

Article

Characteristics of the first recorded spider (Arthropoda: Arachnida) fauna from Sheringal, Khyber Pakhtunkhwa, Pakistan

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Abstract

The spiders (order: Aranae) are an important environmental indicator and play a significant role as predators in biological control of the most of the key insect pests. The present study was conducted to establish the characteristics of the first recorded spider fauna from Sheringal, Dir Upper (DU), Khyber Pakhtunkhwa (KP), Pakistan during June 2013-July 2014. Their 10 species belong to 7 families, and 10 genera ($n_t=123$: total; $n_i=77$: identified; $n_{ui}=46$: unidentified) were recorded in the 6 quadrates, i.e., Daramdala, Doki, Guryaal, Samang, Shahoor and Sia-Sheringal of Sheringal. The largest family was Lycosidae (wolf spiders) with respect to size and numbers of specimens collected ($n=20$), which contained *Arctosa littorali* Simon, 1897; *Hippasa partita* Takidar, 1970; *Pardosa distincta* Backwall, 1867, while the smallest family was Gnaphosidae (ground spiders) ($n=3$) with *Gnaphosa eucalyptus* Ghafoor and Beg, 2002; while other families Sparassidae (huntsman spiders) ($n=19$) *Halconia insignis* Thorell, 1836, and *Isopeda tuhogniga* Barrion and Litsinger, 1995, Opilionidae (harvestmen spiders) ($n=12$) *Hadrobunus grandis* Sundevall, 1833; Pholcidae (cellar spider) ($n=10$) have *Crossopriza lyoni* Blackwall, 1867; Hersiliidae (two-tailed spiders) ($n=6$) is having *Harsilia savignyi* Lucas, 1836; ($n=5$) with *Araneus diadematus* Clerck, 1757 were recorded. It was concluded that 50% of the spiders collected from the study area were venomous. A detail study is required for further exploration of spider fauna of Sheringal, KP, Pakistan with special reference to their taxonomical, physiological and ecological characteristics.

Keywords fauna; Araneidae; Gnaphosidae; Hersiliidae; Lycosidae; Opilionidae; Pholcidae; Sparassidae; Pakistan.

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1 Introduction

The spiders belong to order Aranae, which is one of the grasping animals group (Riechert, 1984). The important characteristics of spiders are the presence of carapace found on dorsal side of cephalothorax. Their

jaws are called chelicerae having fangs, which are piercing device for injecting venom. They produce silk through spinnerets, which are located on the ventral side of the abdomen. Male spiders are smaller than females. The epigynum is female reproductive organ situated on the ventral side of abdomen. The trachea and book lungs are breathing organs (Nieuwenhuys, 2008). They are varying in size and colors. The giant bird eating spider of the family Theraphosidae (Thorell) is 75 mm with leg length up to 255 mm. Their metamorphosis is hemimetabolus takes place through moulting, in which their size is increased with replacement of hard and old skin with new one (Kingsley, 1999). They always represent the hateful and injurious animals (Davey, 1994). In fact, they help us to protect crops from the pests (Fabre, 1999) as they act as biological control agents as predators (Platnick, 1995). Their venom is less polluted than pesticides used in agro-ecosystem (Novak, 2001) and testing for the treatment of heart disease (Davey, 1994). They inhabit on the ground, underground, tunnels systems, under stones and near water, but habitually, they like moist places. Some spiders live on the seaside, where they are sunken into the sea twice a day. Fresh water is also the territory for many species including the water spiders, *Argyroneta aquatic* (Clerck). Therefore, they are found in every type of environment (Karren, 2002).

The origin of spiders is doubtful, however, many scientists believe that they originated in the sea. Later on, they evolved in 2 groups, one with and other without extensor leg muscles. The evolution of spiders is around 400 million years ago. The earliest spiders were larger in size and with segmented body, however, the recent spiders almost all species are having un-segmented abdomen. Only members of the sub-order Mesothelae still reported with segmented abdomen, and they are generally considered the most ancient type of spiders. There is very little record about their fossils; however, the oldest spider fossil was found in rock from New York, USA, which dated back to the Devonian period (410-360 million years). This fossil was preserved and only spinnerets and chelicerae were documented. From Carboniferous period (360-290 million years), the fossil spiders with segmented abdomen were recognized. Little information is available about spider found in Mesozoic era (240-65 million years). The webs of spiders are hardly fossilized. It is believe that early spiders built unstable webs near the ground; however, later on they developed aerial webs on flora for catching the flying insects. It is possibly to say that the evolution of spiders is related with evolution of insects (Karren, 2002).

Spiders of the family Pholcidae are small to medium sized, having 6 or 8 eyes. They can be easily differentiated from other families by the following characters, prosoma about as long as wide; clypeus about as high as chelicerae; male palp with prominent retro-lateral paracymbium (procurus), which is rarely decreased; male chelicerae usually with sexual modifications; and tarsi usually pseudo-segmented. Pholcids occupy a wide range of ecosystems and habitats, ranging from deserts to rainforests, from sea level to over 3,500 m altitude, and from leaf-litter to the canopy (Huber, 2005).

Spiders produce silk from their spinneret glands located at the tip of their abdomen. Each gland produces a thread to perform a special task, e.g., a trail silk for safety line, sticky and fine silk for trapping and wrapping their prey, respectively. Spiders use different types of glands to produce different silks, and some spiders are capable of producing up to 8 different silks during their life-span. Most spiders have 3 pairs of spinnerets, each having its own functions, however, some spiders are with 1 pair and others with as many as 4 pairs of spinnerets. Webs allow a spider to catch prey without having to expend energy by running it down. Thus, it is an efficient method of gathering food. However, construction of the web is in itself an energetically costly process because of the large amount of protein required, in the form of silk (Nieuwenhuys, 2008).

The Sheringal valley is located between the 72°-20° east longitudes and 35°-28° north latitude in Pakistan. Altitude is approximately 2000 m above the sea level. This is a small valley situated northern site of district Dir Upper (DU), Khyber Pakhtunkhwa (KP), Pakistan. Bajaur Agency and Jandool is located toward the west,

while it is surrounded by district Swat and Malakand Agency from the east and south, respectively. Total area covered by this hilly valley is 7992.67 hec, however, the northern part is generally covered with forests. The river Panjkora flows towards the north-south. The climate is somewhat cold in winter and warm in summer. The minimum and maximum temperature in January has been recorded as -2.3 and 11.2 °C, respectively (Fig. 1). The Sheringal is home to a number of wildlife species including mammals such as snow leopard, *Panthera uncia* (Schereber, 1775); common leopard, *Panthera pardus* (L, 1758); musk deer, *Moschus anhucnsis* (L, 1758); black bear, *Ursus americanus* (Pallas, 1780); wolf, *Canis lupus* (L, 1758); yellow throated marten, *Martes flaviqula* (Pinel, 1792); red fox, *Vulpes vulpes* (L, 1758); pika, *Ochotona daurica* (Link, 1795); golden marmot, *Marmota caudate* (Geoffroy, 1844) and rhesus monkey, *Macaca mulatta* (Zimmermann, 1780). However, Himalayan monal pheasant, *Lophophorus impejanus* (Latham, 1790); Himalayan snow cock, *Tetraoggallus himalayensis* (Gray, 1848) and snow partridge, *Lerwa lerwa* (Hodgson, 1837) are some of the key bird species found here. Moreover, at different elevation different types of vegetation occurs in Sheringal. Further, blue pine, *Pinnus wallichiana* (Jacks, 1839) is dominated species with scattered trees of Himalayan cedar, *Cedrus deodara* (Don, 1831) with frequent occurrence of Himalayan poplar, *Populous ciliatae* (Royle, 1888) (Hazrat et al., 2011). The objective of the present research is to find out the characteristics of the first recorded spider fauna from Sheringal for awareness and education.

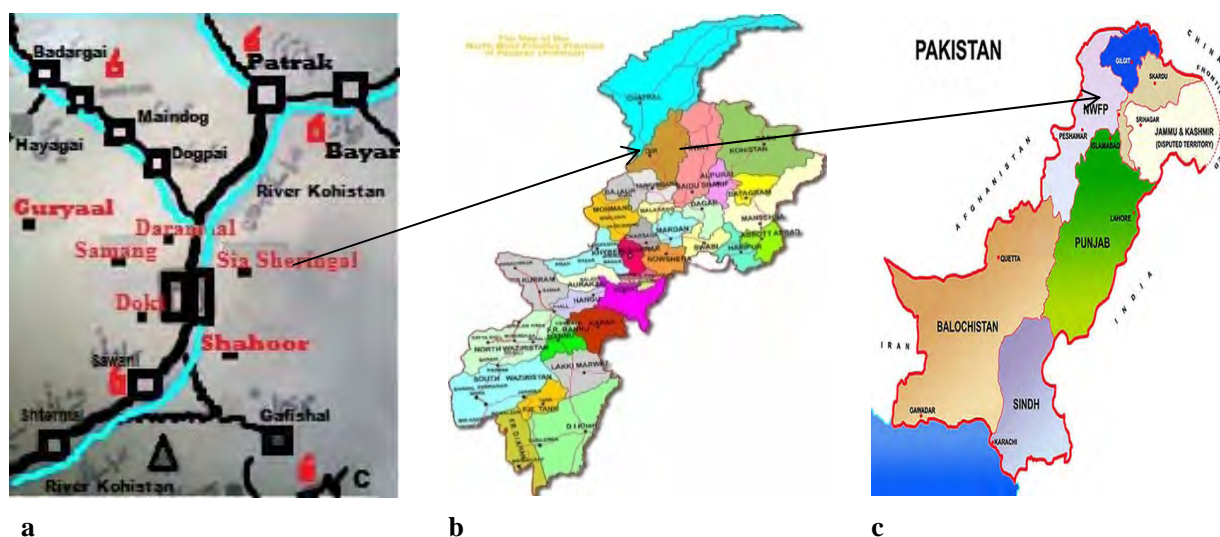


Fig. 1 Characteristics of the first recorded spider fauna from Sheringal, Dir Upper, Khyber Pakhtunkhwa, Pakistan during June 2013-August 2014: arrows show map of 6 quadrates of study area, viz., Daramdala, Doki, Guryaal, Samang, Shahoor and Sia Sheringal are located in Sheringal (a), where the present research was conducted, it is located in the Khyber Pakhtunkhwa (b), which is one of the provinces of Pakistan (c) (Online, 2013)

2 Materials and Methods

The people of Sheringal, DU, KP, Pakistan, where the present research was conducted, usually concern with agriculture. Total area covered by this hilly valley is 7992.7 acres. The population is about 20,000 and literacy rate is 51%. The present research was conducted during June 2013-August 2014 in 6 quadrates, i.e., Daramdala, Doki, Guryaal, Samang, Shahoor and Sia Sheringal of Sheringal (Fig. 1).

For the collection of spiders, the bottles were distributed randomly in community of quadrates of Sheringal. The procedure of collection of the spiders has been explained. The authors and the children collected the spiders. The spiders were collected through various methods like pitfall method and simply by hands picking etc (Perveen and Jamal, 2012 a, b and c; Perveen et al., 2012). The collected spiders were brought to the laboratory, Department of Zoology (DOZ), Shaheed Benazir Bhutto University (SBBU),

Sheringal, DU, KP, Pakistan and faint by mortin[®] (CIC Enterpriser, Lahore, Pakistan) in the Jars. They were identified with the help of keys (Levi and Randolph, 1975; Namkung et al., 2002; Perveen and Khan, 2015 a and b), literature available, already preserved specimens, internet, and experts. Then pictures of the spiders (both dorsal and ventral sides) were taken with the camera[®] (Nikon[®], Tokyo, Japan: 12 mega pixel lense). The specimens were labeled and preserved in 70% ethanol with few drops of glycerin. They were studied under magnifying glass (Nikon, Tokyo, Japan) and stage microscope (BH2; Olympus Co. Ltd., Tokyo, Japan) for their characteristics. They were deposited in Laboratory cum Museum, Department of Zoology, SBBU, Sheringal, DU, KP, Pakistan.

3 Results

The present research was conducted to determine the first recorded spider fauna of 6 quadrates of Sheringal, i.e., Daramdala, Doki, Guryaal, Samang, Shahoor and Sia Sheringal, DU, KP, Pakistan during June 2013-August 2014. The specimens ($n_1=123$) has been collected, however, specimens were identified ($n_1=77$) to species level, they were belonging to 7 families, moreover, due to unavoidable circumstances specimens ($n=43$) has not been identified (Fig. 2). The following are the characteristics of the species identified:

3.1 Garden spider, *Araneus diadematus*

The garden spider, *Araneus diadematus* Clerck, 1757 is one of the most common and the best known orb weavers. Its name, i.e., garden spider is due to gilded silver-face. The size of the first leg is 0.4 ± 0.1 cm; the second leg is 0.9 ± 0.1 cm; the third leg is 0.3 ± 0.06 cm, while the size of the fourth leg is 0.5 ± 0.1 cm. It is easily identified by the distinctive white cross on the abdomen, although in some specimens it is indistinct or missing. This spider is the most commonly called in England the garden spider, it is also known as the cross spider. They are common in gardens, wood and heath-lands. They build circular orb webs and can be found either sitting at the center of the web with facing down or in a retreat at the end of a signal line a short distance from the web itself. It is matured during summer-autumn and usually it becomes the largest in late autumn when it is the oldest and often full of eggs. After laying their eggs, the females die and only the eggs and the spiders that hatched in spring that year will pass over-winter. Young spiders emerge from the egg sac in May, but usually stay together, until they are mature enough to leave. The spider-lings of *Araneus diadematus* are black and yellow and look almost identical to adults except for the markings. Because of its abundance, it is the perfect spider to observe different behaviors. The spider's fly catching and effective-predatory behaviors can be observed by placing a fly in its web. The mating behavior can be easily observed between a female with a male in their web. It is not allergic and does not cause disease in humans (Fig. 2 i: a and b).

3.2 Ground spider, *Gnaphosa eucalyptus*

The ground spider, *Gnaphosa eucalyptus*, Ghafoor and Beg, 2002 is of different color, cephalothorax and legs are brown in color, while clypeus is lighter than cephalothorax. Abdomen is dirty white with cephalothorax. The size of the first leg is 0.4 ± 0.08 cm; the second leg is 0.5 ± 0.08 cm; the third leg is 0.4 ± 0.08 cm, while the size of the fourth leg is 0.4 ± 0.08 cm. Cephalothorax is heart shaped, relatively broad in front, convex with a fovea, clothed with spine like hairs and a brown narrow line encircling almost the entire border of cephalothorax. It has tuft dark brownish hairs, 3 on each side. Legs are long, stout, with spiny hairs. The spines are strong and inter-spars. Several irregular tufts of dark brown hairs are on the middle of abdomen. Ventral surface is uniform, less white than dorsal side and do not clothed with hairs. It is non-poisonous to humans (Fig. 2 ii: a and b).

3.3 Two tailed spider, *Harsilia savignyi*

The two tailed spider, *Harsilia savignyi*, Lucas, 1836 is due to enlarged spinnerets, it is known as two-tailed spiders. The size of the first leg is 0.9 ± 0.1 cm; the second leg is 1.1 ± 0.4 cm; the third leg is 0.2 ± 0.04 cm, while

the size of the fourth leg is 0.7 ± 0.3 cm. Male grows up to 8 mm long, and female up to 10 mm. It uses tree trunks in garden or forest as their habitat. Its color is similar with trees where they live. It feeds on moths, ants and other smaller spiders. Its cocoon is present in the holes or crevices of trees. It can be easily identified by its long spinnerets. The male spider is much smaller than the female. During mating the male spins a companion web alongside the female. The female lays her eggs and place their egg sac into the web which contains 400-1400 eggs. They hatch in autumn, but the spider-lings undergo over-winter in the sac and emerge during the spring. It is poisonous to humans (Fig. 2 iii: a and b).

3.4 Wolf spider, *Arctosa littorali*

The wolf spider, *Arctosa littorali* (Hentz, 1844) is found throughout Australia. It is stronger and agile hunter live on the ground in leaf litter or burrows. It is often found in lawns and gardens. There are many species of wolf spider, ranging in size. The length of the first leg is 1.31 ± 0.21 cm; the second leg is 1.4 ± 0.23 cm; the third leg is 1.1 ± 0.1 cm, while length of the fourth leg is 1.1 ± 0.1 cm. Its body colors are typically drab having variegated patterns of brown, yellow, grey, black and white color. The spider's underside is light grey, cream or black, sometimes salmon pink, often with black or white markings superimposed. The sides of their jaws may have a small raised orange spot. Wolf spiders have 8 eyes in 3 rows (4, 2, 2), with the 4 smaller eyes in front and the 4 largest arranged in a square on top of the high and convex head. This distribution is aided by their ability to disperse aerially as spider-lings or small juveniles over large distances. The female constructs egg sac of white papery silk, having a ball shape with an obvious circular seam. When the spider-lings hatch, they are carried around on the female's back until they are ready to disperse by ballooning or on the ground. Wolf spiders live for up to two years. Mating takes place outside the female's burrow at night. It is not dangerous to human (Fig. 2 iv: a and b).

3.5 Wolf spider, *Hippasa partita*

The wolf spider, *Hippasa partita* (Takidar, 1970) is of different size. The size of the first leg is 1.31 ± 0.21 cm; the second leg is 1.4 ± 0.23 cm; the third leg is 1.1 ± 0.1 cm, while the size of the fourth leg is 1.1 ± 0.1 cm. Their females are larger than males. Cephalothorax is longer, high at anterior and slightly lower at posterior. It is brown or grayish and covered with small hairs. There is dark fovea in middle of the thorax. Eyes are arranged in 3 rows, with slightly recurved anterior row. Padipalps are brown and bended downward. Chelicerae are stronger, longer and pointed downward with fangs. Legs are cylindrical and brown with hairs. Abdomen is long with dark strips at anterior. Posterior end of abdomen is pointed and is covered with small grey brown hair. Toxicity is unknown but they may cause some allergic disease in human. It is found on ground, gardens, under stones, dry places and feed on fluid of insects and their larvae. It is common in Pakistan, India and Australia (Fig. 2 v: a and b).

3.6 Wolf spider, *Pardosa distincta*

The wolf spider, *Pardosa distincta* (Backwall, 1867) is found in diverse fields, forest and bogs. Sometimes found in woods, beaches and dunes. The size of the first leg of this species is $.8\pm 0.2$ cm; second leg is 1.0 ± 0.2 cm; third leg is 0.5 ± 0.1 cm, while size of the fourth leg is 0.8 ± 0.09 cm. Males are generally found from April-late August, while females are generally found between April and October. The total length of the female is 5-6 mm. Webbing is not used in prey capturing, but is used for draglines, nest lining and the construction of egg cases. Mating is precipitated by a visual display on the part of the male and usually lasts about 15 minutes. Egg sacs are constructed from two separate halves that are attached to one another. It does not cause any disease to humans (Fig. 2 vi: a and b).

3.7 Opiliones, *Hadrounus grandis*

The harvestmen (Opilione), *Hadrounus grandis* (Sundevall, 1833) is a group of arachnids known for their long, delicate legs and their oval body. It is so named because most species become more conspicuous in late

summer and early autumn. The group includes more than 6,300 species. Its legs size is different, the size of the first leg is 1.15 ± 0.3 cm; the second leg is 1.5 ± 0.24 cm; the third leg is 1.0 ± 0.2 cm, while the size of the fourth leg is 1.08 ± 0.1 cm. It is also referred to as daddy-long-legs. Although, it resembles with spiders in many respects, however, they both differ from each other in a number of significant ways. Instead of having 2 easily visible body sections, i.e., cephalothorax and an abdomen as spiders do, harvestman have a fused body that looks more like a single oval structure than two separate segments. Additionally, harvestmen lack silk glands; they cannot create webs, fangs, and venom and all other characteristics of spiders. The feeding structure of harvestmen is also different from other arachnids. It can eat food in chunks and take it into their mouth. Most of them are nocturnal although several species are active during the day. There is a well-known myth about harvestman being poisonous, but unable to bite humans because of small fangs and this is completely incorrect (Fig. 2 vii: a and b).

3.8 Cellar spider, *Crossopriza lyoni*

The cellar spider, *Crossopriza lyoni* (Blackwall, 1867) is a widespread species that prefer to live in or around human structures. It is commonly known as tailed cellar, tailed daddy longlegs and occasionally box spiders. The size of the first leg is 1.2 ± 0.20 cm; the second leg is 1.5 ± 0.23 cm; the third leg is 1.2 ± 0.1 cm, while the size of the fourth leg is 1.2 ± 0.4 cm. It possesses exceptionally long and fragile legs that can reach up to 2.4 inches long. Their abdomens are distinctly square shaped when they are viewed from the side and their carapace is more or less circular shaped when viewed from above. They also possess 2 kinds of sound-producing organs and have 6 eyes. It is a regulated species in some countries and is frequently regarded as pests because of the large amounts of unsightly webs, which they build inside human homes. Some people, however, regard it as beneficial, as it is effective predator of mosquitoes and other arthropods. It is not harmful to humans (Fig. 2 viii: a and b).

3.9 Huntsman spiders, *Halconia insignis*

The huntsman spiders, *Halconia insignis*, Thorell, 1836 is also found in Queensland and New South Wales, Australia. This name is given due to their speed and mode of hunting. It is also called giant crab spiders because of its size and appearance. The length of the first leg is 1.9 ± 0.20 cm; second leg 2.0 ± 0.2 cm; third leg 1.4 ± 0.19 cm, while the length of the 4th leg is 1.44 ± 0.25 cm. Its color is mostly grey to brown. It is found living under loose bark on trees, crevices, rock and walls. It is also notorious for entering cars and being found running across the dashboard. It feeds on insects and other invertebrates. The female produces a flat, oval egg sac of white papery silk and lays up to 200 eggs. She then places it under bark or a rock and stands guard over it, without eating for about 3 weeks. During this period, the female can be quite aggressive. It will then complete her egg sac and pick it up, leaving the silk ground-sheet behind. Incubation period is varied and is probably influenced by climatic conditions. It does not bite and harmless (Fig. 2 ix: a and b).

3.10 Huntsman spider, *Isopeda tuhogniga*

The huntsman spider, *Isopeda tuhogniga* (Barrion and Litsinger, 1995) has the cephalothorax of brown to black color. Chelicerae is larger, vertical, brown and with small fangs. Fovea is long and shallow. The size of the first leg is 1.3 ± 0.44 cm; second leg is 1.43 ± 0.42 cm; third leg is 1.3 ± 0.42 cm, while the length of the fourth leg is 0.9 ± 0.44 cm. It has 8 eyes in 2 rows. Clypeus is moderately small. Labium and maxillae are reddish brown. Labium is wide and long. Padipalps are medium size. The legs are long, cylindrical and have black spot at joints. Abdomen is yellow and pointed at posterior. It is non-toxic but may cause some allergy. It is insectivores and found in the dry woods, under stone, ground and houses. It is found in Pakistan, India, Australia and Africa (Fig. 2 x: a and b).

Systematic Classification

Kingdom	:	Animalia
Division	:	Invertebrata
Phylum	:	Arthropoda
Sub-Phylum	:	Chelicerate
Class	:	Arachnida
Order	:	Aranae
Family	:	Aranidae



a



b

i: Garden spider, *Araneus diadematus*, Clerck, 1757; dorsal (a) and ventral (b) sides

Family	:	Gnaphosidae
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a



b

ii: Ground spider, *Gnaphosa eucalyptus*, Ghafoor and Beg, 2002; dorsal (a) and ventral (b) sides

Family	:	Hersiliidae
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a



b

iii: Two tailed spiders, *Harsilia savignyi*, Lucas, 1836; a) dorsal and b) ventral sides

Family

:

Lycosidae



a



b

iv: Wolf spider, *Arctosa littorali* (Simon, 1897); dorsal (a) and ventral (b) sides



a



b

v: Wolf spider, *Hippasa partita* (Takidar, 1970); dorsal (a) and ventral (b) sides



a



b

vi: Wolf spider, *Pardosa distincta* (Blackwall, 1867); dorsal (a) and ventral (b) sides

Family

:

Opilionidae



a



b

vii: Harvestmen, Opiliones, *Hadrobunus grandis* (Sundevall, 1833); dorsal (a) and ventral (b) sides

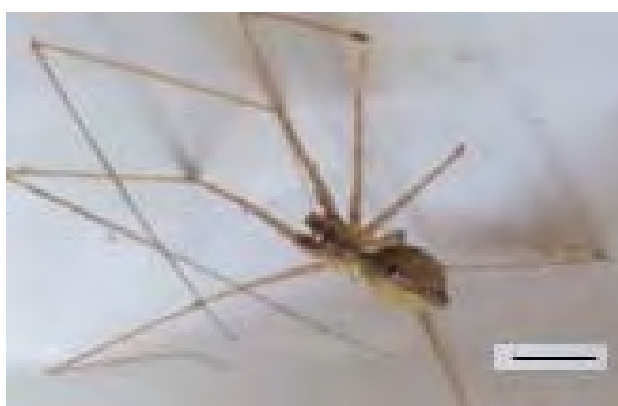
Family

:

Pholcidae



a



b

viii: Cellar spider, *Crossopriza lyoni* (Blackwall, 1867); dorsal (male) (a) and ventral (b) sides

Family

:

Sparassidae



a



b

ix: Huntsman spiders, *Halconia insignis*, Thorell, 1836; dorsal (a) and ventral (b) sides



a



b

x: Huntsman spider, *Isopeda tuhogniga* (Barrion and Litsinger, 1995); dorsal (a) and ventral (b) sides

Fig. 2 Identification, classification and characteristics of the first recorded spider fauna (n=77) from 6 quadrates of Sheringal, i.e., Daramdala, Doki, Guryaal, Samang, Shahoor and Sia Sheringal of the study area, i.e., Dir Upper, Khyber Pakhtunkhwa, Pakistan during June 2013-August 2014; bars on photographs indicate 10 cm; *Gnaphosa eucalyptus*.

4 Discussion

The present study, characteristics of the first recorded spider fauna from Sheringal, DU, KP, Pakistan was conducted during June 2013-August 2014, in which, 10 species under 10 genera belong to 7 families were recorded.

The biodiversity and predatory efficacy of the spiders in rice field were studied from central Punjab, Pakistan, and 44 spider species were recorded from a huge collection of 28000 specimens (Tahir and Butt, 2009). While the present research was a general survey reported total 123 specimens and only 7 families. Therefore, one can argue that both studies have different biodiversity. Moreover, the geographical occurrence, temperature and food availability were the factors responsible for diversity differences in both studied areas. The present research was conducted in very short time; therefore, number of specimens collected was smaller ($n_t=123$).

Mukhtar (2004) surveyed the spider fauna of the foliage from Punjab and reported 124 species under 51 genera belong to 17 families and the most dominated family was Araneidae and the less number of species was reported from Corinnidae family. However, during the present research, 7 families were reported, where the largest family was Lycosidae with 3 species, while the smallest families were Opilionidae, Hersiliidae,

Araneidae, and Gnphosidae each with only one species. Therefore, in both studies, the diversity differences were due to habitat, environmental and geographical differences of both areas. The present study area was more toward the northern pole and away from equator, therefore, the climatic conditions were little colder than Punjab, Pakistan.

Ursani and Soomro (2010) updated the checklist of spider fauna from 16 districts of Sindh, province, Pakistan. A total of 132 species were recorded belong to 24 families under 73 genera. Majority of these species were earlier defined, however, only the family Zodariidae for the first time was recorded from Pakistan. In the present research, 10 species were recorded from Sheringal, KP, Pakistan range. As different types of insects were their source of foods, therefore, they were abundant in the warm areas. However, due to geographical and ecological differences, their great diversity was found in both study areas.

Namkung et al. (2002) reported a critical checklist of the spiders from Jeju Island, Korea, however, they published reports during 1936-2001, moreover, they identified specimens collected during 1964-2001. They classified a total of 347 spider species under 166 genera belong to 36 families from Jeju Island. In the present research, 10 genera and 10 species belong to 7 families were reported during June 2013-August 2014 from Sheringal, KP, Pakistan. The time periods for both researches were quite different.

Whitmore et al. (2014) recorded a high number of spiders families from cultivated and open field habitats of Savanna Reserve, Northern Province, South Africa reflected vegetation complexity, which spiders relied for their life cycle, either for finding food, building retreats or for web building. During the present research, a high number of the spiders families were recorded from inside the buildings and close houses and old shops. The habitats of spiders for both researches were different.

Sebata (2015) collected spiders during 10 weekly sessions, in which a total of 663 individuals belong to 28 species distributed among 11 families were found in the Hillside Dams Conservancy, Bulawayo, Zimbabwe. During the present research, the spiders were collected during 5 weeks, in which a total of 123 individuals belong to 10 species distributed among 7 families were found, in which 77 were identified from 6 quadrates of Sheringal, i.e., Daramdala, Doki, Guryaal, Samang, Shahoor and Sia Sheringal. In 2 studies, difference in duration of time periods for the collection of spiders were found. Due to the extreme weather of the present study area, it was shorter as compared to Sebata.

Perveen and Khan (2015 a and b) explored first recorded spider fauna from Sheringal and prepared checklist for them. During the present research, the characteristics of the same spiders of Sheringal were presented by the same authors. The majority of the spiders were collected from shops, buildings and crevices of the trees. The largest spider was *Halconia insignis* (family: *Sparassidae*) with length of the first leg was 1.9 ± 0.20 cm, while the fourth leg was 1.44 ± 0.25 cm. However, the smallest spider was of *Gnaphosa eucalyptus* (family: *Gnphosidae*) with the first leg was 0.4 ± 0.08 cm, while the fourth leg was 0.4 ± 0.08 cm. The 50% of the species were allergenic and injurious to humans. As it is the colder area of Pakistan, therefore, their breeding season was shorter than other warmer areas.

The limitations encountered during the research were the climatic condition of the study area, shortage of time period for the collection, unawareness of the people about the importance of spiders and initially inexperience of proper collecting practices by authors. In 2010, the flood destructed the habitats of the most of organisms in Sheringal, therefore, a lot of organisms were lost. Moreover, which led lesser number of spider fauna collected according to the requirement at the present. A detail study is required for further enhancing of the biodiversity of the spider fauna of Sheringal, DU, KP, Pakistan for synthesis of the ethnozoopharmaco-products.

5 Conclusion

In the present collected spiders from Sheringal, 50% were the poisonous, however, the largest spider was *H. insignis*, which belongs to family *Sparassidae*, while the smallest spider was of *G. eucalyptus*, which belongs to family Gnphosidae.

6 Recommendation

For further research, it is recommended that advance study is required to identify new species in the area and also need work on their molecular and genetic level. Seminars and workshops must be arranged to make the further research easier and for awareness of the community.

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