.*, *Priamus*, 30: 51.

**iii) Materials examined:** INDIA, Uttar-Pradesh, Udharanpur (Ghazipur), 1♂ and 1♀, 15.X.2017, on *Tectona*, Coll. RS Yadav

**iv) Diagnosis and description:** Female (Fig. 1-13): Body medium to large, Body greenish or yellowish green; Winged forms; Vertex of head prolonged into a more or less conical

protuberance, basically broader and narrower apex, divided at apex; clypeus and frontal sclerite carinated; eyes oval, brownish in colour; Antenna of female filiform; fore coxa with backwardly directed spiniform process at distal end, grooved in inner side, long black band apically; fore femur without dialation, three black band on yellow-brownish femur, internal spines of fore femur with each long spine alternating with 3-4 short spines, long spines apically black tipped; tibia have series of small spines; The Pronotum slender, longer than fore coxae; mid as well as hind femora without ventral lobes, two yellow band on femora; well developed, costal vein yellow in colour, extended beyond the abdomen and abdomen apically pointed, two small black spots on costal margin; abdominal segments usually with expansions; supra anal plate short, broad, transverse and Cerci simple.

Male (Fig. 14-15): Male mantid is also similar in feature except antennae and genitalia; slightly smaller than female and Antennae pectinate.

**Table 1:** Measurements of body of *Empusa spinosa* Krauss, 1902 (all measurements in mm)

S. No.	Body parts	Male (♂)	Female (♀)
1.	Length of Body	57.60	60.50
2.	Width of Head	4.10	4.50
3.	Pronotum	24.85	26.60
	Prozona	3.20	3.60
	Metazona	23.10	23.90
4.	Frontal coxae	11.90	12.20
5.	Frontal femora	13.80	14.00
6.	Length of tegmina	31.80	32.20

**iv) Distribution:** Chandigarh, Chhattisgarh<sup>[50]</sup> and Uttar Pradesh (new record).

## 4. Discussion

The genus *Empusa* Illiger, 1798 comes under the Tribe Empusini. The Tribe Empusini contains 4 genera namely, *Dilatempusa* Roy, 2004, *Empusa* Illiger, 1798, *Gongylus* Thunber, 1815 and *Hypsicorypha* Krauss, 1892 globally<sup>[2]</sup>. Illiger, 1798 has firstly described the genus *Empusa* Illiger, 1798<sup>[48]</sup>. The genus *Empusa* Illiger, 1798 has 11 Species i.e. *E. binota* Serville, 1839; *E. fascita* Brulle', 1832; *E. guttula* (Thunberg, 1815); *E. hedenborgii* Stal, 1871; *E. longocollis* Ramme, 1950; *E. pennata* (Thunberg, 1815); *E. pennicornis* Pallas, 1773; *E. romboidea* Lindt, 1976; *E. simonyi* Krauss, 1902; *E. spinosa* Krauss, 1902 and *E. uvarovi* Chopard, 1921 known from whole world<sup>[2]</sup> whereas 5 species namely, *E. fascita* Brulle', 1832; *E. guttula* (Thunberg, 1815); *E. pauperata* (Fabricius, 1781); *E. unicornis* (Linnaeus, 1763) and *E. uvarovi* Chopard, 1921 from India<sup>[4]</sup> whereas, Majumder<sup>[50]</sup> recorded *Empusa spinosa* Krauss, 1902 from Chhattisgarh. The species is previously recorded from India to the province of Chhattisgarh and Chandigarh<sup>[50]</sup>. The literatures reveal that the species is not known from Uttar-Pradesh. In the present study one male and one female have recorded from the *Tectona* orchard on the bank of the river Karmanasa of district Ghazipur, Uttar-Pradesh and fauna identified as *Empusa spinosa* Krauss, 1902. This is the first record from the district and probably from eastern Uttar-Pradesh. The morphological descriptions and measurements of the relevant body parts are provided.



**Fig (1-8):** *Empusa spinosa* Krauss, 1902 (female): 1. Expanded wings 2. Dorsal view 3. Ventral view 4. Protuberance 5. Clypeus and frontal sclerite with eyes 6. Outer view of fore femora with spines 7. Inner view of showing both, long and small spines and 8. Dorsal view of pronotum



**Fig (9-15):** *Empusa spinosa* Krauss, 1902 (female): 9. Mid and hind femora 10. Fore wing 11. Meso and meta sternum 12. Ventral view of abdomen and 13. Terminal portion of Abdomen and Cerci. 14 *Empusa spinosa* Krauss, 1902 (male): 15. Antennae

## 5. Conclusion

The aim of the present study is to provide Information regarding The *Empusa spinosa* Krauss, 1902 of the subfamily Empusinae from the Uttar-Pradesh. The *Empusa spinosa* Krauss, 1902 is representing the first record from the Uttar-Pradesh. However, several survey works have been made for Mantodea from Uttar-Pradesh, nevertheless, this species was lacking so far from this province.

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