

FIRST RECORD OF SOLIFUGAE (RHAGODIDAE AND GALEODIDAE) FROM DELHI, INDIA

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ABSTRACT

The Solifugae have not been well studied apart from work during the British era in India. Even the recorded distribution is still patchy and needs proper understanding of different species found across the country. In this paper, we report the first record of the Solifugae families Galeodidae and Rhagodidae from Delhi.

KEYWORDS Solifugae, Delhi, Wind-spider, Camel-spider, Galeodidae, Rhagodidae, Biodiversity Parks

INTRODUCTION

Solifugae are commonly known as Sun spiders, Camel Spiders, Wind Scorpions, Desert Archnids or Solifuges. They are small to moderately large spider-like

nocturnal, cursorial and hunting creatures found across the dry, arid and semi-arid habitats worldwide (Bano & Roy, 2016).

In India, Galeodidae is represented by a single genus *Galeodes* Olivier, 1791 which includes 13 species. Initially, Pocock (1897) included Rhagodids under subfamily Rhagodinae in family Solpugidae (Koc *et al.*, 2015); later the status of Rhagodidae was elevated by Roewer (1933). There are twenty-eight species of *Rhagodes* Pocock, 1897 distributed across central and south-east Asia. In India, Order Solifugae have been recorded from Bilaspur (Pocock, 1900); Pimpalner, Maharashtra (Pocock, 1900); Secunderabad, Andhra Pradesh (Pocock, 1900); Kurnool, Andhra Pradesh (Rao *et al.*, 2005); Nagarkurnool, Telangana (Pravalika *et al.*, 2014); Alirajpur, Madhya

Pradesh (Pandram & Sharma, 2015); Jaisalmer, Rajasthan (Bano & Roy, 2016) (Map 3).

Rhagodes have been recorded from India in Kurnool, Andhra Pradesh (Rao *et al.*, 2005), Aruchami & Rajulu (1978) described its poison glands from specimen collected from Kurnool, Andhra Pradesh and Vellore, Tamil Nadu by Pocock (1900) (Map 3).

MATERIAL AND METHODS

The specimen of Rhagodidae [Fig. 2a)] was collected during one of our field surveys from location (28°31'9.02"N, 77°16'38.17"E) on 5th June 2017 and another specimen of Galeodidae [Fig. 1a)] was collected during a birding session on 13th June 2018 at Delhi, India (28°30'51.70"N, 77°16'35.25"E). Both the locations are part of Delhi Development Authority's Tughlaqabad Biodiversity Park (Map 2). Both the specimens were collected and kept for 2 days without food to become less active, photographed using Canon 600D with 18-55 mm lens and extension tube of 35mm. Thereafter the specimens were fed with ants and after they were active, they were released at the site of original capture.

STUDY AREA

The District Park at Tughlaqabad Tekhand Phase II located in the southern ridge, the last spur of Aravali hills, has been declared as Tughlaqabad Biodiversity Park by Delhi Development Authority (DDA), in January 2016. The action plan for the development and management is being implemented by DDA in collaboration with CEMDE (University of Delhi). It is spread over an

area of 500 acres and includes the eastern gentle slope of the Tughlaqabad Fort area. The terrain is undulating with ridges and depressions; most of the ridges are flat and are either barren or with scattered bushes of *Prosopis juliflora*. Few patches have native vegetation of *Ziziphus mauritiana*, *Prosopis cineraria*, *Balanites aegyptica*, *Acacia nilotica*, *Acacia leucophloae*, and shrubby vegetation of *Caparis decidua*, *Caparis sepiaria* and *Ziziphus nummularia*. Several shallow depressions are present across the landscape and these are recharging zones of rainwater along with raw sewage. The terrain is rocky and the climate semi-arid.

DESCRIPTION OF SPECIMEN

The specimen was identified by using identification keys provided by Wharton (1987) and Punzo (1998) helped to easily identify families and family-level identification. Identification to the species level is difficult based on photographs and lack of literature on the Order in India.

The specimen of Galeodidae was identified by the presence of a pair of flagella and a dark brown head, mandibles dark with brown spines, a pedipalp with dark brown adhesive organ, yellowish-brown legs with spines, fine microsetae on the tarsal claws of legs 2 through 4, Fan-shaped sensory organs called malleoli or racquet organ on the undersides of coxae and trochanters of fourth leg.

Anal somite: Flattened

Anus: terminal

Tarsal segmentation on legs: 1-2-2-3

Chelicerae: Multidentate

Flagellum (male): paraxially movable

Punzo (1998) described the Rhagodidae as having the following characteristic features: hemispherical anal somite of abdomen; anus located ventrally on last abdominal segment; tarsal segmentation: 1 - 1 - 1 - 1; tarsi of leg I with a basitarsus and 2 claws; metatarsi with dense ventral clothing of short, spine-like setae; heavy-bodied; short-legged; male cheliceral flagellum paraxially immovable and consists of 2 flattened, curled setae that form a curved, truncate, horn-like tube on the mesial surface; female genital opercula not differentiated from other abdominal sternites; chelicerae powerfully toothed (dentate), fixed digit with 3 teeth anterior to the large main tooth; 5 lateral and 2 median cheek teeth.

According to Koç *et al.* (2015), Rhagodidae species are medium-sized, short-legged, and vary in colour from tawny, yellowish-white or reddish to dark taupe or brown. The specimen recorded from the site had a dark brown body, with reddish legs. A study by Aruchami & Rajulu (1978) found the presence of venom glands in *Rhagodes nigrocinctus* (Rhagodidae) from India.

RESULT AND DISCUSSION

Galeodidae (Figure 1) and Rhagodidae (Figure 2) specimen has been photographically recorded from Delhi for the first time. The entire Order of Solifugae is not well known in Indian faunal studies, making it difficult to identify the specimens photographed and thereby compare distribution of the species. Further research on the Order can highlight the detailed distribution and ecology of the species. The specimen of Galeodidae recorded was 3cm and the

specimen of Rhagodidae was 2.2 cm. The Rhagodidae specimen was found hunting on ants and was aggressive; when disturbed it sped away furiously. The habitat was mainly sandstone and scrubland. Our observation emphasizes that both the families of Solifugae are well distributed in southern Delhi and active in summers during morning and evening. A further search for specimens and scientific documentation of behaviour and distribution in the area can give better understanding and ecology of the Order Solifugae.

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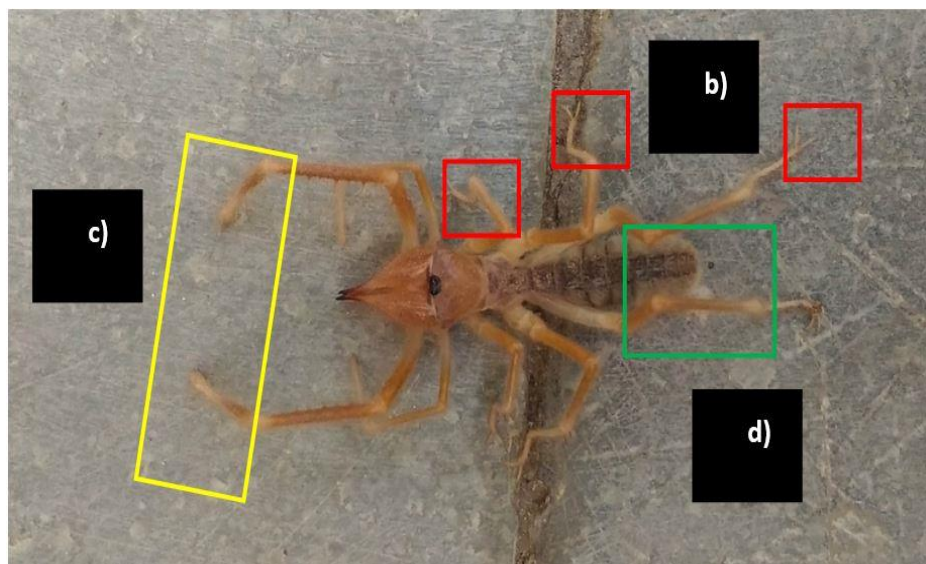




Fig 1: Morphological Characters of identifying Galeodidae

- a) Dark brown thorax and abdomen with light brown legs
- b) Microsetae on the tarsal claws of legs 2 through 4.
- c) A pair of pedipalp with adhesive organ
- d) The flattened anal somite.
- e) Pair of flagellae of male (family Galeodidae).

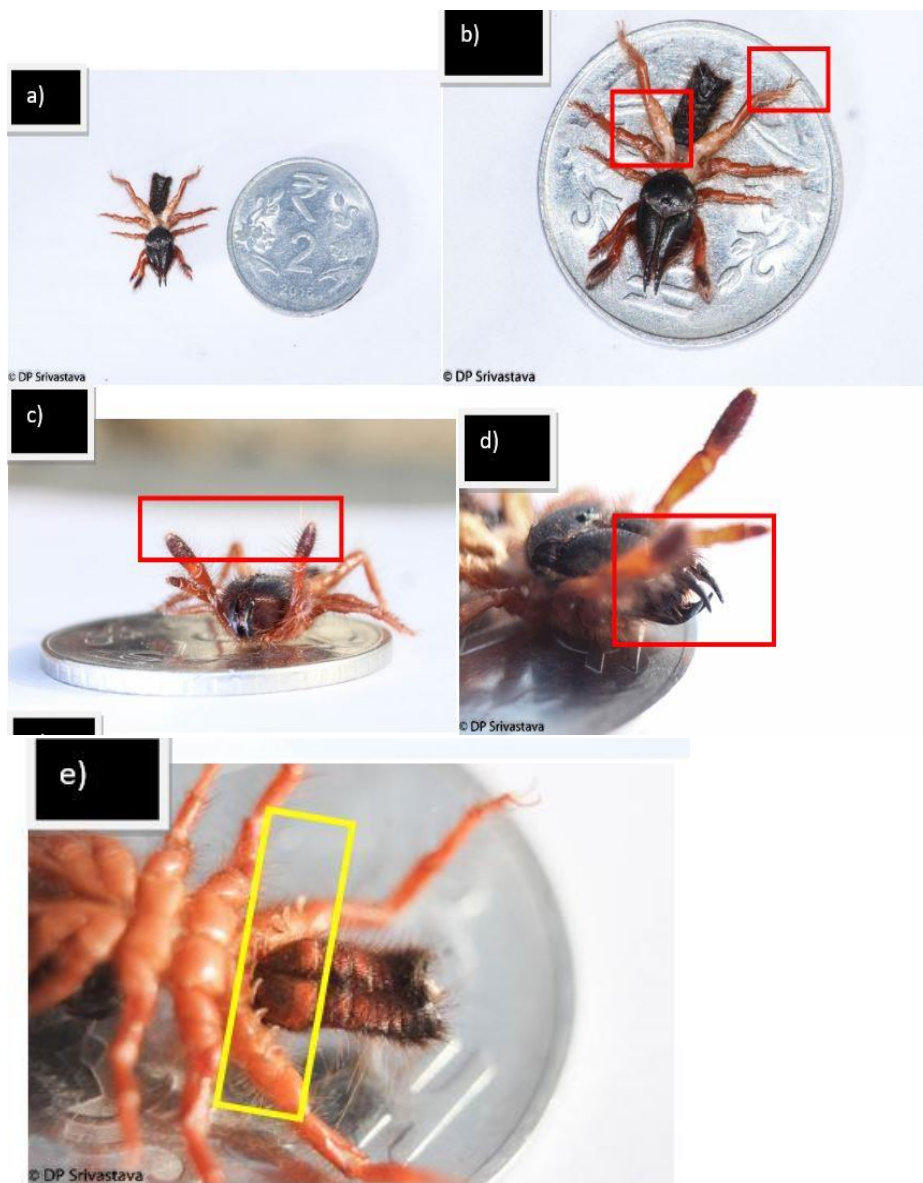
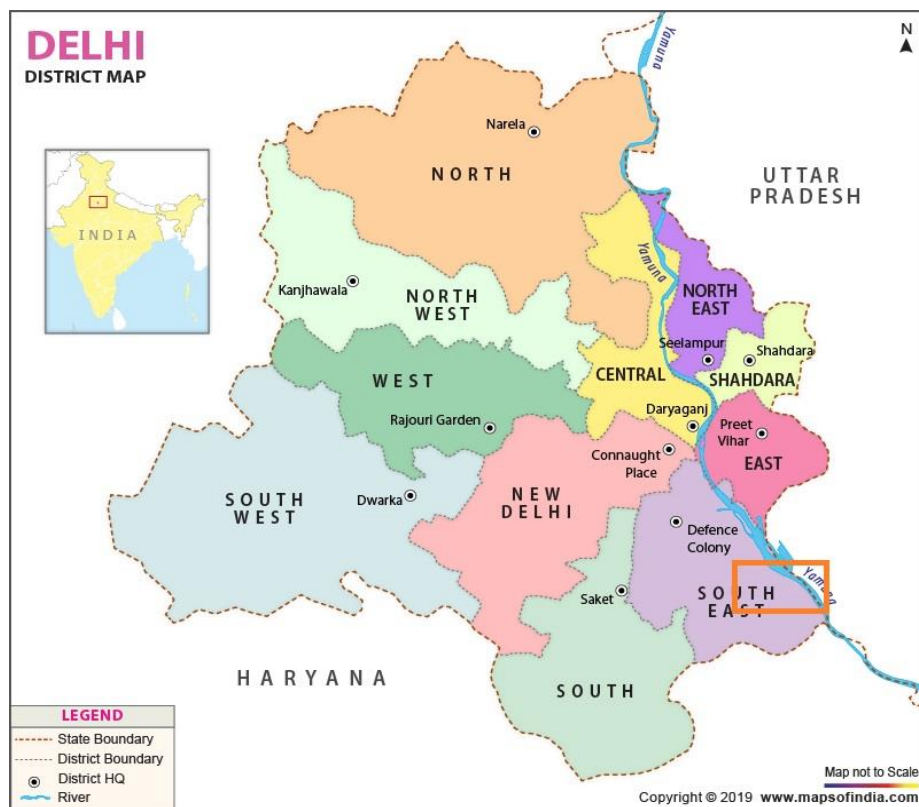


Fig 2: Morphological characters for identifying Rhagodidae

- Dark brown thorax and abdomen with light brown legs
- Tarsi of leg with a basitarsus and 2 claws
- A pair of Pedipalps with adhesive organ
- Pair of Flagellae of male
- Fan-shaped Malleoli on ventral side of fourth leg

ANNEXURE

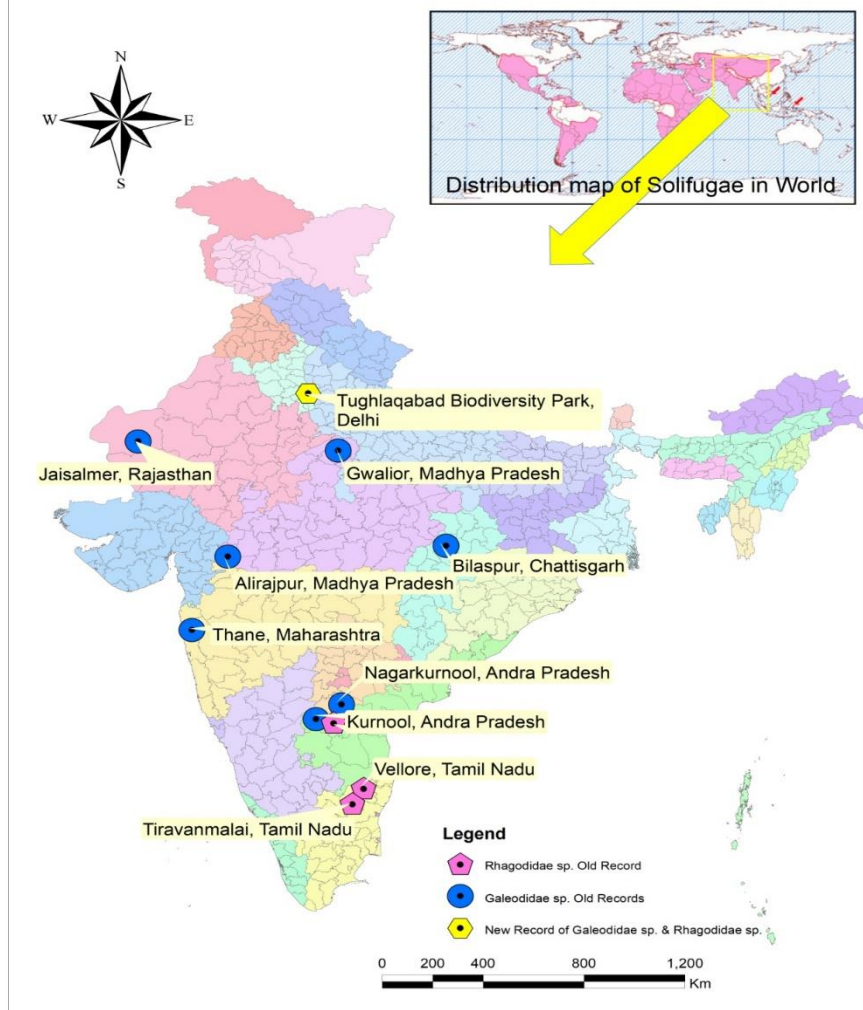


Map 1: Study Area Delhi, India



Map 2: Study Area: Tughlaqabad Biodiversity Park, Delhi, India

DISTRIBUTION OF GALEODIDAE & RHODIDAE FAMILY ORDER: SOLIFUGAE FROM INDIA



Map 3: Recorded Distribution of Solifugae Order from India