

Sexual dimorphism in a whipscorpion, *Thelyphonus indicus* Stoliczka (Arachnida, Uropygi)

K. P. Rajashekhar and Geetha Bali

Department of Zoology,
Bangalore University,
Bangalore 560 001,
India

Introduction

The arachnid order Uropygi consists of whipscorpions of the family Thelyphonidae. Ten genera are recognised. The type genus, *Thelyphonus*, contains about 27 species, most of which are Indian. Earlier studies on the sexual dimorphism of these animals indicate that the sexes look similar in external features, but differences can be observed on close examination of the pedipalps and genital sternum (Gravely, 1912, 1916; Weygoldt, 1971, 1972, 1978; Yoshikura, 1973). Sexual dimorphism in an Indian species, *Thelyphonus indicus* Stoliczka, is described here.

The specimens were collected from the vicinity of Bangalore, southern India, during the rainy season. They were usually found beneath stones and in burrows. The male:female ratio was 1:10.

Observations

Pedipalps

The pedipalp of whipscorpions consists of six segments, viz. coxa, trochanter, femur, patella, tibia and tarsus (Yoshikura, 1973). The pedipalps of both sexes of *T. indicus* are shown in Fig. 1. They are used during courtship and reproduction, and during prey capture, feeding and burrowing.

Trochanter: In *T. indicus* the trochanter of both sexes has six dorsal spines. In the female the third spine from the anterior end is distinctly larger than the rest, but this difference is not seen in the male. Both sexes have two ventral spines. The trochanter of the female is broader than that of the male, this being a character common to all species of *Thelyphonus*. The length/breadth ratio in the female is 0.59 and in the male 0.61.

Femur: No sexual dimorphism was observed in the femur of *T. indicus*, unlike members of the genus *Typopeltis*, in which the femur is much longer and bulging in the female (Yoshikura, 1973).

Patella: Differences were observed only in the patellar apophysis; this is simple and conical in both sexes, but it is thinner in the male. Length/breadth ratio 2.6 in female and 3.0 in male. Considerable structural modifications of the apophysis are reported in other genera of whipscorpions (Gravely, 1912; Yoshikura, 1973; Weygoldt, 1978).

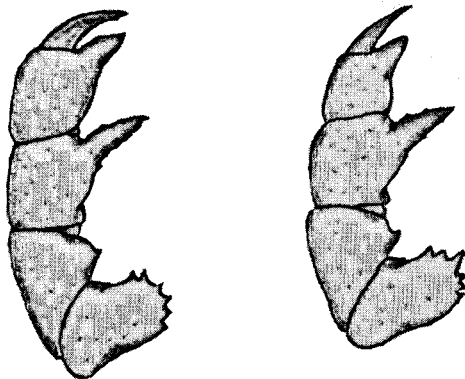


Fig. 1: *Thelyphonus indicus*. Dorsal view of left pedipalp of male (left) and female (right).

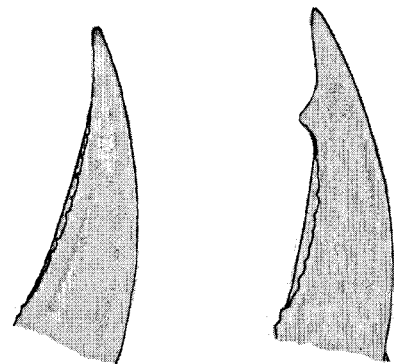


Fig. 2: *Thelyphonus indicus*. Dorsal view of right tarsus of female (left) and male (right).

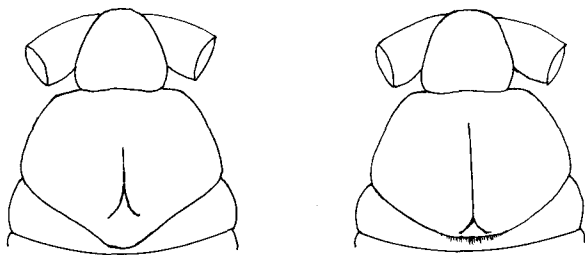


Fig. 3: *Thelyphonus indicus*. Ventral view of genital sternum of female (left) and male (right).

Tibia: The tibia is smaller in the female, and correspondingly the tibial apophysis is also smaller than in the male. The male therefore has a broader "palm"; this is a common feature in a number of whipscorpions (Gravely, 1916; Yoshikura, 1973; Weygoldt, 1971, 1972, 1978).

Tarsus: There is a spine near the tip of the tarsus in the male which is absent in the female (Fig. 2). This is comparable to the accessory tip on the tarsus in the male of *Mastigoproctus giganteus* (Lucas) (Weygoldt, 1971).

Genital sternum

The genital sternum or anterior abdominal sternum provides an easy character to differentiate the sexes (Fig. 3). The genital sternum is large and bulging in the male, with a hexagonal outline. In the female it tends to taper posteriorly, resulting in a pentagonal outline of the sternum. There is a groove in the middle of the sternum in both sexes, but it is more distinct in the male. As in *T. sucki* Kraepelin and *T. shimkewitschi* Tarnani, this groove does not extend to the entire length of the genital sternum, which it does in *T. caudatus* (L.) and *T. linganus* Koch (Gravely, 1916). An interesting character observed in the male of *T. indicus* is the presence of hairs on the posterior margin of the sternum, that of the female being devoid of these hairs (Fig. 3). A similar character has been reported in *Typopeltis stimpsoni* (Wood) by Yoshikura (1973).

Antenniform legs

The modified first leg is antenniform and in the

female of some species there is a notch at the place where the male holds the female during courtship. This notch is not found in the female of *T. indicus*.

Discussion

A considerable degree of variation is seen in the secondary sexual characters of whipscorpions. According to Gravely (1916) these characters are not stable and a lot of variations are observed in different animals of the same species. During courtship the antenniform leg of the female is held by the male with the help of the pedipalps. In later stages the male uses the pedipalps to hold the female's opisthosoma. The tibial "palm" is used to empty the sperm package by pressing the genital operculum, and the larger "palm" of the male is said to form a strong pressing instrument (Weygoldt, 1978). The presence of hairs on the genital sternum is confined to the male and hence may be connected with the sexual processes.

References

- GRAVELY, F. H. 1912: Notes on the Pedipalpi in the collection of the Indian Museum. III. Some new and imperfectly known species of *Hypoctonus*. *Rec. Indian Mus.* 8: 101-107.
- GRAVELY, F. H. 1916: The evolution and distribution of the Indo-Australian Thelyphonidae, with notes on distinctive characters of various species. *Rec. Indian Mus.* 12: 59-86.
- WEYGOLDT, P. 1971: Notes on the life history and reproductive biology of the giant whipscorpion, *Mastigoproctus giganteus* (Uropygi, Thelyphonidae) from Florida. *J. Zool., Lond.* 164: 137-147.
- WEYGOLDT, P. 1972: Spermatophore morphology and sperm transfer in Uropygi (*Mastigoproctus brasiliensis* C. L. Koch) and Amblypygi (*Charinus brasiliensis* Weygoldt and *Admetus pumilio* C. L. Koch) (Chelicerata, Arachnida). *Z. Morph. Tiere* 71: 23-51.
- WEYGOLDT, P. 1978: Mating behaviour and spermatophore morphology in whipscorpions: *Thelyphonellus amazonicus* Butler and *Typopeltis crucifer* Pocock (Arachnida, Uropygi). *Zoomorphologie* 89: 145-156.
- YOSHIKURA, M. 1973: Whipscorpions of Japan. *Kumamoto J. Sci. (Biol.)* 11(2): 81-93.