Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

J E Z S Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2015; 3 (1): 47-52

Received: 21-12-2014
Accepted: 15-01-2015

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Some observations on spider fauna of district Buner, Khyber Pakhtunkhwa Pakistan

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Abstract
The present research was conducted from October 2011 to August 2012 to study some aspects of the spider fauna of the district Buner. Spiders were collected through hand picking and pit fall trap. Totally, thirteen species of spiders were identified belonging to different families viz, Lycosidae, Tetragnathidae, Sparassidae, Araneidae, Pholcidae and Salticidae. Most species belong to family Lycosidae while Sparassidae and Pholcidae families were represented by single species. Most of the spiders were brown black while *Argiopeaaitika* and *Neosconacrucifera* were most colorful spiders.

Keywords: Spider fauna, Diversity, Identification, Buner, Pakistan.

1. Introduction
Spiders belong to Order Araneae. Order Araneae is one of the grasping animal groups in the animal kingdom. A spider uses pedipalps primarily in prey manipulation as well as pit organ, located on the tarsi of the appendages and provides chemosensory information [1].
Spiders are one of the diverse groups of animals which attain 7th number in diversity [2]. There are approximately 42055 described species of spiders in the world. They are widely distributed, Platnick N [3] occupying all terrestrial habitats regardless of altitude or severity. In Pakistan spiders are ignored for a long time because people had no adequate knowledge about it in the past [4].
The evolution of spiders went back to 400 million years ago. Primitive spiders had large body size and segmented body, but now almost all spiders have unsegmented body except the Suborder Mesothelae which has segmented abdomen. Spiders are considered as the natural enemies of pests. They kill the pests either directly or trapped in the web and kill down. Spiders are used as biological control agents. Now majority of studies are conducting to use spiders as biological pest control agents and many scientists agree that they are more efficient to control the pest than pesticides [5].
The size of largest spider is 75 mm having leg size of 25mm.The female spider is larger than male one. Spiders are very little documented in the scientific literature of Pakistan. Mostly works are carried out in Punjab and other areas. The distribution and diversity of spiders have drawn attention of naturalists in different parts of the world since the 1702. A general description of spiders from all over the world has been provided with important notes. Leach WE, Cambridge FOP, Simon E [6-8] prepared the early taxonomic records on spiders. The studies on spiders had developed rapidly with the increasing knowledge about them. Petrunkevitch A [9] provided an inquiry into a natural classification of spiders based on a study of their internal anatomy. Catalogues of Bonnet P [10] gives an overview on the taxonomy of spiders, which covers about two centuries work. The distribution of spiders in rice field of South Asia has been well recorded and performed by [11]. The Nearctic fauna is perhaps 80%, described in New Zealand and Australia and other areas, especially Latin America, Mexico and Greenland. The spider fauna of China was studied by many workers. Bonnet P [12] explored the spider of the Himalayas, Andaman and Nicobar Islands. [13-14] were the pioneer workers on Indian spiders. They described many species from India, Burma and Sri Lanka. Karsch E [13] worked in the Indian, Sri Lankan and Minicoy islands. Dyal S [15] studied the taxonomy of the spider fauna of the Lahore and reported 121 species belonging to 65 genera and 20 families for the first time. After lapsing of long time Arshad M [16] worked on the spider fauna and he reported eight families, thirteen genera and eighteen species from Peshawar and adjacent areas. Mushtaq S *et al.* [17] revised the genus *Plexippus* belonging to Salticidae and added two new species of spiders from Pakistan. Butt A *et al.* [18] reported a new species of

spider, *Neoscona pavida*, from Bahawalpur. Ghafoor A *et al*. [19] reported two species from Faisalabad. Mukhtar MK [20] reported 124 species, 51 genera and 17 families from Faisalabad, Pakistan. Tahir M [21] studied spiders of Punjab and reported 44 species and 30 genera of 12 families. Among these, three new species were reported. Perveen F [22] reported 23 species of spiders belonging to 15 genera and 9 families from Peshawar, Fata, Pakistan.

The main objective of the present research was to study the distribution and diversity of spiders in district Buner.

2. Materials and Methods

2.1 Study Area

Buner District is a district of the Khyber Pakhtunkhwa (KPK) province of Pakistan. It is the beautiful district of Khyber Pakhtunkhwa due to its location and natural beauty. The total area is 1,865 km^2 and the density of total population is 271/km^2.

2.2 Collection site

The specimens were collected from different habitats e.g. fields, crop, ground, underground, house, foliage, dry wood, store, loose bark of plant, rocks, mountain and marshy places in three tehsils namely Dagger, Chagharzai and Chamla of district Buner October 2011 to August 2012.

Buner is rich in forests. Spiders were collected from trees, plants and grasses like wild pomegranate, Ailanthus, Chinese date, walnut, Fig, Chir, Gum tree, Eucalyptus, Mulberry, Dilbergiasisso.

The spiders were collected from trees, plants and ground surfaces by simple hand picking generally at the time of morning and night. The specimen was stored in a concentrated brine solution of Nacl at the field and then transferred to 80% ethyl alcohol and 20% Glycerin solution in the laboratory.

Another method used was pit fall trap. It is used to collect ground dwelling spiders. It consists of a cylindrical glass jar (roughly 6 centimeters in diameter and 12 centimeters in height) buried in the soil to ground level. Each container contains 150 ml solution of alcohol and a small amount of kerosene oil to kill the spiders.

The foliage spiders were collected by shaking the plants on a 1.2m x 1m plastic sheet on the ground. The sheet was rolled down and the spiders were recovered. Maximum numbers of spiders were collected at morning time. It was also reported at this time by Sebastian *et al*. (2001).

Identification was done by using a stereo microscope (XTD-2A china) to study different organs of the spiders in laboratory at the Department of Zoology, Abdul Wali Khan University Mardan (Buner Campus). The collected specimens were identified by available keys [23-24].

For photography Sony cyber-shot 7.2 Mega pixels digital camera was used.

3. Results

In this study a total of 318 specimens were collected and identified. Totally thirteen species of spiders were identified belonging to different families viz. Lycosidae, Tetragnathidae, Sparassidae, Araneidae, Pholcidae and Salticidae.

Family: Sparassidae

Olios diana,

Material examined:

Diagnosis: Size is from medium to very large. This is ecribellate spiders. Carapace is broadly oval, as long as wide, narrow in front. Fovea is present, longitudinal, covered with dense layer of fine setae. Eight eyes in two rows, size of anterior eyes varies between genera, median eyes usually largest, posterior eye row evenly spaced, eyes equal in size with two rows of teeth. Legs are long, metatarsi and tarsi with scopulae. Two claws with dense tufts are present. Opisthosoma longer than wide, dorsoventrally flattened, round to oval, often with dark, median, heart shaped mark, clothed in dense layer of fine setae.

Family: Lycosidae

Lycosa maculata

This is ecribellate, entelegyne spiders. Carapace is longer than wide, usually covered with short setae. Eyes eight all dark in colour. The posterior row of eyes recurved strongly, anterior eyes smaller than other eyes. Chelicera long, it is equiped with 3 prolateral and 2 to 4 retro lateral marginal teeth. Legs are long, usually strong with spines. Tarsi bearing 3 claws, IV leg longest. Six spinnerets present, Colulus absent. Epigyne with well sclerotised median septum. Male palp lacking tibial apophysis. Females of this family carry the egg sac along with them attached to the spinnerets.

Pardosabirminica

Spiders of the genus Pardosa are one of the largest wolf spider genera. They are small to medium in size. Cephalic region elevated. Clypeus is vertical. Labium is usually wider than length. AE is procurved row distinctly shorter than PME row while AME longer than wide. Legs moderately long, slender, and pale or dark. Femur I bear three dorsal and two prolateral spines, prolateral spines close to each other. Tibia with two dorsal bristles, one or two prolateral, one or two retrolateral and six ventral spines. Metatarsus I has a dorsal bristle, two or three prolateral, and two or three retrolateral, and seven ventral spines. Opisthosoma is generally round, dark to pale in color. Cymbium of male pedipalp has one to three short thick spines apically, terminal apophysis tooth-like.

Pardosapsedoannulata

Colors ranging from dull yellowish brown to grey to almost black with broad bands over cephalothorax, carapace is hairy, longer than wide and narrower and higher in cephalic region, fovea longitudinal. Eyes are eight in three rows (4:2:2), all dark colored, of unequal size, anterior row with four small eyes, second row with two large eyes and third row with two eyes of intermediate size, abdomen is oval, covered with dense setae. Legs are usually strong, of moderate length with 3 claws.

Family: Araneidae
Neosconacrucifera

Thoracic groove is longitudinal epigyne with unwrinkled scape and some or more pairs of lateral lobes are present. Abdomen is larger than cephalothorax. The color is yellowish. The body is having a spine. Anterior median eyes are larger than posterior median eyes pedipalps are of medium size. The first leg is 6 mm and last legs are 8 mm dorsal side of the abdomen has white color bar shape chalk.

Neosconatheisi

Sternum dark brown with longitudinal white band, epigynal scape with no prominent rim, constriction behind lateral lobes.

Argiopeaatikai

Labium is transversely triangular, maxillae is roughly pentagonal, and abdomen is pointed posteriorly little bit and spermathecal is bean shape. Promargin with three dissimilar teeth, retromargin with three teeth, higher than promarginal teeth.

Family: Tetragnathidae
Leucage decorate

Abdomen is more elongated, Body green yellowish with white silver lines

Leucagemaxillosa

Carapace oval, widest near the middle, flattened above, with a conspicuous thoracic groove. Prosoma is longer than wide, eyes two rows, lateral eyes nearly contiguous; chelicerae very long, especially in the male. Opisthosoma long and narrow and bears the spinnerets near its end. Eye rows either parallel or converge, but lateral eyes never contiguous, each eye surrounded by a black ring.
Chelicerae well developed, especially in the males, margins of fang furrow provided with numerous teeth. Males have a strong projecting clasping spur that may or may not be bifid at its tip. Maxillae parallel, long and dilated at the distal ends. Opisthosoma at least twice as long as wide, in females often swollen at base, often base is slightly bifid and overhangs the Prosoma.
Epigynal slit posterior to lungs slits in the procurved epigastric furrow, spinnerets usually terminal or almost so. Legs and palps very long and thin, but proportion differs in various species.

Family: Salticidae
Plexippuspykuli,

Eyes are in three rows. The front row of eyes situated more or less vertically. The median eyes are enormously larger than the second row of eyes are usually very small. The carapace is high and color black. The chelicerae are strong and broad having small hairs.

Marmarachneelongate

Opisthosoma constricted, pedicel long and not hidden behind anterior part of opisthosoma (ant like body in male, small coil of seminal receptacle in anterior half of round bulbus, embolus making 2 or more loops around the bulbus, tibialapophysis very small and hook like bent. Female epigyn with white membranous area located posteriorly, divided medially by internal sclerotized channels, prominently visible through membrane.

Family: Pholcidae
Crossoprizalyoni

Small to medium sized, ecribellate, Carapace as long as wide, domed towards the thoracic region, oval narrow in front and rounded posteriorly thoracic region with deep median longitudinal fovea. Six to eight eyes are reported in this genus. Chelicerae without lateral condyle, fused at basal part, fang small. Labium as wide as long, fused to sternum, with slightly concave anterior margin, Legs long and slender, light covering setae, tarsi usually pseudo segmented, with three claws; spines absent; metatarsi longer than tarsi. Opisthosoma is broad, cylindrical to globular or oval, with light covering of dark setae, venter with chitinous depressions behind genital groove. Slightly larger than other spinnerets; colulus large pointed with numerous setae. Female genitalia genitalia, vulva paired with multiple spermathecae and scattered glands. Male palps are usually large, and complex.

Family: Thomisidae
Thomisuspugilis

Carapace truncated in front, with upper corners strongly diverging, as long as wide without setae. Eyes small, sub equal in size, and poorly developed, ALE largest, MOQ wider than long, wider behind than in front, Labium is longer than wide and chelicerae is without teeth. Legs long, I and II longer than III and IV. Leg spines not strongly developed and tibiae I and II bear ventral spines. Opisthosoma is wider than long. Female epigyne simple less developed, without hood, and globular spermathecae with a gland.

4. Discussion

In the present study, distribution and diversity of spiders of district Buner, Khyber Pakhtunkhwa, Pakistan was carried out from October 2011 to August 2012. Current study revealed differences in spider fauna in Buner and other areas.

Arshad M [16] reported eighteen species belonging to13 genera and 8 families of the spiders in Peshawar district. Perveen F [22] reported nine families, 23 species and 17 genera. In current study from district Buner 6 families, 10 genera and 13 species were reported. Regarding the previous literatures, there is great difference between the study areas. The family Tetragnathidae with species *Decorata* and *Mixillosa*, family Araneidae with species *crucifera*, genus *Argiope* with species *aatikai* and family salticidae with genus *Marmarachne* and species *elongata* were the new record from Peshawar region of Khyber Pakhtunkhwa. The climate of Peshawar is warm and humid. It can be argued that the two different climate lodge different diversity.

The biodiversity and predatory usefulness of the spider in rice fields was studied from Punjab Pakistan and forty four spider species were reported from a huge collection of 28000 specimens, [21]. While the current research is a general survey conducted and reported only six families in Buner region. Therefore it can be argued that the two sites showed differences in diversities of spider's fauna. Moreover the environment, geographical occurrence, temperature and food availability are the factors responsible for diversity differences in the two studied areas. The spider's size reported by [22] is smaller than the spider of Buner area. It is due to the fact that study carried out by Perveen is mainly on FR regions which are hilly and uncultivated areas have less insect fauna thus spider faced scarcity of food. While Buner is a cultivated area showing abundant insect fauna and providing more shelter and food to the spiders.

Mukhtar MK [20] surveyed the spider fauna of foliage from Punjab and reported one hundred and twenty four species belonging to fifty one genera and seventeen families and the most dominated family is Araneidae and the less number of species were reported from Corinnidae family. In the current study, it was revealed that Lycosidae is the largest family, while Pholcidae and Sparassidae are the smallest family with only one species each.

Parveen R [25] studied spider taxonomy from Punjab and described one hundred and fifty eight species under twenty one families. Araneidae, Gnaphosidae and Lycosidae have maximum number of species during the research. While exploring spider fauna of Buner only 06 families came under survey and recorded thirteen species under 10 genera, the prominent family among them is Lycosidae having two genera and three species. The difference is due to the change in environment and physical condition of the two areas. One can easily illustrate that the physical barrier play important role in species diversity and also the food availability and protection make the species more diverse. So it might be argued that cultivated areas provide more protective shelter and food than the uncultivated areas. Although Buner has cultivated land but less then Punjab, here the insurgency and military operation in study area (2009-2010) disturbed the spider fauna due to the use of chemical, explosive materials which fired the vegetation.

As insects are the main source of food for spiders and it is a known fact that the insects are abundant in the warm areas and that the diversity in Dagger tehsil in study areas where the vegetations were not fired showed maximum spider fauna it might be due to the fact that noise of explosions might flew away the birds so the insects fauna flourished, providing food for spiders. Ursani T [26] studied spider fauna of Sindh, Pakistan and updated the checklist of spider in Sindh province. A total one hundred and thirty two species were recorded belong to twenty four families and seventy three genera. In this study sixteen districts were surveyed for study. Majority of the species were earlier defined and for the first time recorded Zodariidae family from Pakistan. The diversity difference among the two study areas is due to geographical and ecological differences. In the Rajasthan state of India studies were done on the distribution and bio-control of the spiders and thirty nine species of twenty nine genera and sixteen families were recorded. Araneidae was the most abundant family during the survey. It also pointed out the prey consumption of the spider and provided information about the use of spider in biological control [27]. The difference in the current research and the research conducted in Rajasthan is that the current research is only survey of spider's fauna of Buner while the research of Rajasthan (India) was focused on the use of spider as biological control agent. The present study can be useful using spiders in this direction.

Preliminary studies on the spider of Kerala, India were done and seventy two species representing fifty seven genera and twenty families were identified. The present work on the spiders indicates the presence of divers' type of species in the study areas and it showed different species representing 06 different families in which most of the species belong to ground spiders. The locality and ecosystem of the area is different in many aspects from the above mentioned studies done. The present study areas have less cultivated land and that is the reason for less spider diversity. Ghafoor A [19] investigated corsorial spider fauna of the cotton field in Faisalabad, Punjab, Pakistan and studied the ecology and behavior of spiders. He recorded eight families containing sixty four different species. While in the current survey the 06 families were come under the survey and showed presence of different spider's families. The reason for the different result is again the geographical locality and the prey availability in the present area. The present area has less cultivated land.

5. Conclusion

This was an attempt to explore the spider fauna of Buner region. It is expected that in future more species of spiders should be discovered in Buner and significant literature should be added.

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