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## A study on morphometric and sexual dimorphism characteristics of giant huntsman spider in Kandi, sangareddy region of Telangana state, India

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### Abstract

The giant huntsman spider is a hunting spider which runs faster due to the long jointed appendages. The morphometric characters of huntsman were measured subsequently. The total length of the spider was 3 inches. The bisexual dimorphism of the spider was studied, and it was observed that the female spider had an enlarged abdomen with prominent four spots on its dorsal side and muscular body and legs. In contrast, the captured male species had streamlined bodies and long jointed appendages. This spider's study will help know the biodiversity in the Kandi, sangareddy, Hyderabad, India. These huntsman species were found in localite areas where people or humans resides. Most of the time, they were found in the home of humans. So, there was no need to worry or fear about them as these spiders are not harmful to humans and are also helpful in controlling insect pests such as mosquitoes entangled in their web.

**Keywords:** giant huntsman spider, sexual dimorphism, morphometric characters, prey, hunting

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### Introduction

The spiders belong to the phylum Animalia and class Arthropoda, the characteristic feature of all those animals bearing jointed appendages. The spiders are the part of biofauna of animal biodiversity. There are numerous species of spiders present on the earth's crust. They are different in their habitat, niche and ecological succession rate. Spiders can be observed in dense forests, mountains, hilly regions, extreme cold places, water, barren land, deserts, near hot springs, etc. Spiders behave accordingly depending on the climate where they occur <sup>[1]</sup>. Spiders' few excellent and fabulous characteristics include camouflage <sup>[2]</sup>, water diving, designing and forming a beautiful web, jointed bulbous eyes, etc. <sup>[3]</sup>. The spiders can be categorised depending on their niche; they may be terrestrial, arboreal, sea, or aerial; hence, they can live on the land, in trees and in the air by forming and hanging on the cobweb. Each spider has their way of living <sup>[4]</sup>. For example, they create different web structures with a unique tensile strength of web cord. The food preference of spiders includes flying insects, beetles, centipedes, *Drosophila melanogaster* (fruit fly) and a few large-sized spiders can eat crickets, grasshoppers, lizards, frogs, rodents and sometimes birds, too <sup>[5]</sup>. The spider drink water to survive to form the water source or the moisture condensed on its web <sup>[6]</sup>. The tiny spiders usually suck the fluid sap from the flies and beetles and leave the body as such. The giant huntsman spider (*Heteropoda maxima* Jäger, 2001) <sup>[7]</sup> is the interest of our study due to its larger size and occurrence in human society. This spider might sometimes be scary due to its more prominent appearance, hairy body and enlarged appendages. Sometimes these spiders can grow upto the size of the palm of humans. The spiders are economical in agriculture as they used to kill and feed on insect, which is supposed to be the insecticidal pests for the crop. Therefore the spiders are eco-friendly to the environment. Few recent reports suggested that researchers started developing nanomaterials in the form of nanoparticles for various use, such as performing the anti-microbial study and improving the drug's efficacy for treating multiple diseases. The web of spiders promotes the research of the synthesis of similar tensile fibres and cords to improve the long life of clothes and to form highly tensile eco-friendly materials for the garment industry. Its wide future application may include the development of bulletproof jackets and securing the nation's army. More than 45000 species of spiders have been identified. Spiders are antisocial animals, but few people have a hobby for pet animals; therefore, they can care for the spider as they are fascinating to watch and observe, in their opinion. For example, Orb Weaver, a Giant huntsman spider, Costa Rican Zebra Tarantula, a fishing spider, a green lynx, a Crab spider, Pink toed Tarantula, Mexican Red-Knee Tarantula etc. are the pet spiders widely used in pet stores for selling <sup>[8]</sup>, <sup>[9]</sup>. The mother spider used to lay eggs in the form of sacs consisting of eggs inside, and the babies were hatched after a few weeks. The mother spider eats their babies to protect herself and the remaining babies to grow stronger. In a few species of spider, it was detected that the developing spiderlings eat their mother alive; such process is called matrophagy. The spider's life span varies; some live upto two years, and few live upto 20 years at maximum. The male spider has a smaller life span as

compared to female spiders. The male spiders gain maturity 1-2 years after birth and die after mating. The spiders also follow the circadian rhythm for sleeping and awakening. During sleep, the spiders also remain active to catch prey or protect themselves from threats. The ongoing research study predicted that the spider could also hear a human voice from a few metres <sup>[10]</sup>. This can happen due to the presence of a hairy layer present on the body of the spider, which can detect human speech. The spider species are poisonous and non-poisonous as well. The world deadly spider, namely the Sydney funnel web spider, is native to Australia, and its name is recorded in the Guinness world record book for its poisonous nature. The spider does not excrete urea, but they excrete uric acid in the form of excreta as poop. The spider has four pairs of eyes and a total of eight. They do not have high vision like humans, so they usually can't remember things. An Australian museum conducted a similar study to check their picture and memory capacity. But unfortunately, they concluded that the spider has to sit on its web and wait for the prey to enter its web. Hence they don't have enough memory or eyesight like humans or other animals <sup>[11]</sup>. The male spiders produce noise by hitting the dried leaves; therefore, a kind of purring sound was observed, which is audible to humans. Spiders have an open circulatory system and do not have true blood in their body to circulate, and there is an absence of veins and a circulatory system <sup>[12]</sup>. The blood is present in the form of haemolymph. The copulation in spiders is amazing and quite creepy. The male spider ejaculates onto the web, then shifts the sperms or spermatocytes to its front appendages and slinks on the tiptoe of the female <sup>[13]</sup>. The jumping spiders have the characteristic feature they look at you and move accordingly. The huntsman spider is named after their speed and nature of preying habit. This spider is not poisonous and rarely bites humans <sup>[14]</sup>.

### Materials and Methods

High-resolution fluorescence microscope, Petri dish, Jar, Spider catcher purchased from Amazon. In, Scale, Weighing balance and Live spider.

### Collection of spider

The spiders were collected manually from the houses of humans and nearby societies of Kandi, Sangareddy district of Hyderabad, Telangana state. The Kandi area is a village of 1790 hectares, and the nearest town is sangareddy which is 8 KM apart. The Kandi location has a latitude of 17° 36' N and a longitude of 78° 05' E. The male and female were captured from nearby human dwelling areas. The spiders were caught with the help of jars and strip of paper. First, trap the spider, and put a pot covering the surrounding areas. Care has been taken that it should not hamper or damage a spider's body parts or appendages. Later on, the piece of paper was inserted inside the jar, and it was made sure that the spider jumped over the jar. In the next step, the paper and the pot were tilted, and the spider was pushed inside the jar. This was a simple but efficient method to collect the spider without any damage or harm to the spider's body. Another technique also used to catch the spider was using a spider catcher; this is another method as well efficient and easy to capture the spider. The huntsman spider is enormous; necessary precautions must be taken before its capture. The male and female huntsman spiders were collected and kept in a separate jars. After its collection, the spider was subjected to identification and confirmation under a fluorescence microscope.



Fig 1: A) Spider catcher to capture the speedy huntsman spider

### Identification of spider and evaluation of morphometric characters

The collected spider was kept under observation and placed under a fluorescence microscope of high resolution. During the entire identification study, we did not kill the spider or preserve it; we aimed to identify the species

and make them free after the examination. To achieve this purpose, we manually performed these experiments with certain modifications to the original experiments presented in earlier reports. To conduct these experiments and to generate the data, the spider was kept in a petri dish separately. This Petri dish was kept below the microscope under high resolution. The images were captured and preserved for the record. The morphometric characters are the body characters, including length, weight, height, etc. These characters of spiders were measured subsequently. The weighing balance was used to measure the weight, and the spider's weight was calculated. After wearing gloves, with a gentle touch, the spider was captured and measured its body length. The length of the male and female bodies was measured separately. The scale was used to measure the morphometric difference between the two sexes. To know the exact difference between males and females, the abdomen of both sexes was measured independently.



**Fig 2:** A) Female huntsman spider with four prominent black spots on its enlarged abdomen

#### **Evaluation of sexual dimorphism in spider**

The huntsman spider was studied to know the difference between the male and female characters. The spider's body features were observed and examined nicely under a high-resolution fluorescence microscope. The distinguishing features related to the separation of sexual characteristics were studied and noted the difference accurately.

#### **Results and Discussions**

##### **Collection of spider**

The spider was collected with a spider catcher's help and using a jar, piece and paper, or a sticky trap. The collected spider was kept in a plastic jar made of artificial holes for oxygenation. The collected spider is from the Kandi region of Sangareddy district, Telangana state. The collected spider was stored nicely with the precautions for their aeration, and food was provided. The collected spider was released in the field after the successful completion of the experiment. The collected spider was mature and fully grown.

##### **Identification of spider and evaluation of morphometric characters**

The male and female spiders were identified based on the essential body feature or morphometric characters' help. The male huntsman spider was determined based on its smaller abdomen and elongated jointed appendages. The joint legs were streamlined and 4 to 5 times longer than their total body length. In contrast, the female huntsman spider was identified by studying and observing the morphometric characters. The female huntsman was muscular with an enlarged abdomen indicating the presence of several egg sacs inside.

The jointed appendages of the female spider were muscular and short in length compared to a male spider. There was a presence of prominent black spots present on the dorsal side of the female spider. The male spider had sharp black spikes on the jointed appendages. The streamlined legs of males help them run fast and quickly capture the prey. The huntsman is the fast-running spider in the world. The morphometric characters were measured for the captured spider species. The total body length of the huntsman collected was nearly 03 inches in length. The critical feature of the spider which helps them during running or escaping from the predator is their ground clearance. Therefore, the ground clearance of the spider due to its long legs was 0.3 cm, accelerating the huntsman spider's speed. The spider's body length was  $1\pm 0.5$  cm on average, and the size of appendages was 5-6 times higher. The exact length was  $5\pm 0.1$  cm for males and  $4.5\pm 0.2$  cm for females. The body weight was relatively more minor for the spider. The body weight of the collected spider species was 0.283 g for males and 0.340 g for females <sup>[15]</sup>.



**Fig 3: A)** (a-d) Female huntsman spider with enlarged abdomen



**Fig 4: A)** Male huntsman spider with sharp and hairy enlarged joined legs and small abdomen

#### **Evaluation of sexual dimorphism in spider**

The huntsman spider was sexually dimorphic, so the two sexes are separate. The male and female spider exist and produce the new spiderlings by copulation. The copulation in spiders was not common with other animals. The male spider oozes the spermatogonia on the web, and later on, with the help of front appendages called pedipalp, it slinks these sperms into the female genital opening. In this way, the female spider produces several egg sacs, and the fertilized eggs come out of the female genital space and hatch and are converted into spiderlings in a few days. Therefore the spiders belong to the category of oviparous in fertilization. The female spider lays the fertilized eggs and will be hatched outside the body. Though it belongs to the class of arachnids and is near species to the scorpion, which fertilized the eggs internally and nourished the babies inside even after hatching<sup>[16]</sup>; hence it is an ovoviviparous animal. The female spider takes care of the babies hatched, and once the parent female was lethargic, it consumes its eggs to protect the remaining babies<sup>[17]</sup>. Sexual dimorphism is essential to maintain biodiversity in the near future and will maintain the pool of animal species generation after generation<sup>[18]</sup>.

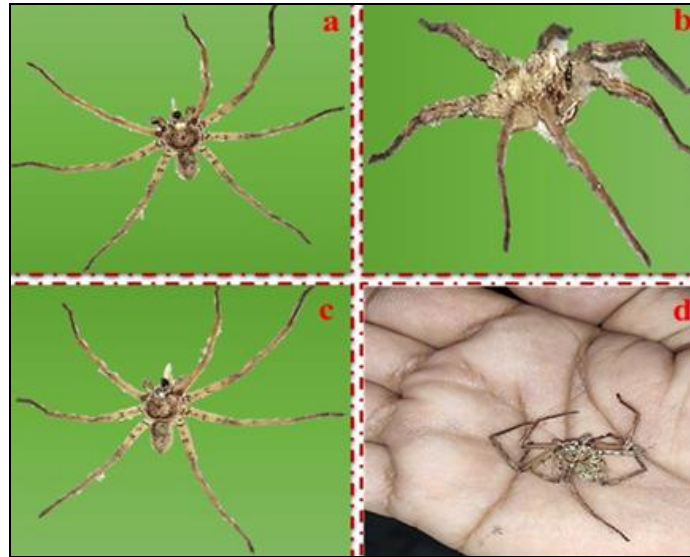


Fig 5: A) (a-d) Male huntsman spider with elongated appendages and small abdomen

Table 1

Evaluation of morphometric characters of huntsman spider							
Male Spider				Female Spider			
Ground clearance (cm)	Body length (head to abdomen) (cm)	Length of appendages (cm)	Body weight (g)	Ground clearance (cm)	Body length (head to abdomen) (cm)	Length of appendages (cm)	Body weight (g)
0.3±0.05	1±0.5	5±0.1	0.283	0.2±0.05	1.5±0.2	4.5±0.2	0.340

### Conclusions

The huntsman spider was known explicitly for hunting; hence, the body characters and the length of jointed appendages were accordingly present. The spider achieved the highest speed to catch the prey due to its spiny and muscular jointed long legs. The huntsman spider was studied for its morphometric characters and its sexual dimorphism. Both the studies concluded that the obtained huntsman spider species belonged to the household areas, and its size was comparatively more significant than another spider. Therefore the male and female species were distinguished depending on the body characteristics and the difference in the genital organs. This study helps know the spider species' biodiversity and improves how people look towards nature and its beauty. Along with this, such a study may help to conserve spiders as they are beautiful creatures of nature and create awareness about their eco-friendliness to the environment. The huntsman is a non-poisonous species. Even if they stay in human houses may look dangerous by their appearance but are socio-animal. This report helps identify and know the difference between poisonous and non-poisonous spider species. So the people will not go to kill them, and finally, it will be helpful for the species to grow and survive, and the biodiversity of spider species will be maintained.

### Conflict of interest statement

All the authors declare there is no conflict of interest to explore.

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