TAXONOMIC STUDIES ON SOME SPIDERS OF PUNJAB, PAKISTAN

By

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M.Phil (UAF)

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IN

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FACULTY OF SCIENCES

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FAISALABAD

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With the Name of Allah, The Most Beneficent
And The Most Merciful!
We, the Supervisory Committee, certify that the contents and form of thesis submitted by **RAZIA PARVEEN** Regd.No.87-ag-710 have been found satisfactory and recommend that it be processed for evaluation by the External Examiner(s) for the award of degree.

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DEDICATION

Dedicated to the Holy Prophet Hazrat Muhammad (S.A.W.),

Who is the greatest gift & everlasting Mercy of Allah to the Mankind
ACKNOWLEDGEMENTS

I have only pearls of my eyes to admire the numberless blessings of the most compassionate and omnipotent Allah Almighty, Who is the absolute source of unlimited knowledge and unrestricted wisdom without an iota of doubt and exaggeration. It is one of the infinite and immeasurable blessings of God that He showered and bestowed on me the potential, capability, rationality and thinking ability to make humble explanatory contribution to the already existing great panoramic vision of knowledge and independent and maturing efforts in exploring and inventing new dimension of nature in a very useful, meaningful and profitable way.

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CHAPTER I

INTRODUCTION

During the preceding few decades, a large array of chemicals has been introduced throughout the world to combat pests of various kinds. They are robbing the mother earth of its biodiversity or life withholding system. World wide, over 50,000 different pesticide products weighing well over two million metric tons are used each year (Miller, 1992).

In Pakistan too, herbicides, insecticides, fungicides and rodenticides are increasingly being used in agriculture. About 44,872 tones of pesticides worth Rs.9,904 million were used during 1997 in Pakistan (MINFA, 1998). The use of these chemical compounds has created serious ecological problems. These chemicals degrade the quality of air, water, soil and biota. On gaining access to the food chain, some of these toxicants are not excreted from the consumers’ bodies, rather they stay in there. As such, they get concentrated in the bodies of the consumers at the top of the trophic hierarchy (Pimentel and Lehman, 1993). Such biologically magnified toxicants cause a variety ailments and some time death in man and animals. Pest problems become aggravated when the natural predators of the pest are eliminated by pesticides (Memon, 1991). The chemical control methods protect the crops from being damaged by the pests, they seriously deplete biodiversity. While in terms of depletion of biodiversity, FAO estimates that in the next ten years, 90% of the existing genetic biodiversity within main crops is at stake (Prabhakat, 1999).

In recent years, the rate of global biotic impoverishment has greatly accelerated due to causes triggered by man. If this trend continues, by the year 2050, the world might
witness a loss of up to one quarter of the world's species. This scenario in Pakistan would be more grave, somber than elsewhere. This will definitely have an adverse impact on the agricultural production of the country. The combined effect of continuing population explosion, paucity of fresh-water, and pollution of the environment on agriculture will be colossal. The impending dangers of the global warming due to greenhouse effect could make the whole thing more miserable.

The ways of 'mother earth' are unique. Resilience and adaptability has been its hallmark. Man's perseverance and innovations have been the secrets of his success in solving his problems. After losing the chemical war against pests, he now, realizes the benefits of being in conformity with the nature. The integrated pest management is a system that is based on the principles of community ecology and is aimed at keeping pest populations below economically threshold with a minimum use of toxic chemicals. Rather, its main emphasis is on the use of biological control agents.

Spiders (Phylum Arthropoda; Sub-Phylum Chelicerate, Class Arachnida; Order Araneae) fall within the general area of natural control factors. They form a significant component of food web in both the natural and man-made ecosystems. Uptil now 110 families, 3618 genera and 39112 species of spiders have been described (Platnick, 2006). As many as 50,000 individuals of spiders per acre have been recorded in cultivations (Nyffeler and Benz, 1980). They form one of the most ubiquitous groups of predaceous organisms in the animal kingdom (Riechert and Lockley, 1984). They feed almost exclusively on insects. Spiders not only prey upon larvae and adults but also cause indirect mortality in them through disturbance. Spiders kill for more pests than commercial insecticides. According to one estimate, spiders devour enough bugs world
wide in a single day to out-weight the entire human population. A spider will kill as much as 50 times the number of prey it actually consumes (Kajak, 1978). In each ecosystem, the impact of spiders follow two pathways. These are the predatory pressure of the whole group of spiders on the entomocoenosis, and the pressure of particular spider species on some species of insects (Lueczak, 1979). Under crop conditions, spiders are important enemies of aphids, mites, and lepidotera larvae and eggs. Spiders along with other general predators, largely account for maintaining biocoenotic stability in ecosystems (Chant, 1956; Sasaba, 1974; Whitecomb et al., 1963).

Spiders can be used as the natural enemies of insect pests in orchards (Mansour et al., 1983). Spiders have been released in rice fields in the People’s Republic of China as biological control agents of rice pests (Nyffeler and Benz, 1980). The potential of spiders as natural control agents of arthropod pests aroused interest in learning more about them (Altierni and Whitcomb, 1980). For employing spiders in Integrated Pest Management, we need to know more about their taxonomy, i.e., diversity and ecology in the local agroecosystems and biology. Studies on the key species of a community for knowing about size, sex ratio and abundance may provide useful ecological data and facilitate in assessing the predatory potentials (Homer, 1972).

Recently, some very useful information on the taxonomy, distribution and abundance of the spiders of the agroecosystems has been brought forth by the zoologists of the University of Agriculture, Faisalabad (Mir, 1992; Hameed, 1993; Waris, 1994; Qadir, 1997; Shabbir, 1997; Nazir, 1999; Mushtaq and Qadir, 1999 and Butt and Beg, 2000,2001 and Ghafoor, 2002).
Interestingly, none of these studies concern the spiders of the non-cropped areas, scrub and arid lands. Being closely associated with the croplands, they might be serving as reservoir habitats to the spider populations of the croplands. The present study is aimed at the taxonomy of the fauna of the non-cropped areas, scrub and arid lands, uplands and orchards and croplands associated with some of these habitats.

It was also tried to evaluate phenological patterns of the dominant species in different climatic zones. It will be helpful to decide whether different species may compliment each other during the growing season, and thus potentially exert consistent predation pressure on phytophagous insect pests. This baseline data will be critical when evaluating future I P.M. programmes (Elise Bolduc et al., 2005).
CHAPTER II

REVIEW OF LITERATURE

Spiders are one of the very diverse groups of animals, which have attained 7th number in diversity (Nyffeber and Benz, 1980). They fall in the order Aranaceae which comprises spiders and their kins.

Simon (1874) of France was the pioneer arachnologist. Thereafter systematic studies on spiders developed rapidly with increasing knowledge. An overview has been provided by Bonnet (1945, 1955-59) and Roewer (1954) who covered about two and a half centuries work in their catalogues.

Laterille (1802, 1804, 1806), Audouin (1825), Koch (1846), Blackwall (1867), Thorell (1891), (1895) and Simon (1897) made a considerable contribution to the family Salticidae which is the largest family of spiders and is cosmopolitan in distribution.

Petrunkevitch's (1933) classification stands out in which external as well as internal characters have been considered and a sound system of classification have been provided which is universally accepted.

Bonnet (1959) added namely super families, families and sub-families; super orders and suborders categories.

Workers like Galiano (1961, 1974, 1981); Cutler (1965), Makic (1965) and Richman (1965) revised and erected a number of new genera, developed keys, proposing some taxonomical changes. Lehtinen (1967) prepared a comparative and phylogenetic system of classification dealing with mostly cribellate families of spiders and their relatives.
Tikader (1980, 1982) actively worked on spiders of Indian region for the last four decades. He described numerous new genera and species, belonging to more than forty families. He has to his credit three volumes on spiders in the fauna of India, series, besides numerous scientific papers on spiders.

Brignoli’s (1983) catalogue of Araneae provided a systematic list of about 7000 species described from 1940 to 1981. In order to supplement the catalogue of Araneae by Brignoli (1983), Platnick (1989), has described new taxa and gave synonymies of previously described taxa besides giving useful references to previously described taxa. The author also provided a bibliography of literature related to the taxonomy of the Araneae published between 1928 and 1989. Platnick and Merrett (1989) published the world catalogue and its addenda and corrigenda which includes the research papers, new and already known species described till 1987.

Platnick (2006) launched on Internet, the World Spider Catalogue. According to this catalogue, up till now a total of 110 families, 3618 genera and 39112 species of spiders have been described.

Spider fauna of America was studied by various arachnologists (Levi and Levi, 1968; Kaston, 1978; Levi, 1992). Stirniman et al. (1998) gave an annotated checklist of 480 species, distributed among 29 families in Missouri, USA. Huber (2000) revised the new world pholcid spiders at the generic level, with an emphasis on South America. A total of 47 extant genera occurred in the New World, 22 of which were newly described. Levi (2002) provided keys to the genera of family Araneidae from America.

Davies (1986) produced a guide to the spiders of Australia including keys down to families and illustration of a species in each family with an index to families and

Roberts (1985) provided information on morphology, behaviour, classification and a key to the families of spiders of Great Britain and Ireland. He described 344 species from the 29 families which ranged from Atypidae to Theridiosomatidae. Keys to the genera of 12 of the larger families were also included. Roberts (1985) described 307 species and in some cases both sexes, illustrated in colour and greatly enlarged to aid identification. These species are representatives of all that are found in Britain and Ireland. Roberts (1987) described 270 species belonging to Linyphidae in Britain and Ireland. Notes on the biology, size, taxonomy and diagnosis of the family along with the key to the genera and species are given.

Roberts (1995) has published a field guide on the spiders of Europe in which 450 species have been described with illustration of epigynes and male palps. The taxonomic description, information on habitats, seasons of maturity and geographical distribution of each family, genus and species has been documented. Merrett and Murphy (2000) presented a complete revised checklist of British spiders including 645 species with explanations for all changes made.

Heimer and Nentwig (1991) reported 1100 species of spiders from central Europe with comprehensive identification guide, description of species and keys to families, genera and species. Nentwig et al. (2003) launched an Internet identification key to the spiders of central Europe, dealing with 46 families. The key included all the central European species, with illustrations, glossary and bibliography.
The taxonomy of 625 species and 188 genera reported before 1993 from an area covering entire Siberia with adjacent Urals, Cisuralia, northern and eastern Kazakhstan and Far East Russia has been discussed by Eskov (1994). Mikhailov (1997) provided an alphabetic index of the catalogue of spider families, genera and species of Araneae from territories of the former Soviet Union. The index comprised of 4300 names. Marusik et al. (2001) reported 96 species of Linyphiid spiders from Transbaikalia and South Siberia, including three new species.

Kim (1991) studied the taxa of Korean spiders comprising 41 families, 91 genera and 529 species.

Namkung et al. (2000) revised a list of Korean spiders, including 46 families, 225 genera and 622 species.


Millidge and Russell-Smith (1992) described 27 species of the family Linyphiidae from the forests of South-east Asia. Millidge (1995) has described nine new genera and 22 new species of Linyphiidae from South East Asia.

The Riceland spiders of South and South East Asia with emphasis on the Philippines have been described and illustrated by Barrion and Litsinger (1995). A total of 342 species belonging to 131 genera under 26 families are being recognized; of these 258 species and 8 genera were new to science. Deeleman (2001) presented a book on forest spiders of southeast Asia with a revision of the sac and ground spiders.
The spider fauna of China was studied by many workers. Yin et al. (1997) dealt with three sub-families, 33 genera and 292 species of the family Araneidae from China. Song and Zhu (1997) worked on the families Thomisidae and Philodromidae from China. They dealt with a total of 32 genera and 145 species. Some very useful information on spiders of China has been provided by recent workers (Song et al., 1999; Hu, 2001; Zhu et al., 2003).


Twenty nine species of spiders belonging to 16 genera and seven families were recorded from rice field of Skikerpur of Jheridah district of Bangladesh by Kamal et al. (1992).

Okuma et al. (1993) provided an illustrated monograph of the rice field spiders of Bangladesh. Notes on morphology and distribution were given for 55 species belonging to 36 genera and 10 families. Biswas and Raychaudhuri (1996) have presented a detailed taxonomic account of the genus Tetragnatha in Bangladesh with keys for identification of species. Some valuable contribution to the taxonomy of spiders (families Araneidae, Salticidae and Clubionidae) of Bangladesh has been done by recent workers (Biswas and Raychaudhuri, 1998a,b; Biswas, 1999; Biswas and Begum, 1999; Biswas and Raychaudhuri, 2000; Biswas and Raychaudhari, 2003).

The spider fauna of Indo-Pakistan sub-continent has been described by several workers. The contributions of Stoliczka (1869), Thorell (1895), Simon (1892-1895),

Tikader (1980) reviewed the general taxonomic characters of spiders of India with special reference to Thomisidae. His review comprised two sub-families, 25 genera and 115 species; of these, 23 species were new to science. Tikader and Biswas (1981) studied 15 families, 47 genera and 99 species of Thomisidae from Calcutta and vicinity.

Tikader (1982) studied Indian spiders of family Araneidae recognizing 101 species and 21 genera. Of these, 5 species were new to science. Biswas (1987) recorded 31 species under 17 genera from families Araneidae, Gnaphosidae and Salticidae from Orissa state, India. He also listed 81 species under 17 families already known from the above mentioned state Sethi and Tikader (1988) studied the giant crab spiders (Heteropodidae) from India.

Majumder and Tikader (1991) studied the spiders of family Clubionidae from India. They recorded 84 species, belonging to 15 genera; of these 12 species in five genera were described as new to science.

Biswas and Biswas (1992) studied the spider fauna of West Bengal, India. They reported 215 species belonging to 70 genera under 20 families. Of these, 11 species in 8 genera under 6 families were described as new to science.

(oxyopidae) from West Bengal, India; of these, five species were described as new to science.


Patel (2003a) surveyed the spider fauna of Vansda National Park, Gujrat. They reported 124 species from 67 genera under 22 families. Patel (2003b) carried out a preliminary survey of spider fauna of Parambikulam Wildlife Sanctuary, Kerala, India. A total of 91 species of spiders, belonging to 53 genera distributed in 24 families were recorded. Biswas and Biswas (2003) studied the spider fauna of Sikkim, India. A total of 91 species in 48 genera under 19 families were reported of these, 17 species under 13 genera and nine families were recorded for the first time in the state.

Information about the spider fauna of Pakistan is very poor. Dyal (1935) reported 20 families, 65 genera and 121 species of spiders from Lahore and vicinity of these, 46 species were new to science. Qureshi (1982) reported 8 new species of spiders from Lahore.

Arshad et al. (1984) recorded 18 species belonging to 13 genera and eight families from Peshawar and adjoining areas. Khatoon (1985-86) listed 13 families, 37 genera and 67 species of spiders from Pakistan.

Mushtaq et al. (1995a,b) reported two genera and four species of family Salticidae from Faisalabad. Of these, one species was new to science. Khan et al. (1995) reported two new records of the genus *Philippus* from Faisalabad.

Ghafoor and Beg (2002) described two new species of family Araneidae from Faisalabad, Pakistan. Some information on spiders of Punjab and Kaghan (NWFP) was also provided by various workers like Hameed, 1993; Waris, 1994; Shabbir, 1997; Qadir, 1997; Gill, 1999; Fatima, 1999; Nazir, 1999; Nazir, 2001; Razzaq, 2002 in the form of M.Sc., M.Phil thesis.
CHAPTER III

MATERIALS AND METHODS

A. METHODOLOGY

Spiders were collected from one Federal Territory and 43 locations in 21 districts of the province of Punjab (Pakistan) from 1996 to 1998 (Table I and II and Map I and II). The vegetation of these areas included agricultural crops, orchards, forests, wastelands, riverside and canal side plantations, scrublands, sand dunes and plateus as well as hilly areas. To ensure collection of a wide array of spider species from the collection sites, the following methods were adopted.

i) Manual Hand Picking

The spiders from trees, plants and from ground surface were hand picked. Generally, the time of collection was morning and evening. The collected specimens were stored in 70% alcohol in the field. In the laboratory, the spiders were transferred into Oudemans's preservative, 85 parts 70% ethyl alcohol, 10 parts glycerine and 5 parts glacial acetic acid. The spiders were stored in vials. The labels on the vials carried the date of collection, method of collection, location, plant and habitat of collection.

ii) Pit-Fall Traps

Pit fall traps were used to collect ground dwelling spiders. The pit-fall traps comprised of a cylindrical glass jar (roughly 6 cm in diameter and 12 cm in height) buried in the soil to ground level. Each cylinder contained 150 ml mixture of 70% ethyl alcohol and a small amount of kerosene oil as preservative and killing agent.
For random sampling, the study field was designated as "X" corners of the field/area were named as A, B, C and D. Each time a corner was selected independently by a draw and traced diagonally joining the two opposite corners of the field. The diagonal measure was subdivided into smaller units. Each unit was assigned a number. Twenty sampling unit points were selected randomly in each field and traps were placed according to these sampling numbers.

The traps were buried with open end which flushes with the soil surface with minimum habitat disturbance. The traps were removed after 24 hours. The collected spiders were brought to the laboratory, washed in xylene sorted into males, females, subadults, immature and numbered individually. The process was applied uniformly for each sampling area.

iii) Jarring Method

The foliage spider fauna was collected by shaking the plants on a 1.2m x 1m polythene sheet spread on the ground under the plant. The sheet was then rolled down to form a loose cylinder, from which the specimens were dumped into a container previously sprayed with ethyl acetate or into a jar containing 70% alcohol. Jarring was done in the early morning and evening. Each tree/branches were shaked ten times. Then the specimens were collected. This process was repeated three times with each sampled plant/tree/branches.

IDENTIFICATION

Identification was done on the basis of morphometric characters of various body parts. A detailed study of various key and catalogues provided by Dyal (1935), Kasten

**PREPRATION OF SLIDES**

Male pedipalps were thoroughly washed in ethyl-alcohol before being placed in xylene. Permanent mounts were made on cavity slides in Canada Balsam.

Female genitalia was carefully removed from the abdomen by lifting the midepigastric furrow using a no.1 insect pin fixed in a wooden handle. The margins of the epigyne were pricked as close to each other as possible with a fine needle and prepared as above. When completed the entire shield was detached using fine forceps.

The epignyes were cleared in 2.5cm petridishes containing dilute NaOH/KOH solution. With NaOH only one to two minutes was the applied time. Usually, five minutes were required to clear the sclerotization of the epignnum. The slides were prepared by keeping the epignnum for 5-minutes each in the following solutions: Distilled water (for washing purpose), clove oil (for the removal of soft tissues with a needle to clear the epignnum), ethyl alcohol and xylene (for clearance and washing). The slides were cleaned and the epignnum was mounted in Canada Balsam. Each slide was labeled indicating specimen no., family, genus and species.
MEASUREMENT AND DRAWING

Measurements of each specimen were taken with the help of eye-piece micrometer. The specimens were placed on slides one by one with legs sprawled out and required measurements of various body parts were taken. The detailed microscopic magnification has been written with each specimen considered to be a new species.

Adult specimens of species suspected to be new were selected for detailed studies. One selected specimen of each species was placed on a slide, properly oriented for drawing. The pencil drawings of taxonomically important body parts were made with the help of a square eye-piece on a graph paper of required magnification. A comparison of drawings was made with the original specimens. These drawings were checked and improved by the comparisons. Later on, they were transferred on chromo-card and carefully inked for ready reference and description.

After detailed study, the specimens were kept in vials bearing labels and other information. Permanent slides of each species were also made along with basic data and deposited in the Department of Zoology and Fisheries, University of Agriculture, Faisalabad.
Map (I) Map Of Pakistan showing study area
B. STUDY AREA

Spiders were collected from 43 locations in 21 districts of Punjab and also from one location in Federal Territory (Table I&II) (Map II). The Punjab province lies between latitudes 27.42° and 34.02° N, and longitudes 69.18° and 75.23° east and covers an area of 205,344 sq.km. The word Punjab means five rivers, signifying the five rivers (Indus, Jhelum, Chenab, Ravi and Sutlej). These rivers are life-blood of this province. The location of Punjab with respect to the sub-continent is shown in Map II.

The province (Map I) is bounded in the northeast by Azad Jammu and Kashmir. In the north by NWFP and Federal capital, Islamabad, in the southeast by Sindh and in the west by Balochistan, Fata and NWFP.

Most of the Punjab province comprises a level plain formed by the Indus and its tributaries. The general slope of the land is from northeast to southwest. The northwest part of the Punjab is hilly. To the south and west bordering Balochistan lies Sulaiman Ranges. The Potwar plateau lies between northern foothills and the salt range. So we can divide the Punjab into three physiographic divisions:

1. Mountain area
2. Potwar plateau
3. The upper Indus plain (doubts)

Climatically we can divide the Punjab province into the following zones (Map III).
Map (II) Map Of South Asia In Relation To Pakistan And Punjab

REF. Geography of South Asia by Bushra Afzaal Abbasi; urdu Science Board Lahore. PP: 16.
1. **Arid with Hot Summer and Mild Winter**

Whole of central Punjab falls in this category. Aridity is the basic characteristic of the region. Extreme heat in summer, dryness and dust are the chief characteristics of this region. Rains are scanty. Some monsoon rains occur in July and August and winter showers are slight; vegetation is thorny.

2. **Semi Arid (Steppe with Hot Summer and Mild Winter)**

This climate is experienced over a small area of Northern Punjab. The winters are cold and the summer is hot. The region receives more rainfall in summer but in winter also there is considerable rainfall.

3. **Sub-Tropical Continental Highlands Or Humid Sub-Tropical with Cool Summer**

It is experienced over a small highland of Murree hills. On many winter days, temperature falls below freezing point and snowfall is common in winter. This area receives rainfall throughout the year. The main vegetation is coniferous forest.

4. **Sub-Tropical Continental Lowlands**

This includes the Indus plain. Early summer with high temperature and aridity. and late summer (monsoon) rains. The annual range of temperature is high. The Potwar plateau and northern submontane areas are better than the rest of the Indus plain and receives more winter rain. The Thal desert is the driest area. Dust storms are frequent during summer.

**Vegetation (Map IV)**

1. Natural vegetation  
2. Cultivations
Map (III) Map Of Punjab: Coloured Areas Indicate the Districts Sampled for Spiders

Reference: Career's Orbis Atlas Published by Career Books Publishers Urdu Bazar, Lahore. PP:27
1. **Natural Vegetation**

   a) **Scrub-Dry Sub-Tropical Broadleaved Forests**

   There forests grow in the foot-hills and lower slopes of the salt range and Sulaman ranges. The species are mostly thorny and often with small evergreen leaves. The main tree species are *Olea ferruginea*, *Acacia modesta*, *Tecoma undulata*, *Pistacia integerima*, while *Dodonaea viscosa*, *Reptonia buxifolia*, *Capparis aphylla*, *Gymnosporia roytana* and *Zizyphus* spp. form the shrub cover.

   b) **Scrub Dry Tropical Thorn Forests**

   These forests are called “Rakh” forest in the upper Indus plain and the Desert forests in the lower Indus plain. It is reported to be the native vegetation of the Indus basin. This forest consist of trees which are usually thorny, stunted and dominated by *Acacia* spp. The usual species are *Acacia modesta*, *Acacia nilotica*, *Salvadora oleoides*, *Prosopis spicigera*, *Prosopis cineraria*, *Tamarix aphylla*, *Zizyphus* spp., *Capparis decidua*, *Tecomella undulata*, *Calotropis procera*, *Acacia senegal*, *Commiphora mukul*, *Euphorbia* spp. and *Acacia jacquemontii*. The sand dune tracts are over-grown by *Calligonum* spp., saline sites are occupied by species of *Suaeda*, *Salsola* and *Haloxyylon*, *Salvadora persica*. Among the grasses, species of *Aristida*, *Eleysine*, *Panicum*, *Cenchrus*, *Lasiurus* and *Sacharum munja* are prevalent on relevant habitats.
Map (IV)  Map Of Punjab showing different climatic zones
c) Irrigated Plantations

These forests are the outcome of human effort on submerginal land where irrigation water is available. Major species in these forests include *Dalbergia sissoo*, *Morus alba*, *Bombax ceiba*, *Eucalyptus camaldulensis*, *Acacia nilotica*, *Melia azedarach*, *Populus* spp. and *Salix* spp.

d) Riverain Forests

These forests, commonly known as the “Bela Forests”, occur on the flood plains and banks of the major rivers of the Indus Basin. The main species are: *Acacia nilotica*, *Tamarix dioica*, *Prosopis cineraria*, *Dalbergia sissoo* and to some extent *Populus euphratica*.

e) Linear Plantations

Several tree species have been planted as borders along roads, canals and railway tracts. The common species are *Dalbergia sissoo*, *Acacia nilotica*, *Eucalyptus camaldulensis*, *Albizia* spp., *Tamarix aphylla*, *Populus* spp., *Morus alba*, *Salix* spp. and *Melia azedarach*.

f) Farm Forests

They are planted in lines around field boundaries and irrigation channels by the farmers.
2. **Cultivations**

As almost all the area is arid, rainfalls are deficient, cultivation is brought about by canal system, tube wells and wells.

In irrigated areas, the native vegetation has been cleared and crops like wheat, maize, cotton, sugarcane, rice, fodder crops, vegetables as well as orchards of mango, citrus, guva and date palm etc. are grown in their respective favourable climatic conditions. The details of collection sites and vegetation is given in Table II.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the district</th>
<th>Location of various districts</th>
<th>Mean Annual Rainfall (mm)</th>
<th>Topography</th>
<th>Vegetation</th>
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<td>Thorny Vegetation</td>
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<td>2</td>
<td>Toba Tek Singh</td>
<td>30° 57' 72° 28'</td>
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<td>Sheikhpura</td>
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<td>5</td>
<td>Lahore</td>
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<td>6</td>
<td>Gujranwala</td>
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<td>7</td>
<td>Sialkot</td>
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<td>Thorny with deciduous trees</td>
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<td>Jehlum</td>
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<td>Sub-tropical dry, evergreen forest mixed with thorny trees &amp; bushes</td>
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<td>Rawalpindi</td>
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<td>Plateau + Murree Hills</td>
<td>Coniferous forest in Murree</td>
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<td>Latitude</td>
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Data for the districts, Bahawalnagar and Chakwal, was not available.
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<th>S. No.</th>
<th>Name of the District</th>
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<th>Month &amp; Year Collection</th>
<th>Vegetation/crops from which collection was made</th>
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<td>Month 2</td>
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<td>Siris, <em>Acacia arabica</em></td>
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<td>Lemon scented Gum, <em>Eucalyptus citriodora</em></td>
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<td>Shoe-flower, <em>Hibiscus rosa-sinensis</em></td>
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<td><em>Cabbage, Brassica capitata</em></td>
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<td>Sheesham, <em>Delbergia sisso</em></td>
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<td><em>Mulberry, Morus alba</em></td>
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<td>vi) Gatwala</td>
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<td>Months</td>
<td>Plants</td>
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<td>Toba Tek Singh</td>
<td>Govt. College (W) T.T.Singh</td>
<td>May, Nov., June 1997</td>
<td>Bougainvillea glabra, Rose, Motia, Gardenia, Clerodendron inerme, Sheesham, Delbergia sisso</td>
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<td>Govt. College (W) Gojra</td>
<td>Nov., 1997</td>
<td>Rose, Motia, Gardenia, Clerodendron inerme, Sheesham</td>
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<td>Govt. H.S.S. Pirmahal</td>
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<td>Govt. Training College for Women, Kamalia</td>
<td>June, 1998</td>
<td>Cypress, Cupressus arizonica, Mor Punkh, Thuja orientalis, Palm, Livistonia chinesis, Rose, Rosa indica</td>
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<td>May, 1997</td>
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<td>ii) Chak No.269 J.B.</td>
<td>April</td>
<td>Maize, Zea mays, Lucern, Medicago sativa</td>
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<td>No.</td>
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<td>Plant Name(s)</td>
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| 3   | iii) Govt. College (W) Rabwah | Egyptian clover, *Trifolium alexandrinum*  
Shafful, *Trifolium resupinatum*  
Lemon, *Citrus indica*  
Pomegranate, *Punica granatum*  
Sirs, *Acacia Arabic*  
Neem, *Azadirachta indica*  
Persian Lilac, *Melia azedarach* |
|     | iv) Head Tarimun         | Kanair, *Narrium odoratum*  
Gardinea, *Citrus limon*; *Clerodendron inerme*  
Kikar, *Acacia auriculiformis* |
|     | v) Aitara Hazari            | Reed, *Saccharum spontaneum*  
Kikar, *Acacia arabica*  
Sarkanda *Saccharum arundinaceum*  
Water grass, *Phragmites karka*  
Dib, *Typha angustata* |
| 4   | Sheikhupura i) Farooqabad | Sugarcane, *Saccharum officinarum*  
Wild plants like Coromnus didymus  
Gnaphium indicum, *Ceratium fontanum* |
|     | ii) Kala Shah Kaku         | Guava, *Psidium guajava* |
|     | ii) Shahkot               | Fallow rice field  
Orange, *Jasminum*  
Jerusalem Thorn, *Parkinsonia acutata*  
Mulberry, *Brassonelgia papyrifera* |
| 5   | Lahore | Apple, *Pyrus malus*  
Alhagi, *Alhagi maurorum*  
Rose, *Rosa indica*  
Puran, *Ehretia serrata* |
| 6   | Gujranwala | Paddy field, *Oryza sativa* |
| 7   | Sialkot | Nim Chamel, *Millingtonia hortensis*  
Dionthus sinensis, *Yucca alvifolia*  
*Malva coronedelium* Kikar, *Acacia arabica* |
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<thead>
<tr>
<th>No.</th>
<th>District</th>
<th>Place(s)</th>
<th>Month, Year</th>
<th>Plants/Monuments</th>
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<tr>
<td>8</td>
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<td>i) Sarai Alamgir</td>
<td>September, 1997</td>
<td>Sugarcane, Saccharum officinarum</td>
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<td>Wild plants like, Nicotiana plumbaginifolia</td>
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<td>Chrozopora tinitoria</td>
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<td>Lasera, Cordia myxa</td>
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<td>Puran, Ehretia serrata</td>
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<td>Keora, Agave Americana</td>
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<td></td>
<td>i) Rawal Town</td>
<td>August, 1997</td>
<td>Ornamental plants, Acalypha hispida</td>
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<td>Agapanthus umbellatus etc.</td>
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<td>ii) Murre Hills</td>
<td>August, 1997</td>
<td>Cypress, Cypressus arizonica</td>
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<td>Indian Willow, Salix tetrasperma</td>
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<td>Shoe-flower, Hibiscus rosa sinensis</td>
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<td>Rose, Rose indica</td>
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<td>Lychnis alpine, Lychnis alba</td>
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<td>Parral, Abies pindrow</td>
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<td>iii) Rawal Dam</td>
<td>September, 1997</td>
<td>Sheesham, Delbergia sisso</td>
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<td>Gardinea, Citrus limon ornamental plants</td>
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<td>Nettle tree, Celtis oviciarpa</td>
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<td>9</td>
<td>Rawalpindi</td>
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<td>10</td>
<td>Chakwal</td>
<td>i) Kalar kahar</td>
<td>October, 1997</td>
<td>Loquat, Eriobotrya japonica</td>
</tr>
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<td></td>
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<td>ii) Mial Tala Gang</td>
<td>Nov., 1997</td>
<td>Cotton, Gossypium herbaceum</td>
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<td>Guava, Psidium guajava</td>
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<td>Citrus, Citrus medica</td>
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<td>11</td>
<td>Sargodha</td>
<td>Road side orange orchard</td>
<td>May, 1997</td>
<td>Orange, Citrus aurantiflorum</td>
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<tr>
<td>12</td>
<td>Okara</td>
<td>Animal Breeding and Research</td>
<td>August, 1996</td>
<td>Rice paddy, Oryza sativa</td>
</tr>
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<td>Institute Bahadar Nagar</td>
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<td>Kikar, Acacia arabica</td>
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<td>Shoe flower, Hibiscus rosa sinensis</td>
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<td>Sugarcane, Saccharum officinarum</td>
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<td>Uncultivated plants like, Fumaria indica</td>
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<td>Anagallis aestivalis, Rumex dentatus, Medicago denticulata</td>
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<td>Conyza ambigua, Vicia sativa,</td>
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<td>Coronopus didymus, etc.</td>
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<td>13</td>
<td>Sahiwal</td>
<td>i) Yousafwala Maize Farm</td>
<td>June, 1998</td>
<td>Maize, Zea mays</td>
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<td>Date Palm, Phoenix dactylifera</td>
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<td>No.</td>
<td>Location</td>
<td>Site Description</td>
<td>Date</td>
<td>Plants and Vegetation</td>
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<td>14</td>
<td>Khanewal</td>
<td>Jahanian</td>
<td>Oct., 1997</td>
<td>Mango, <em>Mangifera indica</em>&lt;br&gt;Sudan grass: <em>Sorghum vulgare</em></td>
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<td>15</td>
<td>Multan</td>
<td>Road Side Mango Orchard</td>
<td>August, 1997</td>
<td>Mango: <em>Mangifera indica</em>&lt;br&gt;Wild Plants like, <em>Cassia occidentalis, Cassia obtusifolia, Lactuca serriola</em></td>
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<td>16</td>
<td>Muzaffar Garh</td>
<td>i) Road Side Vegetation</td>
<td>July, 1997</td>
<td>Gardinea, <em>Citrus limon, Gardenia jasminoides, Sheesham, Delbergia sisso</em></td>
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<td>ii) Head Punjnad</td>
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<td>Ornamental &amp; Wild Plants like <em>Hibiscus rosa sinensis, Heliotropium strigosum, Calotropis procera</em></td>
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<td>Kanair, <em>Narium odoratum</em></td>
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<td>17</td>
<td>Bahawal Nagar</td>
<td>Chishtian</td>
<td>August, 1997</td>
<td>Cotton, <em>Gossypium herbaceum</em>&lt;br&gt;Wild plants like,&lt;br&gt;<em>Cicropora tinctoria, C painteda</em></td>
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<td>ii) Open Area (Quarry)</td>
<td>July, 1996</td>
<td>Reed, <em>Arundo donax</em>&lt;br&gt;Water grass, <em>Phragmites karka</em></td>
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<td>iii) D.G. Cement Factory</td>
<td>August, 1996</td>
<td>Grasses, <em>Cydon dactylon, Dactyloctenium setinum</em></td>
</tr>
<tr>
<td>18</td>
<td>D.G.Khan</td>
<td>i) Fort Munro</td>
<td>August, 1996</td>
<td>Cotton, <em>Gossypium herbaceum</em></td>
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<td>Reed, <em>Arundo donax</em>&lt;br&gt;Water grass, <em>Phragmites karka</em></td>
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<td>Grasses, <em>Cydon dactylon, Dactyloctenium setinum</em></td>
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<td>19</td>
<td>Vihari</td>
<td>i) Mailsy</td>
<td>July, 1997</td>
<td>Cotton, <em>Gossypium herbaceum</em></td>
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<td>No.</td>
<td>Place</td>
<td>Location/Species</td>
<td>Year</td>
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<td>21</td>
<td>Rahim Yar Khan</td>
<td>Mango orchard</td>
<td>September, 1998</td>
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<td>Mango, <em>Mangifera indica</em></td>
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<td>Date Palm, <em>Phoenix dactylifera</em></td>
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<td>Cotton, <em>Gossypium herbaceum</em></td>
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<td>23</td>
<td>Islamabad (Federal Territory)</td>
<td>Rose and Jasmine Garden</td>
<td>September, 1997</td>
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<td>Rose, <em>Rosa indica</em>, Chinar: <em>Platanus orientalis</em></td>
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<td>Nettle tree, <em>Celtis eriocarpa</em></td>
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<td>Carob tree, <em>Ceratonia siliqua</em></td>
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<td>Lasura, <em>Cordia myxa</em></td>
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<td>Honey Locust, <em>Gleditsia triacanthos</em></td>
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<td>Silver oak, <em>Grevillea robusta</em></td>
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<td>Jacaranda, <em>Jacaranda ovalifolia</em></td>
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<td>Chinese Willow Tree, <em>Salix sclerophylla</em></td>
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<td><em>Fritillaria meleagris</em>, <em>Agapanthus umbellatus</em>, <em>Cestrum nocturnum</em></td>
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<td><em>Agave Americana</em>, <em>Celtis eriocarpa</em></td>
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<td><em>Cedrela toona</em>, <em>Broussonetia papyrifera</em>, <em>Jasminum humile</em>, <em>Jasminum grandiflorum</em>, <em>Jasminum sambac</em></td>
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CHAPTER IV

RESULTS

The survey of the foliage and ground spider fauna was carried out from 1996 to 1998. The result was a capture of about 14743 spiders belonging to 21 families, 57 genera and 157 species. One family, 10 genera (Oopoea, Salticus, Callilepis, Nodocion, Megamelesion, Sergioius, Synaema, Xysticus, Arctosa and Nephila) and 80 species were recorded for the first time from the Punjab (Pakistan). Of the 80 species, 32 species were regarded as new to science (Table III and IV). Taxonomical description of only the new species was written.

Key to the families recorded from Pakistan was developed. Alongwith detailed description of new species, synonymsies of the already known species were given. Present and previous locality record (with emphasis on India and Pakistan), background and brief history of all the known taxa recorded from Punjab during this study were given. Type species of various genera and their distribution in the world was also given.

Key to the families of Pakistani spiders:

**Key to the families of Pakistani Spiders**

1. Chelicerae Paraxial, fang articulate with chelicera in vertical and movable plane more or less parallel to median plane of body; with two pairs of book lungs... Suborder Orthognatha...2.
Chelicerae dixial: fang articulated with chelicerae in vertical plane and moveable in more or less transverse plane: commonly with one pair of book lungs.

3. Suborder Labidognatha

2. Farsi with a small median claw and two large lateral claws, without claw tufts

Dipluridae Simon

Farsi only with two claws and claw tufts

Theraphosidae Thorell

3. With cribellum in front of spinnerets and a clamistrum on metatarsus IV, varying from just few bristles to a row along the entire length of the metatarsus

Section Cribellatae

4. PME circular: anal tubercle of usual type, without conspicuous fringe of hairs

5. Cephalic region high, broad, rounded: PLE remote from the rest

Family Eresidae C. L. Koch

Cephalic region low, narrow: PLE very rarely remote from the rest, ocular group compact

Family Urocteidae

5. Family Araneidae

6. Chelicerae fused together at base: labium fused to sternum: clamistrum short

Chelicerae not fused together at base: labiums free: clamistrum long

7. Eyes homogenous, dark: both rows recurved: metatarsus IV compressed and concave above

Family Uloboridae Thorell
8. Posterior spinnerets enormously long, usually longer than abdomen...........................................Family Hersiliidae Thorell.

Posterior spinnerets of normal size.................................................................9.

9. Tarsi long and flexible; labium wider than long, legs very long and slender...........................................Family Pholcidae C.L. Koch.
Tarsi of usual type; labium variable; legs not very long.........................10.

10. Eyes six, in three groups, carapace round, high behind; sternum round behind...........................................Family Semydidae Blackwall.

11. Eyes six, median eyes larger than the laterals. Labium not joined with sternum.
Epigastric furrow at the normal region. Labium as wide as long. Tarsi two clawed but without tufts...........................................Family Oonopidae.


13. Front row of eyes more or less situated vertically; median eyes enormously large.
second row of two eyes usually very small, often minute, third row of two eyes of
medium size...........................................Family Salticidae Blackwall.
Eyes arranged in two rows.................................................................14.

14. Legs at least I and II latrigrade; crab like...........................................15.
Legs usually prograde; not crab like.................................................................16.

15. Retromargin of cheliceral fang furrow armed with teeth; colulus absent
............................................................................................................................Family Sparassidae Berthau.
Retromargin of cheliceral fang furrow smooth; colulus present.................................................................16.
16. Tarsi I and II with scopulate legs usually equal in length approximately

................................................................. Family Philodromidae Thorell.
Tarsi I and II without scopulate, legs I and II much longer than III and IV................................................. Family Thomisidae Sundevall.

17. Eyes homogenous or almost so; maxillae without a transverse or oblique depression anterior spinnerets cylindrical, separated by distance equal to diameter of one.................................................. Family Gnaphosidae Pocock.

18. Labium distinctly longer than wide; tibia I without series of movable spines....................................................... Family Clubionidae Wagner.
Labium not or slightly longer than wide, tibia I with series of movable spines .......................................................... Family Corinnidae Karsch.

19. Eyes group hexagonal, clypeus high, abdomen pointed behind; legs with very conspicuous spines................................................. Family Oxyopidae Thorell.

20. Tarsi IV without comb of serrated bristles.................................................................21.

22. PER strongly recurved, forming two distinct rows, median claw smooth or with single tooth................................................. Family Lycosidae Sundevall.

23. Clypeus usually lower than height of median ocular area; eyes homogenous.................................................................24.

Clypeus usually as high as or more commonly higher than height of median ocular area; eyes heterogenous; chelicerae with stridulating ridges, male paracymbium separate sclerite............................................ Family Linyphiidae Blackwell.

Tibia of male pedipalp in most species with at least one apophysis. Palp of female without a claw at end of tarsus. Tibia IV with a single dorsal spine or bristle, and
with the metatarsi spineless, or all spines lacking altogether
..............................................................................................................Family Erigonidae/Micryphantidae.

24. **Chelicerae** long, strong, without or with rudimentary boss. Legs very long...............................................................................................Family Tetragnathidae Menge.

Chelicerae not strong with boss. Legs not as long as above..............................................................................................................Family Araneidae Simon.
Family OONOPIDAE Simon, 1891


Family Oonopidae has 67 genera and 459 species worldwide (Platnick, 2006). This family has been reported for the first time from the Punjab, Pakistan.

Genus *Opopoea* Simon, 1891


Species: *Opopoea batanguena* Barrion & Litsinger 1995

**Material Examined**

6♂♂ collected from Faisalabad. 1996.

Only one genus and one species has been recorded for the first time from Pakistan.
Family UROCTEIDAE  Dufour, 1820

Genus Uroctea


There is a striking similarity between the family Oecobiidae and the ecribellate family Urocteidae. Some American workers prefer to consider it as Oecobiidae. Platnick (2006) has placed it under family Oecobiidae.

Uroctea matthaii  Dyal (1935)


Species Examined

3♀♀, 2♂♂ in some houses in Faisalabad. 1996.
Family *ERESIDAE*  C.L. KOCH, 1851
(Eresids)


This is a small family containing 10 genera and 102 species (Platnick, 2006). In Pakistan, this family was studied by Dyal (1935), Arshad *et al.* (1984), Khatoon (1985-86), and Qadir (1997). Uptill now one genus and four species have been recorded from Pakistan. During present study, one species was reported from Punjab.

**Genus Stegodyphus**  Simon, 1873


Khatoon (1985-86) and Qadir (1997) recorded the genus from Islamabad, and Sialkot respectively. In the present study one species of this genus was recorded from Punjab.

**Type species:** *Stegodyphus lineatus* (Latreille, 1817).

**Distribution:** Asia, Africa, Europe, Brazil.

*Stegodyphus sarasinorum*  Karsch, 1891


This species has already been reported from Pakistan by Dyal (1935) from Lahore and by Qadir (1997) from Sialkot. During present study this species has been reported two new localities.

**Material Examined**

15 ♀♀ and 1 ♂ collected from Bahadar Nagar Okara.

7 ♀♀ collected from Faisalabad.
Family ULOBORIDAE    Thorell, 1869
(Feather-legged spiders)


The family Uloboridae is a small family containing 19 genera and 244 species from all over the world (Platnick, 2006). In Pakistan, Dyal (1935) reported one species from Lahore. Presently one species has been recorded from Pakistan.

Genus Uloborus    Latreille, 1806.


1874. Uloborus Simon, Arachn. Fr., :244.


This is a large genus comprising 77 species (Platnick. 2006). Dyal (1935) recorded one species of the genus from Lahore. In present study one species has been recorded from Punjab.

**Type Species:** *Uloborus walekenaerius* (Latreille. 1806)

**Distribution:** Europe, Africa, Asia, North & South America, Australia, New Guinea, Sunda Islands.

*Uloborus plumipes* Lucas


**Material Examined**


3♀ from ornamental plants from L.I. Singh in June 1997.

2♀♀ from Rukh Khairywali (Layyah) in Nov. 1998.

2♀♀ from Jhang in May 1997.

3♀♀ from Faisalabad in June 1996.
Family HERSILIDAE  Audouin, 1826


This is a small family having 10 genera and 143 species (Platnick, 2006). In Pakistan Dyal (1935) recorded one species from Lahore. Qadir (1997) recorded one species from Sialkot.

Genus HERSILIA  Audouin, 1826


1999. HERSELIA: Song. et al., The spiders of China. 78.


This is the largest genus of family Hersiliidae with 58 species (Platnick, 2006). In Pakistan, this genus is represented by two species, one species has been recorded for the first time.

**Type Species:** *Hersilia caudata* (Audouin, 1826).

**Distribution:** Africa, Asia, Australia, New Guinea.

*Hersilia clathrata* Thorell, 1895


**Material Examined**

1♂ collected on Kikar bark on 30.8.96 from Bahadar Nagar Okara.

3♀♂ collected from Rukh Khairaywali, Leah on 21.11.98.

*Hersilia savignyi* Lucas, 1836


Material Examined

7♂♂, 1♀ collected from the Kikar Bark on 30.8.96 Bahadar Nagar, Okara.

6♂♂, 1♀ collected from Maize Farm, Sahiwal on 26.6.98.

13♂♂, 5♀ collected from Rukh Khairaywali, Liahis on 21.11.98.
Family **PHOLCIDAe** C.L. Koch, 1851
(Daddy-longleg spiders)


Uptill now 868 species under 75 genera have been described in the family Pholcidae Koch from all over the world (Platnick, 2006). Dyal (1935) recorded two species belonging to two genera from Lahore. Arshad et al. (1984) and Khatoon (1985-86) reported these species from NWFP. and Islamabad/Rawalpindi, respectively. Later on Qadir (1997) and Nazir (1999) recorded one already known species from Sialkot and Jhang respectively. During present study one species was recorded.

**Genus Crossopriza** Simon, 1893


Type species: *Crossopriza pristina* (Simon, 1893)

**Distribution:** Egypt, Arabia, Indo-Pakistan Sub-continent.

*Crossopriza lyoni* (Blackwall, 1867)


**Material Examined**

5♀♀ and 1♂ from Kikar tree, Bahadarnagar, Okara in September 1996.

Family SCYTODIDAE  Blackwall, 1864
(Spitting Siders)


Scytodida Blackwall is a small family having five genera and 157 species worldwide (Platnick, 2006). Dyal (1935) studied the genus Scytodes latreille from Pakistan and placed it under the family Sicaridae. Fatima (1999) also recorded the family from Faisalabad.

Genus Scytodes  Latreille, 1804


53


This is a large genus containing 150 species (Platnick, 2006). Dyal (1935) recorded four species of the genus including one new species from Lahore. Fatima (1999) recorded the genus from Faisalabad. In the present study, one already recorded species is found from Punjab.

**Type Species:** *Scytodes thoracica* (Latreille, 1804)

**Distribution:** Cosmopolitan.

*Scytodes thoracica* (Latreille, 1804)


**Material Examined**

7♀♀ Faisalabad. 1996.
Family **SALTICIDAE**  
Blackwall, 1841  
(*Jumping Spiders*)


This is a large family comprising 553 genera and 5035 species (Platnick, 2000). Dyal (1935) recorded 17 genera and 29 species of the family from Lahore, Pakistan and placed them under family Attidae, of these 15 species were new to science. Arshad *et al.* (1984) recorded one of these genera (*Plexippus*) from Mardan. NWFP. Khatoon (1985-86) recorded six genera and seven species including one new species from Islamabad and Attock. Later on Mushtaq *et al.* (1995a,b), Khan *et al.* (2000), Shabbir (1997), Fatima (1999), Butt & Beg (2000) and Mushtaq *et al.* (2000) also reported some new species and new records from Punjab, Pakistan. In the present study 9 genera and 27 species were recorded from different localities of Punjab and 8 species were a new record from Punjab.
Genus *Myrmarchne*  MacLeay, 1839


This is a large genus with 209 species distributed all over the world. Dyal (1935) recorded four species of the genus from Lahore. Khatoon (1985-86) recorded one of these species from Rawalpindi. Mushtaq et al. (1995a) recorded two more species from Faisalabad. During present study four already known species were recorded from various localities.

**Type Species:** *Myrmarchne melanocepalis* (MacLeay, 1839)

**Distribution:** Cosmopolitan

*Myrmarchne maratha*  Tikader, 1973


Material Examined

1♀: Okara: 31.8.96.
1♂: Rawal Town, Rawalpindi: 29.8.97.
2♂♂: Booraywala, Vehari: 18.6.98.
2♂♂: Kala Shah Kaku, Sheikhupura: 24.6.98.
3♀♀, 2♂♂: Yousafwala Maize Farm, Sahiwal: 26.6.98.
6♀♀, 3♂♂: Kalim Shaheed Park, Faisalabad: 15.8.98.

Myrmarachne orientales Tikader, 1973

30;105.

Mushtaq et al. (1995a) were first to record this species from Faisalabad, Pakistan. Fatima (1999) also recorded this species from Faisalabad. During present study, this species was recorded from various localities of Punjab.

Material Examined

1♂: Thikarywala, Faisalabad: 10.6.97.
1♀: Rawal Dam, Rawalpindi: 1.9.97.
1♀: Chak No.269 J.B. Jhang: 12.4.98.
25♀♀, 13♂♂; Booraywala, Vehari: 18.6.98.
1♀; Kamalia, T.T. Singh: 21.6.98.
1♀; Kala Shah Kaku, Sheikhpura: 24.6.98.
1♀; Yousafwala Maize Farm, Sahiwal: 26.6.98.
1♀; Kalim Shaheed Park, Faisalabad: 15.8.98.
10♀♂; Jahanian, Khanewal: 30.9.98.

*Myrrmarche bengalensis*  Tikader, 1973


This species is recorded for the first time from Punjab.

Material Examined

21♀♀, 5♂♂; Thikarywala, Faisalabad: 10.6.97.
1♀; Shah Kot, Sheikhpura: 25.6.98.
5♀♀; Kalim Shaheed Park, Faisalabad: 15.8.98.

*Myrrmarche laetus*  Thorell, 1887


Material Examined

15♀♀, 3♂♂; Kalim Shaheed Park, Faisalabad: 20.7.96.

**Genus Marpissa**  C.L. Koch, 1846


The genus *Marpissa* C.L. Koch has 47 known species in the world. It has been recorded in Pakistan from Faisalabad and Sialkot (Waris, 1994; Shabbir, 1997; Fatima, 1999). Butt & Beg (2000) described four new species from Faisalabad. During present study 7 species of this genus were recorded. One species *Marpissa mucosa* was a new record. Two species *M. officinarum* and *M. viriscence* were regarded as new to science.

**Type species:** *Marpissa mucosa* (Clerck, 1757)

*Marpissa tigrina* Tikader, 1965


In Pakistan this species was recorded by Waris (1994) from Faisalabad and Shabbir (1997) from Sialkot.
During present study this species was recorded from whole of the Punjab.

Specimens Examined

81♀♀, 25♂♂: Chak No.31 J.B., Faisalabad: 8.7.96.
2♀♀: Okara: 30.8.96.
14♀♀, 4♂♂: Mailsy, Vehari: 10.7.97.
2♂♂: Head Punjab, Muzaffar Garh: 12.7.97.
24♀♀, 5♂♂: Jahanian, Khanewal: 31.10.97.
3♂♂: Chakwal: 10.11.97.
18♀♀: Chak No.269 J.B., Jhang: 11.9.98.
1♀♂: Booraywala, Vehari: 18.6.98.
1♀♂: Kala Shah Kaku, Sheikhupura: 24.6.98.
13♀♀, 1♂: Samundri, Faisalabad: 16.7.98.
2♀♀, 1♂: Rabwah, Jhang: 30.7.98.
68♀♀, 3♂♂: Kalim Shaheed Park, Faisalabad: 15.8.98.
12♀♀: Rahim Yar Khan: 12.9.98.
34♀♂, 12♂♂; Khanewal: 30.9.98.
10♀♂, 1♂; Mial. Chakwal: 10.11.97.
29♀♂; Leah: 21.11.98.
4♀♀ collected from Head Tarimun, Jhang on 21.11.98.

*Marpissa dhakuriensis*  
**Tikader, 1974**


**Specimens Examined**

64♀♂, 12♂♂; Chak No.31 J.B., Faisalabad: 8.7.96.

42♀♂, 9♂♂; Kalim Shaheed Park, Faisalabad: 20.7.96.

3♀♂, 1♂; T.T. Singh: 16.5.97.

3♀♂; Thikarywala, Faisalabad: 10.6.97.

13♀♂; Mailsy, Vehari: 10.7.97.

2♀♂; Muzaffar Garh: 11.7.97.

58♀♂, 26♂♂; Kalim Shaheed Park, Faisalabad: 10.8.97.

4♀♂, 1♂; Rawal Dam, Rawalpindi: 1.9.97.

2♀♂; Sialkot: 6.10.97.

15♀♂; Mial. Chakwal: 10.11.97.

12♀♂, 4♂♂; Kala Shah Kaku, Sheikhpura: 24.6.98.

14♀♂; Gatiwala, Faisalabad: 25.6.98.

2♀♂; Yousafwala, Sahiwal: 26.6.98.

33♀♂, 18♂♂; Kalim Shaheed Park, Faisalabad: 15.8.98.


**Material Examined**

31♀, 12♂: Chak No.31 J.B., Faisalabad: 8.7.96.

1♂: Vehari: 10.7.97.


5♀, 8♂: Jahanian, Khanewal: 31.10.97.


**Specimens Examined**

13♀♀, 4♂♂: Chak No.31 J.B. Faisalabad: 8.7.96.


41♀, 12♂♂: Katun Shaheed Park, Faisalabad: 20.7.96.

34♀♀, 9♂♂: Mailsy, Vehari: 10.7.97.

2♂♂: Muzaffar Garh: 11.7.97.

1♂: Hend Punjnad, Muzaffar Garh: 12.7.97.


Marpissa mucosa  C.L. Koch, 1846


Material Examined

1♂: Chak No.31 J.B., Faisalabad: 9.7.96.

4♂♂: Harappa. Sahiwal: 15.7.98.

4♂♂, 1♀: Samundri. Faisalabad: 16.7.98.

12♂♂: Leliah: 22.11.98.

Marpissa officinarum sp. nov  
(Fig.1 A-D)

Type Material: Female holotype specimen from Jamay Cheema, Sialkot, October 1997  
paratype - with same data.

Etymology: This species was named after its host plant Saccharum officinarum.

Diagnosis: Marpissa officinarum is close to Marpissa bengalensis Tikader but differs in  
the following respects: sternum of this new species is roughly octagonal and broad,  
whereas, in Marpissa bengalensis, it is oval and pointed at both anterior and posterior  
ends. Labium is dumb-bell shaped by contrast it is broad at base and narrow anteriorly in  
M. bengalensis. Maxillae fusiform in M. bengalensis and rectangular in the new species.  
Epigyne of M. officinarum is triangular, with spermathecae at the base and fertilization  
tubes anteriorly having triangular uterus. The uterus is rounded in M. bengalensis.

Measurements: Total length 7.45 - 8.40mm (8.18 ± 0.30: carapace length: 3.01 -  
3.44mm (3.22 ± 0.28); carapace width: 1.96 - 2.34mm (2.15 ± 0.26); abdomen length:  
4.40 - 4.86mm (4.63 ± 0.30; abdomen width: 2.57 - 3.03mm (2.8 ± 0.31); Leg I 17.70mm:  
Leg II 7.43mm; Leg III 8.38mm; Leg IV 8.80mm; Pedipalp: 3.02mm.

Cephalothorax: Blackish brown; longer than wide. widest in the middle: anteriorly  
narrow; cephalic region flat, ocular platform small than that of thoracic; small fovea at  
the junction of cephalic and thoracic region; radiations from fovea towards sides and  
posterior region; short black hairs and striations at the sides; AF row recurved; eyes  
encircled by black patches; strong long hairs in the eye area; 2nd row of eyes small and  
close to ALE than to PLE: eye formula; AME > PLE > ALE > PME: chelicerae strong;  
moderately elongated; fang small gradually tapering, recurved and extending the  
cheliceral teeth; one tooth on the retromargin and two teeth on the promargin; maxillae
Fig. 1(A-D), *Marpissa officinarum*, n.sp.

A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae ventral view, 100x,
C. Chelicerae, lateral view, 100x,
D. Epigynum internal view, 100x,

(ft; fertilization duct, ut; uterus and st; spermatheca)
cylindrical, apically scutulate; labium dumbbell shaped, anteriorly truncated; sternum roughly octagonal with characteristic conical markings; 1st pair of legs stronger and more stout than others, legs with hairs and spines. Spination on legs: femora I = 0-0-1 (001), I = 0-0-2 (011)-0, III = 0-0-1-2 (011), IV = 0-0-0-1 (001); Patella I-IV without spines; Tibia I = 0-1-2 (011)-1; II = 0-0-5 (1-2-2)-0, III = 2-2-0-0, IV = 1-1-1-3. Metatarsus I = 0-1-1-0; II = 1-2-1-0; III = 0-0-0-0; IV = 3-1-2-1. Leg formula; 4312.

**Abdomen:** Abdomen longer than wide, balekish brown, with black pigmentation and patches; sparsely hairy; notched anteriorly, broadest at the posterior and venter yellow-brown with striations and bawls. posterior spinnerets longer than others, hairy and pigmented; epigynal plate oblong; spermathecae nearly rounded; copulatory ducts slightly coiled; fertilization tubes opening at the base of a conical uterus anteriorly.

**Natural History:** Two female specimens were collected from sugarcane field from Jamkay Cheema near Canal Rest House, Sialkot during October, 1997.

**Distribution:** Northeast Punjab, Pakistan.
Marpissa virescense sp. nov.
(Fig. 2 A-C)

**Type Material:** Holotype ♀: I.T. Singh; June 1998 collected from Citrus limon.

**Female:** Unknown

**Etymology:** This species was named after its pearly shining AME.

**Diagnosis:** Marpissa virescense resembles Marpissa decorata Tikader but can be differentiated from it on the basis of following characters. Sternum is broad anteriorly and pointed posteriorly whereas in M. decorata it is pointed at both ends. Eye spacing of both the species is different, especially the PLE are cone like in M. decorata.

**Measurements:** Total length: 6.40mm; carapace length: 3.25mm; width: 2.48mm; abdomen length: 3.16mm; width: 2.2mm. Leg I: 9.76mm. Leg II: 9.27mm. Leg III: 9.21mm. Leg IV: 13.06mm. pedipalp: 2.61mm.

**Cephalothorax:** reddish brown, longer than broad; broadest in the middle; high in front; postero-lateral sides sloping; cephalic region flat; two bands of silky black hairs on postero-lateral sides; and one band of longer hairs at the base of fovea; fovea not so prominent; two black spots at the mid-cephalic region behind the AME; AME pearly & shining white; rest milky white. AE row recurved; eye basis black; ocular trapezium broader than long; eye formula AME > ALE > PLE > PME. Chelicerae moderately developed. reddish brown; promargin with two teeth and retromargin with one tooth; sternum oval pitcher like but pointed posteriorly; reddish brown; maxillae longer than wide, broad apically, pointed basally; labium broad at the base and pointed anteriorly. fine scopulae on the upper margins of both labium and maxillae. legs yellowish brown: 1st pair of legs comparatively thick and stout with hair and spines. Spination: On legs: I'emora I = 0-1-01-1; II = 2-2-0-1; III = 0-2-1-0; IV = 1-1-0-0. Patella: I = 1-1-0-0; II = 1-
Fig. 2(A-C), *Marpissa virescens*, n.sp.
A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Pedipalp, lateral view 40x,

cy; cymbium, bb; bulbus, and em; embolus)
1-0-2: III = 1-1-2-0, IV = 1-1-1-0: Tibia I = 3-3-2-2-2-4(2-2); IV = 3-2-5(2-2-1).
Metatarsus I = 3-3-3-3; II = 2-2-4(2-2); 4(2-1-1); III = 3-3-6(2-2-2); 5(1-2-2); IV = 3-5-2-4(2-2). Tarsi with two claws. Leg formula: 4123.

Male palp prominent; cymbium spatula like, long with stout long; black, sparse hair; embolus black, thick and pointed. RTA not prominent bulbus/tegulum rounded; median tegular apophysis short sperm duct blackish and prominent, conductor straight and elongated.

**Abdomen:** Yellowish brown: longer than wide: broadest at the mid-dorsal region; broad anteriorly and pointed posteriorly; broad, mid-dorsal longitudinal band of black hairs with scattered spines; streaks of black hair originate from the central band towards the sides; a long black cylindrical patch arising from the base of the spinnerets and leading to the posterior one third of the central abdominal band. A fringe of thick black hair at the outer postero-lateral lower margin of the abdomen. Anterior pair of spinnerets thick: deep brown: hairy and tubular. Posterior spinnerets longer than others. Anal tubercle prominent and hairy. Ventrum yellowish brown with scattered spines.

**Natural History:** One male specimen collected from T.I. Singh during June 1998; from *Citrus limon*.

**Distribution:** Central Punjab, Pakistan.

**Genus Phlegra** Simon, 1876


This is a large genus containing 70 species (Platnick, 2006). In Pakistan Waris et al. (1994) recorded two species of this genus from central Punjab of which one species Phlegra swamae was new to science. Shabbir (1997) recorded one more species of this genus from Jamke Cheema (Sialkot). During present study, two species were recorded: of which one species was considered as new to science.

**Type Species:** Phlegra fasciata (Hahn. 1826).

**Phlegra dhukariensis** Tikader, 1974


**Phlegra dhukariensis** Tikader has been recorded in Pakistan by Waris (1994) from Faisalabad and Shabbir (1997) from Sialkot. During present study it was collected from Faisalabad and Rawalpindi and Bahawalnagar.

**Material Examined**

2♂♂: Chak No.31 J.B., Faisalabad: 8.7.96.

16♀♂, 1♂♀: Kalim Shaheed Park, Faisalabad: 20.7.96.


14♀♂: Chishtian: 15.8.97.

2♀♂: Gutwala. Faisalabad: 25.6.98.

3♀♂, 2♂♀: Kalim Shaheed Park, Faisalabad: 15.8.98

4♀♂, 2♀♂: Rawal Town, Rawalpindi: 29.8.97.
Phlegra decorata sp.nov.
(Fig.3 A-D)

Type Material: Female Holotype specimen collected from grass Cynodon dactylon in August, 1998. Allotype 6♀♀ with same data.

Etymology: This species was named due to the decorations on the cephalothorax and abdomen.

Diagnosis: Phlegra decorata resembles Phlegra dhukariensis (Tikader) but can be distinguished from it by following differences: fovea absent; ocular quad longer than wide; tuft of long hair on the proximal and antero-lateral sed of chelicerae; promarginal teeth slightly longer than that of retrormargin; labium broader than long; sternum hexagonal whereas in P. dhukariensis it is oval. Leg formula in this species is 2413 whereas in P. dhukariensis, it is 4132. Epigynum of P. dhukariensis is different in detail because spermathecae are rounded in P. decorata and oblong in P. dhukariensis fertilization tubes are straight in P. dhukariensis whereas in P. decorata it is much convoluted.

Measurements: Total length: 9.7 11.5mm (10.47 ± 0.65); carapace length: 3.00 4.60mm (3.7 ± 0.62); carapace width: 2.84 4.03mm (3.59 ± 0.49); abdomen length: 5.86 - 6.79mm (6.3 ± 0.32); abdomen width: 3.23 - 4.58mm. Leg I: 11.5mm. Leg II: 12.10mm; Leg III: 9.90mm; Leg IV: 11.8mm. Pedipalp: 6.92mm.

Cephalothorax: Blackish, longer than wide; ocular area blackish; AME largest; ALI row recurved; PME equidistant between ALI and PLE; ocular trapezium longer than wide one thick stout hair arising from the upper margin of each PLE. Eye formula AME > ALI > PLE > PME. A tuft of flame like thick gray group of hair present in the center of cephalothorax. Chelicerae large with long hair; fang strong and stout; curved and pointed.
Fig. 3(A-D) *Phlegra decorata*, n.sp.

A. Body dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae lateral view, 100x,
D. Epigynum, internal view 100x,

(ut; uterus, ft; fertilization duct and st; spermatheca)
at the tip; one tooth at the retromargin and two teeth on promargin; maxillae broad anteriorly, notched with prominent thick scopulae; labium broader than long; sternum longer than broad, somewhat octagonal with small, scattered bristles; legs strong with hair and spines. Spination on legs: Femur I = 0-0-1-0; II = 1-1-0-0; III = 0-0-1-0; IV = without spines. Patella I = 0-1-0-0; II = 1-1-0-0; III = 0-1-0-0; IV = 1-1-0-0; Tibia I = 3-1-4(2-2)-4(2-2); II = 1-2-1-3; III = 2-2-3-2; IV = 2-2-3-2; Metatarsus I = 1-2-1-2-2; II = 1-0-2-1; III = 2-2-4 (2-2)-3; IV = 2-2-3-3. Leg formula: 2413.

**Abdomen**: Dark brown, longer than wide, wider anteriorly, pointed posteriorly; clothed with hair; two brown characteristic marking in the middle of abdomen; spinnerets conspicuously long and segmented; posterior spinnerets longer than others. Epigynal plate elongated and divided into two halves; thick hairs present on the sides of epigynal plate. Fertilization tubes are straight; spermathecal tubes arising from spermathecae are convoluted. Spermathecae are nearly rounded.

**Natural History**: 7 female specimens collected from grass *Cynodon dactylon* and *Riccinus communis*

**Distribution**: Central Punjab, Pakistan.

**Genus Phidippus** Koch, 1846


Genus *Phidippus* is a small genus and most of the members of this genus have been recorded from India. Koch (1846) erected this genus and regarded *Phidippus variegates* (Lucas) as its type species. Later on Barrion et al. (1984) placed *Priniceps* (Peckham and Peckham, 1883) under the genus *Phidippus*. Tikader (1977), Tikader and Biswas (1981) described 5 species of the genus recorded from India and Kim (1987) recorded one species of this genus from Canada. Uptill now 6 species of the genus have been described out of which two species are previously known but are regarded as new locality record from Pakistan. Butt (1996) described two new species of the genus *P. notabilis* and *P. eximius* from a vineyard and citrus grove of University of agriculture, Faisalabad. During present two new species were recorded from Rahim Yar Khan and Faisalabad.

**Type Species:** *Phidippus variegates* (Lucas)

*Phidippus pateli* Tikader, 1974


**Material Examined**

2♂♂. 1♀: Chak No.31 J.B., Faisalabad; 8.7.96.

5♂♂. 1♀: Chak No.232 J.B., Faisalabad; 12.7.96.

7♂♂. 1♀: Thikraywala, Faisalabad; 10.6.97.

2♂♂. 4♀: Kalim Shaheed Park, Faisalabad; 10.8.97.

1♂♂. 3♀: Chishtian, Bahawalnagar; 15.8.97.

1♂. 1♀: L.L. Singh: 15.6.98.

1♂: Booraywala, Vehari; 18.6.98.
Phidippus bengalensis  Tikader, 1976


**Material Examined**

29♀♂. 10♂♀: Chak No.31 J.B., Faisalabad: 9.7.96.


37♀♂, 8♀♂: Kalim Shaheed Park. Faisalabad: 20.7.96.

4♀♂: D.G. Khan; 31.7.96.

3♀♂: Quarry, D.G.Khan; 1.8.96.

2♀♂: Okara; 30.8.96.


2♀♂: Vehari: 10.7.97.


10. 2♂: Head Punjnad, Muzaffar Garh: 12.7.97.

2♂♂: Chishtian, Bahawalnagar: 15.8.97.

2♂♂: Kallar Kahar, Chakwal: 11.10.97.


4♂♂: Khanewal: 31.10.97.


1♀ 3♂♂: Kala Shah Kaku, Sheikhpura: 24.6.98.

2♂♂ collected from Yousaifwala, Sahiwal on 26.6.98.

2♂♂: Samundri, Faisalabad: 16.7.98.

1♀ 1♂: Rabwah, Jhang: 30.7.98.

48♂♂, 21♀♀: Kalim Shaheed Park, Faisalabad: 15.8.98.

1♀ 3♂♂: Khanewal: 30.9.98.

1♀ 1♂: Attara Hazari Jhang: 21.11.98.


*Phidippus indicus*  Tikader, 1974


**Specimens Examined**

52♂♂ 21♀♀: Chak No.31 J.B., Faisalabad: 8.7.96.

4♂♂ 1♀: Chak No.232 J.B., Faisalabad: 12.7.96.

35♂♂ 8♀♀: Chak No.197 R.B., Faisalabad: 19.7.96.

4♂♂ 1♀: Thikarywala, Faisalabad: 10.6.97.
1ε: Head Puj jurad. Muzaffar Garh: 12.7.97.
1ε: Mial. Chakwal: 10.11.97.
Phidippus punjabensis sp. nov.

(Fig. 4 A-L)

**Type Material:** Holotype ♀ and paratype ♂ from Rahim Yar Khan during 1998.

**Etymology:** This specimen was named after the province of the Punjab.

**Diagnosis:** Phidippus punjabensis resembles Phidippus indicus Tikader but differs in external morphological characters as well as in the details of male and female genitalia. As regards male pedipalp, cymbium is larger and prominent; embolus and median apophysis as well as RTA are well developed in the new species as compared to *P. indicus*. In female genitalia spermathecae are rounded; fertilization tubes are convoluted and copulatory openings are prominent as compared to *P. indicus* in which fertilization tubes are straight and spermathecae are elongated.

**Measurements:** ♀ Total length: 6.57 - 8.69mm (7.45 ± 0.65); carapace length: 2.04 3.31mm (2.72 ± 0.41); carapace width: 1.87 - 2.51mm (2.21 ± 0.23); abdomen length: 4.53 5.38mm (4.97 ± 0.28); abdomen width: 1.75 - 2.37mm (2.71 ± 0.68). Leg I: 6.74mm; Leg II: 5.91mm; Leg III: 7.28mm. Leg IV: 7.56mm. Pedipalp: 1.93mm.

**Cephalothorax:** Brownish red; longer than wide; high in front, posterior and lateral sides sloping; cephalic region flat; sides of the anterior and lateral eyes provided with black hair. AME: milky-white and others pearly white; ALE row recurved. Bases of the eyes encircled with conspicuous black patches; eye formula: AME > ALE > PLE > PME. PME very small and situated near the ALE. Fovea absent. Chelicerae cylindrical, one tooth on retromargin and two teeth on promargin. Sternum oval, longer than wide, narrowing in front. In male palp, RTA small; cymbium is broad anteriorly with large spine like hairs; tegulum/bulbus rounded; embolus long tapering anteriorly; median apophysis rounded; sperm duct coiled; legs strong and stout provided with hair and
Fig. 4(A-E) *Phidippus punjabensis*, n.sp.,
A. Body dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae, lateral view, 100x,
D. Pedipalp, lateral view, 100x,
E. Epigynium, internal view 100x,
(rta; retrolateral tibial apophysis, cy; cymbium, bb; bulbus, spd; sperm duct, ma; median apophysis, em; embolus, at; atrium, co; copulatory opening and st; spermatheca)
spines. Spination on legs = Femur I = 0-1-0-0; II = 0-1-1-0; III = 0-1-0-0; IV without
spines. Patella I. II without spines; III = 1-1-0-0; IV = 1-1-0-0. Tibia I = 0-4(2-2)-0-0; II
0-4(2-2)-0-0; III = 2-3-1-0; IV = 1-2-2-0. Metatarsus I = 0-1-0-0; II = 0-2-0-0; III = 2-1-
3-2; IV = 1-1-3-2. Leg formula: 4312.

Abdomen: Dark brown: longer than wide, narrowing posteriorly: black hair on the
dorsum forming a branched tree like structure of strong bushy hairs. Patches of hairs also
present on the both lateral sides of abdomen. Anal tubercle small: posterior spinnerets
larger than the others. Epigynal plate broad: epigastric furrow notched: spermaticae
rounded: fertilization ducts coiled: uterus broad: copulatory openings rounded and
prominent present anteriorly, near the uterus.

Natural History: 9♀ and 2♂ collected from mango tree during 1998 from Khanpur.
Rahim Yar Khan.

Distribution: South Punjab, Pakistan
**Phidippus beautifurcatus** sp. nov.  
(Fig. 5 A-D)

**Type Material:** Holotype ♂ collected from *Acacia arabica* in August 1998 from Faisalabad.

**Etymology:** This species was named after its beautiful mermaid-like appearance.

**Diagnosis:** *Phidippus beautifurcatus* resembles *Phidippus bengalensis* Tikader but can be easily separated from it by the absence of V-shaped black or brown markings on the abdomen which are present in *P. bengalensis*. Instead, three dense-like whitish markings and one inverted U-like structure is present in *P. beautifurcatus*. By comparison, in the male genitalia of *P. beautifurcatus*, RTA, embolus, and median tegular apophysis are very prominent. In *P. bengalensis* ITA and VTA are present which are absent in *P. beautifurcatus*.

**Measurements:** Total length: 6.0 mm; carapace length: 2.61 mm; width: 2.34 mm; abdomen length: 3.44 mm; width: 1.93 mm; Leg I: 7.84 mm; Leg II: 5.9 mm; Leg III: 6.3 mm; Leg IV: 6.74 mm; Pedipalp: 1.95 mm.

**Cephalothorax:** Reddish brown: longer than wide, widest in the middle: posterior and lateral sides sloping cephalic region flat: clothed with fine and long hair. Outer sides of AE provided with conspicuous long black hair. AME and ALE milky white; others are pearly white. AE row recurved. Bases of all the eyes provided with conspicuous black patches. PME: very small and slightly closer to ALE. Eye formula: AME > ALE > PLE > PME. A small deep fovea in the middle of cephalothorax. Base of the cephalothorax provided with two bands of thick black hair originating from the central tuft and leading towards the periphery. Chelicerae moderately developed with one tooth on the retromargin and two teeth on the promargin: chelicerae somewhat scapulated: fang small
Fig. 5(A-D) *Phidippus beautifuracatus* n.sp.,

A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae, lateral view, 100x,
D. Pedipalp, lateral view, 100x,

(rta; retrolateral tibial apophisis, cy; cymbium, bb; bulbus, ma; median apophysis and em; embolus)
and sharply pointed. Sternum nearly oval, narrowing in front labium basket shaped and maxillae strongly bent with scopulae. Legs clothed with hair and spines. Leg I and II more robust than III and IV. Leg formula: 14:3:2.

In the male palp, cymbium is cylindrical having a thick fringe of spine like black hair on the outer periphery. RTA well developed embolus long and curved; median tegular apophysis tubular; tegulum/bulbus oval, spermatheca duct coiled.

**Abdomen**: Longer than wide; narrowing behind and notched anteriorly; deep brown patches and black hair cover the abdomen. Three lens like plates and one inverted U-like structure are prominent. Anal tubercle short and prominent. Posterior spinnerets butterfly like and longer than the rest; ventrum brown with dark patches.

**Natural History**: Holotype & collected from Siris tree during August 1998 from Faisalabad.

**Distribution**: Central Punjab.

**Genus Rheone Thorell, 1869**


(Platnick, 2006) listed 47 species of the genus *Rhene* Thorell from the world. Shabbir (1997) and Fatima (1999) recorded one species of this genus from Pakistan. During present study, three already known species were recorded from various localities of the Punjab.

**Type species:** *Rhene flavigera* (C.L. Koch, 1846).

**Distribution:** Europe, Africa, Asia, Central and South America.

*Rhene indicus*  
**Tikader, 1973**


During present study, this species was recorded from various localities of Punjab.

**Material Examined**

34♀♀, 18♂♂: Kalim Shaheed Park, Faisalabad: 10.8.97.

1♀: Kala Shah Kaku, Sheikhupura: 24.6.98.

6♀♀: Kalim Shaheed Park, Faisalabad: 15.8.98.


2♀♂: Leiah: 22.11.98.
Rhene decoratus  Tikader, 1977


This species has been recorded from various localities in the Punjab during the present study.

Material Examined

6♂♂, 2♀♀: Chak No.232 J.B., Faisalabad: 12.7.96.


27♂♂, 9♀♀: Vehari; 10.7.97.


1♂, 2♀♀: T.T. Singh: 15.6.98.

4♂♂: Kalim Shaheed Park, Faisalabad: 15.8.98.

6♂♂: Khanpur, Rahim Yar Khan: 15.9.98.

Rhene danieli  Tikader, 1973


This species has been recorded from Pakistan by Shabbir (1997) from Sialkot and Fatima (1999) from Faisalabad.

**Material Examined**

1♂: Chak No. 31 J.B., Faisalabad; 8.7.96.

20♀♀: Kalim Shaheed Park, Faisalabad: 29.7.96.


7♀♀, 1♂: Kalim Shaheed Park, Faisalabad: 15.8.98.

**Genus Thiania**  C.L. Koch, 1846


The genus *Thiania* C.L. Koch has 16 species in the world (Platnick, 2006). Dyal (1935) and Shabbir (1997) recorded two species from Lahore and Sialkot. During present study, one species was recorded from various localities.

**Type Species:** *Thiania pulcherrima* (C.L. Koch, 1846)

**Distribution:** Asia, Europe, New Guinea, Hawaii.
Thania aura  Dyal, 1935


This species is endemic to Pakistan. Dyal (1935) recorded it for the first time from Lahore. Later on Shabbir (1997) reported it from Sialkot.

Material Examined

32♀♂. 6♂: Thikarywala. Faisalabad: 10.6.97.


4♀♂: Chishian Bahawalnagar: 15.8.97.

2♀♂: Rawalpindi; 1.9.97.

36♀♂. 12♂: Khanewal: 30.9.98.

7♀♂. 1♀: Lelia: 21.11.98.

Genus Salticus Latreille, 1804


Type species: *Salticus scenicus* Clerck

Distribution: Europe, America, Asia

Salticus ranjitus Tikader, 1967


Specimens Examined

12♀♂. 6♂: Chak No.31 J.B. Faisalabad: 8.7.96.

1♀: Chak No.232 J.B. Faisalabad: 12.7.96.
19 Judge, 14: Kalim Shaheed Park, Faisalabad: 20.7.96.
1 Judge, 1: Jhang: 20.5.97.
2 Judge, 1: Muzaffar Garh: 11.7.97.
1 Judge: Head Punjab, Muzaffar Garh: 12.7.97.
1 Judge: Rawal Dam, Rawalpindi: 1.9.97.
4 Judge: Kallar Kahar, Chakwal: 11.10.97.
2 Judge, 1: Jahanian, Khanewal: 31.10.97.
4 Judge: Mial. Chakwal: 10.11.97.
2 Judge, 4: Booraywala. Vehari: 18.6.98.
1 Judge: Kala Shah Kaku, Sheikhpura: 24.6.98.
2 Judge, 2: Samundri: 16.7.98.
52 Judge, 15: Kalim Shaheed Park, Faisalabad: 15.8.98.
5 Judge: Khanpur, Rahim Yar Khan: 15.9.98.
4 Judge: Jahanian, Khanewal: 30.9.98.
2 Judge, 5: Head Tarimun, Jhang: 21.11.98.
29 Judge, 9: Leiah: 22.11.98.

**Genus Plexippus**    C.L. Koch, 1846


Butt (1996) recorded one species of this genus from Faisalabad, which according to him was new to the science. Shabbir (1997) recorded three species, one known and two new species of this genus from Chakwal and Sialkot.

Plumier (2006) listed 36 species of the genus from the world. Dyal (1935) recorded one species of the genus from Lahore. Arshad et al. (1984), and Khatoon (1985-86) also recorded the same species from Pakistan. During present study, three species of this genus were recorded; of which one species was regarded as new to science.

**Type Species:** *Plexippus paykullii* (Audouin, 1826)

**Distribution:** Cosmopolitan

*Plexippus paykullii*  
**Audouin, 1826**


Dyal (1935) recorded this species from Lahore. It was reported from NWFP (Arshad et al., 1984): Attock (Khatoon: 1985-86) and Faisalabad (Mushtaq et al., 2000). During present study, it was recorded from all over Punjab.

**Material Examined**

26♀♂. 15♂♂: Chak No.31 J.B., Faisalabad: 8.7.96.


76♀♂. 25♀♂: Kalim Shaheed Park, Faisalabad: 20.7.96.

1♀: Thikarywala; 10.6.97.

173♀♂. 27♂♂: Mailsy, Vehari: 10.7.97.

44♀♂. 35♂♂: Muzaffar Garh: 11.7.97.


14♀♂: Chishtian, Bahawalnagar: 15.8.97.

23♀♂. 15♂♂: Harappa, Sahiwal: 15.7.98.


180♀♂. 26♂♂: Kalim Shaheed Park, Faisalabad: 15.8.98.

91♀♂. 1♂: Khanpur, Rahim Yar Khan: 15.9.98.
19♀♂ Khanewal: 30.9.98.

1♂ Head Tarimun, Jhang: 21.11.98.

22♀♂, 1♀♂: Leah; 22.11.98.

**Plexippus bengalensis** Tikader, 1974


**Material Examined**

31♀♂, 11♂: Kalim Shaheed Park, Faisalabad: 15.8.98.
Plexippus similis sp.nov.
(Fig.6 A-D)

**Type Material:** Holotype ± specimen collected from Chakwal during October 1997.
Paratype ± with same data collected from Loquat tree.

**Etymology:** This species was named due to its greater similarity with *Plexippus paykullii* Audouin.

**Diagnosis:** *Plexippus similis* is similar to *Plexippus paykullii* Audouin but can be separated from it. Fovea is prominent; epigynal plate is broad; and fertilization tubes coiled forming conical black sacs in *P. similis* whereas in *Plexippus paykullii* epigynal plate is elongated with straight fertilization tubes.

**Measurements:** Total length: 6.98 – 8.79mm (7.9 ± 0.57); carapace length: 3.07 ± 0.45; carapace width: 1.47 mm; abdomen length: 2.90mm (2.54 ± 0.65); abdomen width: 3.58 – 4.50mm (4.06 ± 0.35); abdomen width: 1.54 – 3.02mm (2.23 ± 0.48); Leg I: 9.08mm; Leg II: 8.53mm; Leg III: 8.39mm; Leg IV: 10.18mm; Pedipalp: 3.03mm.

**Cephalothorax:** Longer than wide, dark brown, blackish in ocular area; clothed with fine grey and black hair; cephalic area flat. All row slightly recurved: PME very small, situated equidistant between AL1 and PL1. AME milky white, rest are pearly white. A cylindrical whitish patch behind the AME and a balloon like pale patch behind the fovea.

**Eye Formula:** AME = AL1 = PL1 = PME. fovea distinct; chelicerae moderate, robust; fang curved and pointed at the tip, retro margin with one tooth, promargin with two teeth; maxillae tubular and transverse with a fringe of long hairs on the inner boarder; labium small and triangular; both labium and maxillae scopulated; sternum somewhat oval, narrow behind, pale yellow in colour and sparsely hairy. Legs long and stout provided with hair and spine. 1st pair e.g. legs robust, all the legs pale brown. Spination: Femur I &
Fig. 6 (A-D) *Plexippus similis*, n.sp.

A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae lateral view,
D. Epigynum, internal view 40x,

(at; atrium, ft; fertilization duct, ut; uterus and st; spermatheca, co; copulatory duct)
III without spines. IV=0-0-2-0: Patella:1=1-1-0-0: II=1-1-0-0: II=1-1-0-0: IV=1-0-0-0.
formula: 4123.

Abdomen: Dark brown, longer than wide; broadest in the middle; frill of thick coating of
hair on both the sides of abdomen; central region lighter in colour; thick spines scattered
all over the abdomen; spinnerets conspicuous and hairy; posterior spinnerets longer than
others. Epigynal plate elongated: divided in two halves, spermathecae saes small and
rounded; fertilization ducts slightly convoluted forming upper blackish conical saes.
Copulatory ducts opening at the base far from each other.

Natural History: 2♀♂ collected from Loquat tree, Erubsyra japonica during October
1997 from Kallar Kahar, Chakwal.

Distribution: North Punjab, Pakistan.

Genus Habrocestum  Simon, 1876

        Arigona Edu/Proszynski/html.

Dyal (1935) recorded and described 4 species of this genus for the first time from
different localities of Lahore, Punjab, Pakistan. Shabbir (1997) recorded one species
*Habrocestum coronatum* from Chakwal. During present study one species of this genus was recorded from various localities.

*Habrocestum coronatum*  
Peekham, 1887


**Material Examined**

14♂♂, 6♀: Chak No. 232 J.B., Faisalabad: 12.7.96.

7♀♀: Kalim Shaheed Park, Faisalabad: 20.7.96.

2♀♀: Gujranwala: 27.9.96.


2♀♀: Rawal Dam, Rawalpindi: 1.9.97.

4♀♀: Chakwal: 10.11.97.

9♀♀: Khampur, Rahim Yar Khan: 15.9.98.

10♀♀: Loha: 21.11.98.
Family SPARASSIDAE Bertkau, 1872
(Huntsman or Giant Crab Spiders)


The family Sparassidae Bertkau is a senior synonym of both Heteropodidae and Eusparassidae (Jager, 1999). It has 83 genera and 989 species (Platnick, 2006). In Pakistan this family has been studied by Dyak (1935); Arshad et al. (1984) and Khatoon (1985-86). During present study two genera and two new species have been described.

The family Sparassidae Bertkau is a senior synonym of both Heteropodidae and Eusparassidae (Jager, 1999). This family is represented by 83 genera containing 998
species (Platnick, 2006). This family in Pakistan was studied by Dyal (1935), Arshad et al. (1984) and Khatoon (1985-86).

Genus *Heteropoda* Latreille, 1804


This large genus includes 182 species (Platnick, 2006). Dyal (1935) and Khatoon (1985-86) recorded this genus from Lahore and Islamabad respectively. During present study, one species of this genus was recorded which is regarded as new to science.

**Type Species:** *Heteropoda venatoria* (Linnaeus, 1767)

**Distribution:** Asia, Africa, Europe, Australia, New Guinea, America.
**Heteropoda qadri sp. nov.**

(Fig. 7 A-D)

**Type Material:** Holotype ♂ collected from *calyptrus citriodora*, Kalim Shaheed Park, Faisalabad on 10.8.97.

**Etymology:** This species was named after Mr. Abdul Qadir who always sincerely helped me in my research work.

**Diagnosis:** *Heteropoda qadri* resembles *Heteropoda venatora* (Linnaeus) but can be distinguished from it by the absence of fovea; presence of two pairs of sigilla on the abdomen; in male pedipalp RTA small; absence of tibial apophysis; embolus long and median tegular apophysis is present.

**Measurements:** Total length: 9.1mm; carapace length: 3.00mm; width: 4.0mm; abdomen length: 6.0mm; width: 3.50mm; Leg I: 25mm; Leg II: 28.0mm; Leg III: 19.0mm; Leg IV 18.50mm; Pedipalp: 9.00mm.

**Cephalothorax:** Wider than long; slightly flat; yellow with a brown double band in the center. Fovea indistinct; sternum yellow, pointed behind; having long hairs on the upper margin, eyes white with black rims. AI: and PL both recurved. ME closer to I.E than to each other. Eye formula: AME > ALI > PME > PLE. Labium wider than long, yellowish brown; maxillae reddish brown, both have distinct scopulae; chelicerae stout, chocolate brown, with four teeth on the retromargin and two teeth on the upper margin; fand strong, elongated and curved; legs yellow, scopulae black, spiny and hairy. Leg formula: 2134. Labial palp yellow with black tibial apophysis. RTA strong and sclerotized; short and pointed; cybium pointed anteriorly; provided with a tuft of bristles; tegulum/bulbus oblong; embolus black and short; median apophysis present; ejaculatory duct prominent and thick. Spination on legs: Femur I = 3-1-2-2; II = 0-2-1-1; III = 0-1-1-1; IV 0-1-1-1.
Fig. 7 (A-D) *Heteropoda qadri* n.sp.

A. Body dorsal view, 40x,
B. Sternum, labium and maxillae, ventral view, 80x,
C. Chelicerae, lateral view, 80x,
D. Male palp, ventral view, 100x,

(rta; retrolateral tibial apophysis, cy; cymbium, bb; bulbus, spd; sperm duct, ma; median apophysis and cm; embolus)
Patella: without spines; Tibia = 1: 1-0-1-1; II = 1-0-3-4 (2-2); III = 0-2-1-0; IV = 2-2-2-2; Metatarsus = 1 = 0-2-2-2; II = 1-2-2-2; III and IV without spines. Leg formula: 2134

Abdomen: Longer than wide, broad anteriorly, pointed posteriorly, widest at the middle; yellowish brown, with two pairs of sigilla in middle; covered with hairs.

Natural History: Holotype collected from lemon scented gum, *Eucalyptus citriodora* on 10.8.97 from Kalim Shaheed Park, Faisalabad.

Distribution: Central Punjab, Pakistan.

**Genus Olios Walekenaer, 1837**


Platnick (2006) listed 259 species of this widely distributed genus. Dyal (1935). Arshad *et al.* (1984), Khatoon (1985-86) reported this genus from Lahore, Peshawar and NWFP respectively. During present study, one species of this genus was collected which was regarded as new to science.
Type Species: *Olios argelasius* (Wajckenaer. 1805)

Distribution: Cosmopolitan.
**Olios narwaliensis sp.nov.**
(Fig.8 A-D)

**Type Specimen:** Holotype - collected from Date-Palm in Chak No.232 Narwala Road, Faisalabad on 12.7.96; paratype - collected from Younaswala Maize Farm Sahiwal during June 1998.

**Etymology:** This species has been named after the type locality which is situated near Narwala Bangla, Faisalabad.

**Diagnosis:** *Olios narwaliensis* resembles *Olios perezi* Barrion and Litsinger but can be distinguished from it as AE row procurred, PME close to PLE: four teeth on the retromargin and two on the promargin in the new species whereas in *O. perezi* there are two promarginal and five retromarginal teeth on the chelicerae. Absence of a half moon like structure in the anterior and inverted V-shaped anterior of epigastric furrow in the new species.

**Measurements:** Total length: 22.8 - 23.0mm (22.9 ± 0.14); carapace length: 8.1 - 8.5mm (8.3 ± 0.28); carapace width: 7.89 - 9.00mm (8.44 ± 0.81); abdomen length: 13.73 - 14.00mm (8.83 ± 0.21); Leg I: 20.63mm; Leg II: 22.55mm; Leg III: 16.09mm; Leg IV: 17.88mm. Pedipalp: 5.80mm.

**Cephalothorax:** Wider than long; cephalic area dark brown to blackish; thoracic area yellow brown; cephalic area much hairy; cephalic area with well-defined boundary from thoracic area marked by setae. Fovea short and black nearly at the base of cephalothorax clypeus high; eight eyes in two rows. AE row procurred. PE row recurved; eye area well marked with setae, particularly posterior and laterals of PLE, inner side of ocular quadrangle, between PME and PLE, similar to those in clypeus. Eye formula PME > AME > ALE > PLE; chelicerae large, stout, blackish brown; much hairy, with four teeth
Fig. 8 (A-D) Olios narwaliensis n.sp.

A. Body, dorsal view, 8x,
B. Sternum, labium and maxillae, ventral view, 16x,
C. Chelicerae, lateral view, 16x,
D. Epigynum, internal view, 20x,

(at; atrium, ft; fertilization duct, co; copulatory opening and st; spermatheca)
in the retromargin and two teeth in the promargin; sternum pointed, yellowish brown with dark brown spots. Labium and maxillae blackish brown with prominent thick scopulae. Legs pale brown with reddish spots spiny and banded; tarsus and metatarsus much hairy.

Spination: on legs = Femur = 1-3(1-1)-1-0-0; II = 3(1-1-1)-3(1-1-1)-0-0; III = 3(1-1-1)-3(1-1-1)-2-0; IV = 3(1-1-1)-1-0-0; Patella = 1 = 2(0-1-1)-0-0-2-2. II, III & IV without spines; Tibia = 1 = 2-1-2-2; II = 1-2(1-0-1)-0-0; III = 2-2-0-2; IV = 1-0-1-1. Metatarsus: I = 3-0-1-0; II = 0-2-0-0; III = 2-2-0-0; IV = 1-1-0-0. Leg formula: 2143.

Abdomen: Longer than wide, blackish brown, with dark spots and long hairs. Seven groups of thick setae originate from the anterior margin of abdomen and cover the base of cephalothorax. Abdomen uniformly yellow and covered with long hairs. Anal tubercle hairy and prominent. Spinnerets yellow with long hairs. Posterior spinnerets larger than the others. Epigynal plate longer; kidney shaped; spermathecae large and kidney shaped and joined at the base with inverted V-shaped septum scape narrow and hairy: fertilization tubes opening anteriorly; copulatory openings at the base near the epigastric furrow.

Natural History: Holotype ♂ was collected from the data-palm in a house in Chak No.232 Narwala Road, Faisalabad on 12.7.96; one paratype ♀ was collected from the maize field in Younaswala Maize Farm Sahiwal during June 1998.

Distribution: Central and Eastern Punjab
Family PHILODROMIDAE  Walckenaer, 1825


Previously Philodromidae was treated as a sub-family of thomisidae but removed from the Thomisidae by Homann (1975). The family Philodromidae is represented by 29 genera and 516 species worldwide (Platnick. 2006). This family has been studied in Pakistan by Simon (1897), Shabbir (1997) and Fatima (1999). During present study two genera and four species have been recorded: of which 2 species are a new record and one species is considered as new to science.
Genus *Philodromus* Walkenaer, 1826


The genus *Philodromus* Walckenaer is represented by 244 described species on world basis (Platnick, 2006). Shabbir (1997) reported two species of this genus from Chakwal. Fatima (1999) recorded five species of this genus from the Punjab. During present study three species were recorded: of which 2 species is a new record.

**Type Species:** *Philodromus aureolus* (Clerck, 1757)

**Distribution:** Cosmopolitan
**Philodromus domesticus** Tikader, 1962


Fatima (1999) recorded this species from Faisalabad. During present study, it has been recorded from various localities.

**Material Examined**


14♀️♀️. 8♂️♂️: Kalim Shaheed Park. Faisalabad: 15.8.98.


16♀️♀️: Leiah: 22.11.98.

**Philodromus devhutai** Tikader, 1966


This species has been recorded for the first time from Pakistan.

**Material Examined**

17♀️♀️. 5♂️♂️: Mīyal Chakwal: 10.11.97.


4♂️♂️: Leiah: 22.11.98.
*Philodromus kianganensis*  Barrion and Litsinger, 1995


This species is a new record to Pakistan.

**Material Examined**

1♂: Chak No.269 J.B., Jhang: 11.4.98.


1♀: Rabwah, Jhang: 11.4.98.

**Genus *Tibellus*  Simon, 1875**


*Tibellus* Simon comprised 49 species with wide distribution (Platnick, 2006). This genus has been recorded by Fatima (1999) from Faisalabad, Pakistan. During present study one species is reported which is considered as new to science.

**Type Species:** *Tibellus oblongus* (Walckenaer, 1802).

**Distribution:** Europe, North and South America, Africa, Asia, Australia.
Tibellus islamabadensis sp.nov.
(Fig.9 A-D)

Type Material: Holotype ♂ specimen from Islamabad collected on 1.9.97; 3 paratype ♂♂ with same data; 2 paratype ♂♂ from Rawalpindi collected on 1.9.97.

Etymology: This species has been named after its type locality, Islamabad.

Diagnosis: Tibellus islamabadensis is close to Tibellus elongates Tikader but can be separated from it by the following characters. Tibellus elongates has margin of clypeus with eight spines whereas in Tibellus islamabadensis clypeus is covered with hair and spine. There are no pigmented dots on the legs of T. islamabadensis. Abdomen is not cylindrical and pattern of the dorsum is quite different in both the species. Spermathecae are bean-shaped in T. elongates while it almost rounded in T. islamabadensis. The copulatory tubes are S-shaped in T. elongatus while they are straight in T. islamabadensis. The anterior boarder of the epigynum is covered by elongated hair which are absent in T. elongatus.

Measurements: No. of specimens measured: 4; total body length: 5.42 - 7.51 mm (6.41 ± 1); carapace length: 1.80 - 2.75 mm (2.25 ± 0.65); carapace width: 1.98 - 2.50 mm (2.15 ± 0.36); abdomen length: 2.99 - 4.76 mm (4.04 ± 0.77); abdomen width: 1.22 - 2.53 mm (1.95 ± 0.61).

Cephalothorax: Longer than wide, narrow in front, reddish brown, fovea insignificant, one middle and two longitudinal brown bands extending from ocular area to the base of the cephalothorax; AE row close, recurved, equal, ME closes to the laterals, anterior four eyes and posterior two median eyes form a small hexagonal area, the PLE removed from other eyes. Sternum reddish brown and heart-shaped, boardered with hairs, labium and maxillae reddish brown with normal scopulae. Legs stout covered with spines and hair.
Fig. 9 (A-E) *Tibellus islamabadensis* n.sp.

A. Body, dorsal view, 20x,
B. Labium and maxillae, ventral view, 40x,
C. Chelicerae, lateral view, 40x,
D. Epigynum, 40x,
E. Internal genitalia, 100x,

(at; atrium, ft; fertilization duct, co; copulatory opening and st; spermatheca)
Chelicerae reddish brown, hairy and with two teeth on the retromargin. Spination on legs: Femur I 0-2-1-0; II=0-1-0-2; III=0-2-1-1; IV=0-1-1-1. Patella: I&IV without spines. II=0-0-0-1; III=0-0-1-0: Tibia I=1-1-3(1-1-1)-0; II=3(1-1-1)-3(1-1-1)-3(1-1-1)-0; III=2(1-1)-2(1-1)-3(1-1-1)-3(1-1-1)-1-1; IV=1-3(1-1-1)-3(1-1-1)-3(1-1-1)-1-1; Matarsus=1=2(1-1)-1-3(1-1-1)-0; II=3(1-1-1)-2(1-1)-5(2-2-2)-4(2-2)-III=3(1-1-1)-1-6(2-2-2)-5(2-2-1); IV=2-3(1-1-1)-6(2-2-2)-5(2-2-1): Tarsus without spines. Leg formula: 2143.

Abdomen: Long, spined, narrow behind, slightly overlapping, central brown band with three pairs of sigilla is present mosaic pattern on either side of the abdomen. Ventral side also has a brown patchwork, otherwise yellow in colour. Both sides are much hairy. Epigynum sclerotized: spermathecae rounded: fertilization tubes covering the outer border of spermathecae and opening at the base of the epigastric plate (Fig.34-D and F).

Natural History: Four female specimens were collected from roses plant. *Rosa indica* from Islamabad: Rose Jasmine Garden on 1.9.97: 2 female specimens were collected from ornamental plants in Rawalpindi on 1.9.97.

Distribution: North Punjab
Family THOMISIDAE  Sundevall, 1833
( Crab Spiders)


This is a large family containing 2024 species belonging to 170 genera in the world (Platnick, 2006). In Indo-Pakistan sub-continent, family Thomisidae Sundevall was studied by Cambridge (1885) and Dyal (1935). Arshad et al. (1984), Khatoon (1985-86), Ilamood (1993) and Fatima (1999) made considerable contribution to this family in

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Pakistan. During present study, 16 species under four genera were recorded; of which one species was considered as new to science. Three genera were a new record to Pakistan.

**Genus Thomisus** Walekenaer, 1805


There are 122 known species of this genus (Platnick, 2006). Dyal (1935) recorded three species of the genus including one new species from Lahore. Arshad *et al.* (1984) recorded two new records from Peshawar. Khatoon (1985-86) reported two known species from Islamabad. Hameed (1993) and Fatima (1999) recorded this genus from Faisalabad. During present study 12 species belonging to this genus were recorded, of which one species was considered to be new to science.

**Type species:** *Thomisus onusius* (Walekenaer, 1805)

**Distribution:** Europe, Africa, Asia, Australia and America.
Thomisus lobosus  Tikader, 1965


Material Examined

1♀: Okara; 30.8.96.

21♂♂, 8♀♀: Gujranwala; 27.

1♀♂: Khanewal; 31.10.97.

1♀♂: Harrappa. Sahiwal; 15.7.98.

2♀♂, 1♀♂: Head Trimun; 21.11.98.

34♀♀, 4♀♀♂: Leiah; 22.11.98.

Thomisus andamanensis  Tikader, 1980


Material Examined


12♀♂, 7♀♀: Kalim Shaheed Park. Faisalabad; 20.7.96.


2♀♂: Chak No.269 J.B., Jhang; 12.4.98.

1♂♂: Chak No.31 J.B., Faisalabad; 8.7.98.

23♀♀, 5♀♀♂: Leiah; 22.11.98.

Thomisus projectus  Tikader, 1960


Material Examined

21♀. 6♂♂: 269 J.B. Jhang; 11.4.98.
1♀: Khanewal; 31.9.98.
2♀♂. 1♂♂: Leiah; 22.11.98.

*Thomisus sikkimensis* Tikader, 1962


Material Examined


*Thomisus dhakuriensis* Tikader, 1960


Material Examined

3♀♂: Head Trimmu; 21.11.98.
4♀♂ collected from Leiah on 22.11.98.

*Thomisus sorajii* Basu, 1963


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Material Examined

1♀♂: Kalim Shaheed Park, Faisalabad: 20.7.96.


3♂♂: Leiah: 22.11.98.

*Thomisus pugilis*  Stoliczka, 1869


In Pakistan, this species was recorded from Lahore (Dyal, 1935), Peshawar (Arshad *et al.*, 1984), Islamabad (Khatoon, 1985-86) and Faisalabad (Hameed, 1993). During present study this species has been recorded from various localities of Punjab.

Material Examined


12♀♂: Chakwal (Mial): 10.11.97.


1♂: Kala Shah Kaku, Sheikhpura: 24.6.98.
Thomisus bulani  Tikader, 1960


Material Examined


7♀♂: Head Tarimun: 21.11.98.

2♀♂: Leiah: 22.11.98.

Thomisus cherpunjeus  Tikader, 1966


Fatima (1999) recorded it from Faisalabad. During present study, it was collected from Faisalabad, Gujranwala, Rahim Yar Khan & Leah.

Material Examined

4♀♂; Chak No.31 J.B., Faisalabad: 8.7.97.

3♀♂, 1♂♀; Gujranwala: 27.9.96.

♂; Thikarywala, Faisalabad: 10.6.97.

♀; Rahim Yar Khan: 12.9.98.

8♀♂, 1♂♀; Leah: 21.11.98.

*Thomisus elongatus* Stoliczka, 1869


Material Examined

33♀♂, 9♂♀; Chak No.31 J.B., Faisalabad: 9.7.96.

4♀♂, 1♂♀; Chak No.232 J.B., Faisalabad: 12.7.96.

♂; Chak No.197 R.B., Faisalabad: 18.7.96.

2♀♂; Okara: 30.8.96.

♀; Gujranwala: 27.9.96.

♀; Govt. College (W), Jhang: 20.5.97.

♀♂; Thikarywala, Faisalabad: 10.6.97.

♀; Malik, Vehari: 10.7.97.

2♂♂; Islamabad: 1.9.97.
1♂: Sialkot: 6.10.97.

3♀♀: Malik Chakwal: 10.11.97.

3♀♀: Kalim Shaheed Park, Faisalabad: 15.8.98.

3♀♀: Leiah: 22.11.98.

Thomisus okinawensis  Strand, 1907


Material Examined

2♀♀. 1♂: Chak No.31 J.B., Faisalabad: 9.7.96.


1♂♂: Kalim Shaheed Park, Faisalabad: 20.7.96.

15♀♀. 11♂♂: Chak No.269 J.B., Jhang: 12.4.98.


4♀♀: Leiah: 22.11.98.
**Thomisus zaheeri** sp. nov.
(Fig. 10 A-I)

**Type Material:** Holotype ♀ collected from *Helianthus annus* on 20-7-97 from Faisalabad; Paratype ♂ with same data.

**Etymology:** This species was named as a reverence to my teacher, Dr. Zaheer Ahmad

**Diagnosis:** *Thomisus zaheeri* resembles *T. sikkimensis* and *T. okinawensis* strand to some extent but can be separated from both the species. Black transverse bands on tibia and tarsus I only. Tarsus claw and tuft is prominent. In female genitalia spermathecae are rounded with inverse S-shaped fertilization tubes. Copulatory opening present on the lower side rather than on the upper side as in *T. okinawensis*. ITA and VTA absent; median tegular apophysis and apical tegular apophysis present. A tuft of hair is present in the uterus.

**Measurements:** Total length: 4.27; carapace length: 1.79mm; width: 1.90mm; abdomen length: 2.48mm; width: 2.31mm; Leg I: 7.6mm; Leg II: 7.29mm; Leg III: 4.40mm; Leg IV: 4.54mm; Pedipalp: 1.79mm.

**Cephalothorax:** Cephalothorax wider than long; broadest posteriorly; yellowish brown except with a central longitudinal lighter area from which arise ridges of black hair towards the periphery. Ocular area encircled by a yellowish brown triangle; eyes black. Clypeus long. Eight eyes in two rows: shorter AE row; more recurved than PLE row and lateral eyes in the tubercle by formula: PML > ALE > AME > PLE. MOQ much broader behind than in front, length equal to one half of posterior width. Sternum longer than wide, anterior margin concave. Lateral margins without concavities opposite each coxa and posterior end rounded; labium oval, maxillae cylindrical, broader behind; both maxillae and labium are scopulated and yellowish brown. Chelicerae yellowish brown.
Fig. 10(A-I) *Thomisus zaherii* n.sp.,

A. Body dorsal view 12x,
B. Labium and maxillae, ventral view, 160x,
C. Chelicerae, ventral view, 160x,
D. Position of eyes 64x,
E. Ist/leg 12x,
F. Male palp, lateral view 250x,
G. Male palp, ventral view, 160x,
H & I Epigynum, interal view 250x and 160x,

(rta; retrolateral tibial apophysis, cy; cymbium, bb; bulbus, spd; sperm duct, ma; median apophysis, em; embolus, at; atrium, co; copulatory opening and st; spermatheca)

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fang thick stout, curved and pointed anteriorly three strong spines near the base of the fang on the promargin chelicerae without teeth. Legs light brown with blackish brown bands in the subapex of tibia and tarsus and base of patella. Tarsi two clawed, with at least three spines on the metatarsus and three spines on the dorsum of tibia and two spines on the pro-lateral boarder of the tarsus three teeth in each claw of tarsi I. Leg formula 1243: pedipalp longer than femur I. Tibia with short stout RTA. ITA absent. VTA not prominent: tegulum rounded. Tegular apophysis and median tegular apophysis present: embolus stout and pointed downward: cymbium narrow with an apical tuft of hair. Sperm duct coiled. Spination on legs: Femur I = 0-2-1-1; II = 0-2-0-0; III & IV = without spines; Patella = I, II, III without spines; IV = 0-0-1-0; Tibia = I = 0-0-2-0; II = 0-0-2-0; III = without spines; IV = 0-0-2-0. Metatarsus = I = 0-0-4(1+1+1+1)-0; II, III and IV without spines. Leg formula: 1243.

Abdomen: Yellow brown, with a central tree-like blackish patch covering two thirds of the central region with four black spots in the broadest area of abdomen: abdomen pentagonal, slightly overlapping the posterior region of cephalothorax in front: broadest just behind the middle, tapering to the anal tubercle. Posterior end with conspicuous transverse, muscular corrugation or striations. Ventral yellow-brown with a central brown band. Posterior pair of spinnerets widely separated. Epigynal plate broad, scape broad and hairy: spermathecae globular with coiled spermathecal ducts: fertilization tubes in the form of inverted S: copulatory opening in the middle.

Natural History: Holotype ♂ and paratype ♀ collected from sunflower plant in Kalim Shaheed Park, Faisalabad on 20.7.97.

Distribution: Central Punjab.
**Genus Oxyptila**  Simon, 1940


**Oxyptila chandosiensis**  Tikader, 1980


**Material Examined**


**Genus Synaema**  Simon, 1864


**Synaema decorata**  Tikader, 1960


**Material Examined**

1♂: Chak No.31 J.B., Faisalabad; 9.7.96.

**Genus Xysticus**  Koch, 1835


**Xysticus minutus**  Tikader, 1962

Material Examined


6♀♂: Leah: 22.11.98.

1♀: Shahkot. Sheikhpura: 25.6.98.

7♀♂: Kalim Shaheed Park. Faisalabad: 15.8.98.

28♀♂. 12♂♂: Leah: 15.8.98
Family GNAPHOSIDAE  Pocock, 1884


Genus Gnaphosa  Latreille, 1804


Genus Gnaphosa  Latreille, 1804


Faisalabad. 84-88.

**Distribution**: Asia, Europe, Africa, North & South America.

**Types species**: *Gnaphosa lucifuga* (Walekenaer)

*Gnaphosa poonaensis* Tikader, 1973


Previously this species has been recorded by Qadir (1997) and Gill (1999).

During present study this species has been recorded from various localities of the Punjab.

**Material Examined**

1♀: Khanpur, Rahim Yar Khan; 12.9.98.

53♀♀-♂♂; Kalim Shaheed Park, Faisalabad; 15.8.98.

22♀♀-♂♂; Thikarywala, Faisalabad; 10.6.97.

1♂; Harappa, Sahiwal; 15.7.98.

2♀♀; Rukh Khairaywali Leliah; 20.11.98.

2♂♂; Attaira Hazari, Jhang; 21.11.98.

*Gnaphosa jodhpurensis* Tikader & Gajbe, 1977

This species has been recorded for the first time from the Punjab, Pakistan.

Material Examined

1♀♂: Bahadar nagar Okara; 21.11.98.


2♀♂: Chak No.31 J.B. Faisalabad; 9.7.96.

Genus Callilepis Westring, 1851


Type species: Callilepis nocturna (Linnaeus)

Distribution: Europe, Arabia, Ethiopia, Africa, Australia, America, Asia.

Callilepis rajasthanicus Tikader & Gajbe, 1977


This is a new record from the Punjab, Pakistan.

Material Examined

1♀: Kalim Shaheed Park, Faisalabad; 10.7.97.

Callilepis lambai Tikader & Gajbe


This species is a new record from the Punjab, Pakistan.

Material Examined

4♀♂: Kalim Shaheed Park, Faisalabad; 15.8.98.

2♀♂: Thikarywala; 10.6.97.
*Callilepis khairiensis* sp.nov.
(Fig. 11 A-D)

**Type Material:** Holotype ♂ collected from Rukh Khairaywali, Leiaha on 21.11.98.

**Etymology:** This species has been named after its locality, Rukh Khairaywali.

**Diagnosis:** *Callilepis khairiensis* is close to both *Callilepis rukminiae* Tikader and Gajbe and *Callilepis rajasthanicus* Tikader and Gajbee but can be differentiated from both: the structure of chelicerae is different: in *C. rukminiae* there is no serrated ridge and in *C. rajasthanicus* there is no tooth on the chelicerae. Female Epigynum is totally different from *C. rukminiae*. The epigynum the new species is different from *C. rajasthanicus* by the presence of rounded spermathecae in the middle with conducted copulatory ducts which are not C-shaped in *C. rajasthanicus*. The uterus is much broad whereas in *C. rajasthanicus* it is quite narrow anteriorly.

**Measurements:** Total length: 6.5mm; carapace length: 2.61mm; width: 2.06mm; abdomen length: 3.85mm, width: 2.2mm; Leg I: 10.18mm; Leg II: 9.9mm; Leg III: 9.65mm; Leg IV: 12.93mm. Pedipalp: 2.75mm.

**Cephalothorax:** Longer than wide, narrowing in front, slightly convex; posterior middle provided with a distinct fovea. Yellowish brown, central region with dark butterfly like bands. AF row slightly procured: ME slightly small than the laterals, and closer to the laterals than to each other. PE row slightly recurved, and longer than the AE row. PMI conspicuously silvery white in colour, oval, smaller than the laterals and closer to the laterals. MOQ slightly wider anteriorly. A tuft of long black bristle project near the AF row towards the outside. All the eyes have black rims. Eye formula: PLE > ALE > AME > PME.
Fig. 11 (A-D) Callilepis khairiensis n.sp.

A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae, Ventral view, 1
C. Chelicerae, lateral view, 100x,
D. Epigynum, internal view, 100x,

(at; atrium, ft; fertilization duct, co; copulatory opening and st; spermathu

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Central area of cephalothorax is pigmented and hairy while peripheral covered with long stout hairs. Sternum oblong, pointed behind, broader anteriorly, brown and bordered with groups of long brown hair. Yellowish with scattered brown spots: labium and maxillae longer than wide with conspicuous scopulae; chelicerae strong, one tooth on the retromargin and serrated ridge on promargin. Leg long and strong, longitudinal brown bands on tarsi and metatarsi. Spination on legs: Femure I=0-0-0-1; II=0-0-2-0; III=0-2-2-0; IV=1-0-1-0; Patella without spines: Tibia I = 0-2-2-2; II = 0-2-2-2; III = 3(1-1-1)-2-5(1-2-2)-5(1-2-2); IV = 3(1-1-1)-3(1-1-1)-5(2-2-1)-5(2-2-1). Metatarsus = 1=0-0-0-2; II=0-1-0-4(1-2-1); III=2-2-3(1-1-1)-2; IV=2-1-1-1. Leg formula = 4123.

**Abdomen:** Elliptical, longer than broad, a black ridge demarcates the abdomen into upper one third and lower one fourth portion yellowish brown. Cloth with hair and pigments; dark brown spots scattered throughout. Ventral side lighter and also covered with brown spots and hairs. Spinnerets very prominent; covered with hair, unsegmented; posterior spinnerets larger than the others. Anal tubercle prominent. Epigynum broader than long spermathecae large oval, and close to each other: fertilization tubes straight; copulatory tubes convoluted and open near the epigastric furrow by copulatory openings.

**Natural History:** Holotype ♀ collected from Farash, *Tamarix aphylla* tree Rukh Khairaywali chah; 21.11.98.

**Distribution:** South Junjab, Pakistan.

**Genus Nodocion** Chamberlin, 1922


**Nodocion solanensis** Tikader & Gajbe, 1977

Material Examined

11♀: Kalim Shaheed Park, Faisalabad: 15.8.98.

Genus Scotophaeus  Simon, 1893


Type Species: Scotophaeus quadripunctatus (Latreille)

Scotophaeus poonaensis  Tikader, 1982


Material Examined

22♀: Kalim Shaheed Pak, Faisalabad: 15.8.98.

Scotophaeus similaensis  Tikader, 1982


Material Examined

2♂: Kalim Shaheed Park, Faisalabad: 15.8.98.

Scotophaeus domesticus  Tikader, 1982


Material Examined

Genus Phaeocedus  Simon, 1893


Type Species: Phaeocedus braccatus  Koch

Phaeocedus poomaensis  Tikader, 1982


Material Examined

3♀♂; Harrappa. Sahiwal: 15.7.98

17♀♂, 3♂♂; Kalim Shaheed Park, Faisalabad

3♂♂; Kalim Shaheed Park, Faisalabad

1♀; Thikarywala, Faisalabad: 10.6.97

3♀♂, 2♂♂; Attara Hazari Jhang 21.11.98

Genus Herpyllus  Hentz, 1832


Generic Characters: The two rows of eyes are nearly straight and widely separated; the eyes of each row are quite evenly spaced. The AME are larger than others. The PL row subequidistant; ME are round a little smaller than the PL. Height of clypeus is not more than the diameter of an AME; lower margin of furrow of chelicera is armed with one tooth or nodule.

Type Species: Herpyllus eccelestiaicus  Hentz
**Herpyllus bicolor**  Simon, 1885


**Material Examined**

4 ♂♂ 2 ♀♀: Kalim Shaheed Park, Faisalabad: 15.8.98.

**Herpyllus gouensis**  Tikader

**Material Examined**

1♀ 1♂: Kalim Shaheed Park, Faisalabad: 15.8.98.
**Herpyllus faisalabadensis** sp.nov

(Fig.12 A-D)

**Type Specimen:** Holotype - collected from Kalim Shaheed Park on 10.8.97.

**Etymology:** This species has been named after its type locality Faisalabad.

**Diagnosis:** *Herpyllus faisalabadensis* resembles *H. govaensis* Tikader, but can be distinguished from it by external morphological difference like the position of eyes. AM1 are very close to each other in *H. govaensis* whereas AM1 and AL1 are contiguous in the new species. MOQ is longer than wide in *H. govaensis* but wider in the new species. As regards internal genitalia, spermathecae are present on the upper side rather than on the lower side; spermathecal apophysis absent in *H. faisalabadensis*. Fertilization tubes are swollen at the base and elongated. Copulatory tubes open anteriorly in *H. govaensis* whereas they open posteriorly in *H. faisalabadensis*.

**Measurements:** Total body length: 4.60mm. carapace length, 2.06mm. width, 1.57mm. abdomen length: 2.53mm. width, 1.38mm.

**Cephalothorax:** Longer than wide, oval, narrowing in front. slightly convex, reddish brown clothed with pubescence and long hairs. posterior middle provided with a conspicuous short fovea. a central dark band extending from PME to the fovea and two dark spots on the posterior region of thorax. Eyes eight, pearly white, posterior row of eyes slightly longer than the anterior row. Anterior row of eyes nearly straight, medians larger than the others and closer to the laterals than each other. Posterior row of eyes nearly straight, medians larger than the laterals and closer to the laterals. Median ocular quad longer than wide; wider behind than in front. chelicerae short. vertical, retromargin with one small tooth and promargin without any teeth. Maxillae longer than wide, labium wider than long, both provided with small conspicuous scopulae. Sternum dark brown.
Fig. 12 (A-D) *Herpyllus faisalabadensis* n.sp.

A. Body, dorsal view, 40x
B. Sternum, labium and maxillae, ventral view, 100x
C. Chelicerae, lateral view, 100x
D. Epigynum, internal view, 100x

(at; atrium, co; copulatory duct, st; spermatheca, ft; fertilization duct)
nearly elliptical, bordered with strong spine like hair, and scattered brown spots. Legs small, stout covered with hairs and longitudinal brown bands on femur, transverse striations on the tarsus and metatarsus. Spination on legs: Femur = I = 1 and Patella without spines; Tibia = 1 = 2-1-00; II & III = without spine; IV = 0-0-0-3; Metatarsus = 1 = 4(2-2)-0-2-2; II & III = without spines; IV = 1-0-2-4(2-2). Leg formula = PME > AME > PLE > ALE.


Natural History: Holotype ♂ collected from under the bark of siris tree, *Acacia rubic* from Kalim Shaheed Park, Faisalabad on 10.8.97.

Distribution: Central Punjab.

Genus *Meganyrmecion* Reuss, 1834


Type species: *Meganyrmecion caudatum* Reuss.

This species is a new record from Pakistan.

**Material Examined**

12♂♂. 3 ♀♀: Kalim Shaheed Park, Faisalabad; 15.8.98.


12♂♂. 24♀♀: Rakh Khairwala Leiah; 21.11.98.

**Genus Drassodes** — Westring, 1851


Faisalabad, 80-81.


**Type Species**: *Drassodes lapidosus* (Walekenaer)

**Distribution**: Asia, Africa, North & South America.
**Drassodes pashaensis**  Tikader & Gajbe, 1977


This species has been recorded for the first time from the Punjab, Pakistan.

**Material Examined**

1♀♂: Chakwal: 10.11.97.

1♀♂: Vehari: 10.7.97.

**Drassodes deoprayagensis**  Tikader & Gajbe, 1975


This species has been recorded for the first time from the Punjab, Pakistan.

**Material Examined**


2♀♂: Head Tarimin Jhang: 21.11.98.

**Drassodes gangeticus**  Tikader & Gajbe, 1975


This species is a new record from Pakistan.

**Material Examined**


**Drassodes oppenheimeri**  Tikader, 1973


This species is a new record from Pakistan.
Material Examined


*Drassodes sagarensis*  Tikader, 1982


Material Examined

♂♀: Thikarywala, Faisalabad: 10.6.97

*Genus Sergiulus*  Simon, 1891


This genus is a new record from Pakistan.

*Sergiulus poonaensis*  Tikader & Gajbe, 1976


Material Examined

♀♂♀: Kalim Shaheed Park, Faisalabad: 15.8.98.

*Genus Zelotes*  Gistel, 1848


*Zelotes baltoroi* Caporiacco, 1934


**Material Examined**

1♂; T. T. Singh; 16.5.97.

*Zelotes nalingae* Tikader & Gajbe. 1979


**Material Examined**

1♂; Rukh Khairaywala; 21.11.98.

*Zelotes desioi* Caporiacco. 1934


**Material Examined**

32♂♂; Thikarywala. Faisalabad; 10.6.97.
Zelotes sajali  Tikader & Gajbe, 1979


Material Examined

1♂: Kalim Shaheed Park, Faisalabad: 20.7.96.

Zelotes kusumae  Tikader, 1982


Material Examined

1♂: Kalim Shaheed Park, Faisalabad: 20.7.96.
Family CLUBIONIDAE  Wagner, 1887
(Sae Spiders)


This family comprised of 15 genera and 532 species (Platnick, 2006). Dyal (1935) studied three genera (Lanxs, Strobarchus, Lioeramum) of the family Clubionidae from Lahore, Pakistan. All of them were later on transferred to other families. Qadin (1997), Nazir (1999) and Nazir (2003) recorded some species of this family. During present study, three genera and 11 species were recorded from various localities of Punjab.

Genus Clubiona  Latreille, 1804


The *Clubiona* Latreille is a very large genus with 429 known species all over the world (Platnick, 2006). It has been studied in Pakistan by Qadir (1997) from Sialkot, Nazir (1999) from Bahawalpur, and Nazir (2001) from Jhang. During present study two new species have been recorded.

**Type Species:** *Clubiona pallidula* (Clerck, 1757)

*Clubiona analis* Thorell, 1895

1895. *Clubiona analis*: Thorell. spider of Burma: 42.


During present study this species has been recorded for the first time from Pakistan.

**Specimens Examined**

1♀: Chishtian: 15.08.97

13♀♂: Sialkot: 06.10.97.

1♂: Chakwal: 10.11.97.

1♀: Samundri, Faisalabad: 16.07.98.

36♀♂: Katlim Shaheed Park, Faisalabad: 15.08.98.

Clubiona drossodes O.P. Cambridge, 1874


Specimens Examined


2♂: Okara: 31.08.96.

35♂♂: 3♀: Kalim Shaheed Park, Faisalabad: 10.08.97.

2♂♀: Saray Alangir, Jehlum: 01.09.97.


This species is confined to Asia and has not been reported from other areas of the world.

**Specimen Examined**


1♀; Muzaffar Garh; 11.07.97.

1♀; Head Punjnad, Muzaffar Garh; 12.07.97.

1♂; Chistian; 15.08.97.

1♀: Rawal Dwn, Rawalpindi; 01.09.97.
32♂: Chak No. 269 J.B. Jhang: 11.04.98.
1♀: Gawala, Faisalabad: 25.06.98.
33♂♂: Kalim Shaheed Park. Faisalabad: 15.08.98.
3♂♂: Rahim Yark Khan: 12.09.98.
14♂♂, 12♀♀: Liah: 22.11.98.

*Clubiona ludhianaensis* Tikader, 1976


In Pakistan it was recorded from Sialkot (Qadir, 1997).

**Previous Locality Record:** Pakistan, Sialkot, India: Ludhiana, Punjab, Umaran, Meghalaya, Himainagar, Gujrat, Goalpara, Assam, Burdwan, West Bengal, Bangladesh.

**Specimen Examined**

11♂♂: Chak No.31 J.B., Faisalabad: 09.07.96.


44♂♂, 11♀♀: Kalim Shaheed Park, Faisalabad: 10.08.97.

4♂♂: Chakwal: 10.11.97.

1♀♂: Head Tarimun, Jhang: 21.11.98.

10♀♂: Leiah: 25.06.98.

**Clubiona pashabaii**  Patel & Patel, 1973


*Clubiona pashabaii* Patel & Patel is found only in India and Pakistan. This species has already been recorded by Qadir (1997) from Sialkot, Nazir (1999) (Jhang) and Nazir (2001). During present study, it was recorded from various localities of Punjab.

**Material Examined**

22♀♂: Chak No.31 J.B., Faisalabad: 08.07.96.


2♀♂, 1♂: Thikarywala, Faisalabad: 10.06.97.

1♂: Muzaffar Garh: 11.07.97.


5♀♂, 31♀♂: Kalim Shaheed Park. Faisalabad: 10.08.97.

5♂, 1♂: Chakwal: 10.11.97.


2♀♂, 2♂: Kala Shah Kaku. Sheikhupura: 24.06.98.

1♀: Samundri. Faisalabad: 16.7.98

2♀: Kalim Shaheed Park. Faisalabad: 10.08.97.
Genus Cheiracanthium  Koch, 1839

 :152.

Cheiracanthium C.I. Koch was transferred from the family Clubionidae to family Miturgidae Simon by Ramirez et al. (1997), followed by El-Hennawy, 2001. But this transfer is still controversial as it is not accepted by most other authors (Zhang & Yin, 1999; Merkens and Wunderlich, 2000; Biswas & Raychaudhuri, 2003; Biswas and
Biswas, 2003; Nentwig et al., 2003). It is considered a senior synonym of *Chiracanthops*
Mello-Leitão by Bonaldo and Brescovit (1992). This is a large genus containing 195
species (Platnick, 2006). In Pakistan Nazir (1999) recorded one species from Jhang and
one species from Bahawalpur (2001). During present study one new record and two new
species have been reported.

*Cheiracanthium insigne*  
Cambridge, 1981


pp:60.

This species has been recorded for the first time from Punjab.

**Specimens Examined**

1♀: Kalim Shaheed Park, Faisalabad, 20.07.96.

16♂♂: Kalim Shaheed Park, Faisalabad: 10.08.97.


15♀♀: Miah, Chakwal: 10.11.97.

6♀♀, 5♂♂: Khangur, Rahim Yar Khan: 15.09.98.

10♀♀: Liajah: 22.11.98.
Cheiracanthium shaheedi sp.nov.
(Fig.13 A – D)

Type Material: Holotype ♀: Kalim Shaheed Park, Faisalabad found under the two curled leaves on the grass on 15.8.98.

Etymology: This species has been named to give tribute to the martyrs of Islam.

Diagnosis: Cheiracanthium shaheedi resembles Cheiracanthium trivialis (Tikader) and Cheiracanthium tingiling Barrion and Litsinger; but can be distinguished from both by the difference in the structure of chelicerae. Cheiracanthium shaheedi has no sclerotized C-shaped cavity in between the spermathecae; copulatory tubes open at the base through copulatory opening; fertilization tubes convoluted, contrary to C. tingiling.

Measurements: Total length: 6.28 – 6.43mm (6.36 ± 0.10); carapace length: 2.21 – 2.34mm (2.28 ± 0.08); carapace width: 1.95 – 2.20mm (2.07 ± 0.17); abdomen length: 3.99 – 4.09mm (4.04 ± 0.07); abdomen width: 2.16 – 2.97mm (2.57 ± 0.5); Leg I: 9.21mm, Leg II: 6.33mm, Leg III: 8.11mm, Leg IV: 11.90mm, Pedipalp: 4.73mm.

Cephalothorax: Longer than wide, yellowish brown; fovea small; three striations radiating from foveal region towards the periphery; cephalic region high; blackish eye margins. Eight eyes in two rows, eyes silvery white AME pearly white; anterior row of eyes slightly recurved, medians slightly larger than the laterals and close to each other, posterior row longer than anterior row, nearly straight, medians larger than the laterals and not in wider distance from each other; laterals very close to each other median ocular quad long than wide, slightly narrow posteriorly; clypeus high. Eye formula: PME > PLE > PME > AME. Cephalic area well marked from the thoracic area. Chelicerae longer than wide; wider posteriorly, strong and stout. 3 teeth each in pro and retromargin; promargin side scapulated anterior to the apical tooth; fang curved and sharply pointed. Sternum
Fig. 13 (A-D) Cheiracanthium shaheedi n.sp.

A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view,
C. Chelicerae, lateral view. 100x,
D. Epigynum, internal view. 100x,

(fl; fertilization duct, co; copulatory, ef; epigastric farrow, and st; spermat
longer than wide, yellow with darker margins; spine like tubercles opposite each coxa; lateral margin with moderately broad concavities; sternum is posteriorly pointed, sub-lateral area of entire sternum is more hairy than the median area. Legs yellow, slender, with rare spination. Spination on Legs = Femur and Patella without spines; Tibia I = 0-0-0-0-0; II = 0-0-0; III = 0-0-0-0; IV = 1-1-0-1; Metatarsus I = 0-2-2-0; II = 0-0-2-0; III = 0-0-1-0; IV = 0-1-1-1. Leg Formula: 4132.

**Abdomen:** Abdomen yellow, except cardiac are which is lighter in colour. Dorsum of abdomen has a central T-shaped band with two wing like structures in the middle. Two pairs of transverse striations also arise from the central band. Rest of the dorsum covered with a mosaic patchwork. A blackish spot at the base. Spinnerets visible dorsally: posterior pair distinctly longer than the anterior pair. Its segment II a little shorter than segment I. Basal segment of anterior spinnerets wider than the anterior spinnerets. Posterior spinnerets larger than the others. Ventrum in lighter than the dorsum. Epigynum bilobed, which are widely separated: spermathecae rounded; fertilization tubes coiling around the spermathecae; copulatory tubes swollen anteriorly and opening near the epigastric furrow by copulatory openings.

**Natural History:** Holotype collected from leaf litter; paratype ± collected from tree bark of *Jacquinia arabica* on 15.8.96 from Kalim Shaheed Park, Faisalabad.

**Distribution:** Central Punjab.
Cheiracanthium fairiensis sp.nov.
(Fig.14 A-D)

Type Material: Holotype ♂ collected from Kalim Shaheed Park, Faisalabad on 15.8.98.

Etymology: This species was named after its fairy like appearance.

Diagnosis: Cheiracanthium fairiensis resembles Cheiracanthium tighuanensis Barrion and Litsinger but can be separated from it by difference in the number of teeth on the pro and retromargin of chelicerae: epigynum is not C-shaped as in C. tighuanensis spermathecae are in the middle whereas in C. tighuanensis they are near the epigastric furrow. Fertilization tubes are concave, copulatory tubes are convoluted and open near the epigastric furrow. The opening is not triangular as in C. tighuanensis.

Measurements: Total length: 7.3mm; carapace length 2.89mm; width 2.20mm; abdomen length: 4.4mm; width 1.93mm; Leg I: 9.49mm; Leg II: 11.56mm; Leg III: 7.29mm; Leg IV: 7.43mm; Fang 9.35mm.

Cephalothorax: Longer than wide. reddish brown, cephalic area blackish brown. center of the thoracic area lighter brown. with long white hair and short black hairs along the lateral margin of the thorax. Cephalic area narrower than the thoracic area. Median thoracic area narrowly U-shaped; fovea prominent. Eight eyes in two rows: slight recurved A1: row shorter than slightly procurred PE: row. Median ocular quad wider behind than in front. Clypeus high. Sternum oval reddish brown, longer than wide, margins indented and with spur-like extension. Covered with long hair. Labium reddish brown, broader than long, indented laterally on the basal region. Maxillae of the same colour as labium, broad apically and narrow basally, outer lateral margins strongly indented, and lined with long brown hair. Scopulae at the inner end of each serrula. Chelicerae moderately long, retromargin with one tooth and pro-margin without any teeth. Chelicerae reddish brown.
Fig. 14 (A–D) *Cheiracanthium fairiensis* n.sp.

A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view 100x,
C. Chelicerae, lateral view, 100x,
D. Epigynum, internal view, 100x,
(at; atrium, co; copulatory opening and st; spermatheca)
and covered with long hair on inner and outer margin. Legs reddish brown with thickly set long black hair. Tarsus two clawed. Spination on Legs: Femur and Patella without Spination. Femur I = 0-1-2-0; II = 0-1-2-0; III = 0-1-0-1; IV = 0-1-0-1; Patella I & II without spines III = 0-1-0-0; IV = 0-1-0-6; Tibia I = 0-0-1-0; II = 0-0-0-0; III = 2-1-2-2; IV = 2-2-3(1-1-1)-2. Metatarsus I & II without spines: III = 1-2-3(1-1-1)-2; IV = 2-2-3(1-1-1)-3(1-1-1)-3(1-1-1). Leg formula: 2143.

**Abdomen:** Ovate to globular, indented strongly on the basal side longer than wide, blackish brown with scattered yellow patches, candiac area lighter in colour. Dorsum covered with long black hair. Venter similar to dorsum, anterior spinnerets brown with black hair, robust basally and converging towards each other. Posterior pair longer and cylindrical with black hairs. Epigynum as in Fig.15D. Spermathecae funnel shaped, copulatory opening small.

Epigynum plate is broad; spermathecae oval; copulatory tubes convoluted over the spermathecae; copulatory openings near the epigastric furrow; fertilization tubes concave.

**Natural History:** Holotype ♀ collected under the bark of sirs tree from Kalim Shaheed Park, Faisalabad on 15.8.98.

**Distribution:** Central Punjab.
Family CORINNIDAE  Karsch, 1880


The Corinnidae Karsch is a large family comprising 75 genera and 902 species in the world, considered valid by Wunderlich. 1986, so genera listed by Brignoli, 1983, under Castianerinae and Corininae (Clubionidae) are included this family (Platnick. 2004). This family is not much studied in Pakistan and only a single genus has been so far recorded (Nazir, 1999; Ghafoor. 2002, Butt & Beg. 2001).

Genus Castianera  Keyserling, 1879


*Castianeira* Keyserling is represented by 131 species (Platnick, 2004). Nazir (1999) recorded the genus from Jhang. Butt & Beg (2001) described a new species of the genus from Faisalabad, Pakistan. During present study, only a single species has been recorded.

**Type species:** *Castianeira rubricauda* (Keyserling, 1879)

**Distribution:** Asia, Europe, Africa, North & South America.

*Castianeira zetes* Simon, 1897


Nazir (1999) recorded this species from Jhang and in the present study it has been collected from various districts of the Punjab.

**Specimens Examined**

21♂: Chak No.31 J.B., Faisalabad; 08.07.96.

34♀♀: Killim Shaheed Park, Faisalabad; 20.07.96.

2♀♀: Okara; 30.08.96.

3♂♂: Chishian; 15.08.97.

1♂: Sialkot; 06.10.97.

26♀♀: Killim Shaheed Park, Faisalabad; 15.08.98.

15♀♀: Leliah; 21.11.98.
Family OXYOPIDAE Thorell, 1870
(Lynx Spiders)


Platnick (2006) listed 9 genera and 417 species of the family from the world. In Pakistan, Dyal (1935) recorded two genera (Oxyopes Latreille and Pencelia, Thorell) and six species from Lahore. Later on the family was studied by Khatoon (1985-86) who reported three species from Islamabad. Mushtaq & Qadir (1999) described three new species of the family from Pakistan. Butt and Beg (2001) described one new species from
Faisalabad. In the present study, 8 species were recorded from various districts and out of which three species were regarded as new.

**Genus Oxyopes** Latreille, 1804


The *Oxyopes* Latreille is a large genus with 284 species (Platnick, 2006). Dyal (1935) recorded five species of this genus from Lahore, Pakistan. Of these, one species was new to science. Khatoon (1985-86) recorded three of these species from Islamabad. Mushtaq and Qadir (1999) described three new species. During present study 8 species were recorded from various districts of Punjab.
Oxyopes wroughtoni  Pocock, 1901


Dyal (1935) recorded and redescribed this species from Lahore, Pakistan. Later on Mushtaq & Qadir (1999) reported it from Faisalabad and Sialkot. During present study this species has been collected from various localities of Punjab.

Material Examined

45♂♂ 16♀♀: Chak No.197 R.B. Faisalabad: 18.7.96.

13♀♀: Chak No.31 J.B., Faisalabad: 8.7.96.

8♀♀ 5♂♂: Kalim Shahheed Park, Faisalabad: 20.7.97.

1♂: Muzaffar Garh: 11.7.97.


1♂: Rawal Town, Fawalpindi: 29.8.97.

1♂: Murree: 31.8.97.

2♂♂ 2♀♀: Rawal Dam, Rawalpindi: 1.9.97.

1♂: Islamabad: 1.9.97.

1♂: Sialkot: 6.10.97.

1♂: Jahanian, Khanewal: 31.10.97.

2♂♂ 18♀♀: Booraywala, Vehari: 18.6.98.
Oxyopes rufisternus  Pocock, 1900


Material Examined

32♂♂, 1♀; Chak No.31 J.B., Faisalabad: 8.7.96.

120♂♂, 17♀♀; Chak No.197 R.B., Faisalabad: 19.7.96.

64♂♂, 15♀♀; Kalim Shaheed Park. Faisalabad: 20.7.96

6♀♀; D.G. Cement Factory. D.G. Khan: 3.8.96.

2♀♀; Okara: 31.8.96.

2♀♀; Gujranwala: 27.9.96.

1♀; Jhang: 20.5.97.

3♀♀, 1♂; Thikarywala. Faisalabad: 10.6.97.

1♂; Mailshy, Vihari: 10.7.97.

2♀♀; Head Punjnad. Muzaffar Garh: 12.7.97.

1♀: Rawal Dam, Rawalpindi: 19.97.
1♂: Mial, Chakwal: 10.11.97.
1♂: Booraywala, Vihari: 18.6.98.
22♀♂. 12♀♂: Head Tarimin, Jhang: 21.11.98.
14♀♂: Rakh Khairaywali, Liah: 22.11.98.

**Oxyopes ratnai**

Tikader, 1970


This species is reported only from Indo Pak sub-continent. Mushtaq & Qadir (1999) reported this species from Sialkot. During present study, it has been recorded from some other localities.

**Previous Locality:** Pakistan: Sialkot; India: Sikkim; Calcuta, West Bengal, Madhya Pardesh.

**Material Examined**

1♀: Okara: 31.8.96.
Oxyopes sheweta  Tikader, 1970


Material Examined

52♂♀. 18♀♂: Chak No.31 J.B., Faisalabad: 8.7.96.

2♂♂: Chak No.232 Faisalabad: 12.7.96.

69♂♀. 25♂♂: Chak No.197 J.B., Faisalabad: 19.7.96.

1♀: Kalim Shaheed Park, Faisalabad: 20.7.96.


2♀♀: Okara: 30.8.96.

9♀♀: Gujranwala: 27.9.96.

1♀: Thikarywala, Faisalabad: 10.6.97.


1♂: Sialkot: 6.10.97.

3♀♂: Chak No.269 J.B., Jhang: 11.4.98.

1♀: Kala Shah Kaku. Sheikhupura: 24.6.98.


1♀: Khanewal: 31.9.98.


Previous Locality Record: This species has been found in Sialkot and Faisalabad (Mushtaq and Qadir. 1999). Now this species has been recorded from various districts of Punjab.
Oxyopes rizwani
(Fig.15 A-D)

**Type Material:** Holotype ♂ collected from Chak No.197 R.B., Faisalabad on 18.7.98; paratype ♂ with same data.

**Etymology:** This species has been named after my loving niece, Rizwana Bashir who practically helped in the collection of spiders.

**Diagnosis:** Oxyopes rizwani resembles Oxyopes javanus Barrion & Litsinger. Litsinger to some extent but differs from both the species in the following way: O. rizwani differs from O. javanus in the structure of labium, chelicerae, tarsi etc. Epigynal plate is broad; convoluted fertilization tubes and separate copulatory openings near the base contrary to O. javanus. In male palp RTA is short; ventral apophysis is not blunt and bifurcated contrary to O. javanus.

**Measurements:** No. of specimen measured: 8; total body length: 8.01 – 10.75 mm (9.41 ± 1.00); carapace length: 2.69 – 4.00 mm (3.30 ± 0.52); carapace width: 2.28 – 3.01 mm (2.66 ± 0.34); abdomen length: 4.93 – 6.32 mm (5.7 ± 0.58); abdomen width: 1.79 – 2.90 mm (2.48 ± 0.40); leg formula: 4123.

**Cephalothorax:** Longer than wide; reddish brown in colour; fovea distinct; eight eyes in four rows arranged hexagonal all the eyes with black rings. Ocular area dark in colour Y shaped mark above the fovea and below the PMP. Clypeus high. Sternum yellow brown with grey tinges; erect brown hairs scattered. Lateral margins indented with outgrowths or extensions in between opposite coxal, posterior end tapers, extending beyond coxae IV; and apical end straight; Labium pitcher like, yellowish brown, with upper end indented and posterior end strongly rounded. Maxillae yellow, slender and three times longer than
Fig. 15 (A-D) *Oxyopes rizwani* n.sp.

A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae, lateral view, 100x,
D. Epigynum, internal view, 100x,

(at; fertilization duct, co; copulatory opening and st; spermatheca)
broad scopulae not very distinct. Chelecaae brown in colour, hairy moderately robust
with two promarginal and one romarginal teeth short and relatively small. Boss
distinct. Legs brown, long and slender, with long spines in all the segments, except tarsi.
Tarsi claws with three and thirteen teeth in the inferior and superior claw, respectively.
Pedipalp yellow-brown with long spines, tarsus single clawed with seven teeth. Femur I
2-3(1-1-1)-1-1; II = 3(1-1-1)-3(1-1-1)-0-1; III = 2-2-0-2; IV = 2-4(1-1-1)-2-0; Patella I
0-0-1-0; II = 1-0-0-2; III = 0-1-0-1; IV = 0-0-1-1; Tibia I = 1-1-4(1-1-1-1)-2; II = 1-2-
3(1-1-1)-3(1-1-1); III = 2-1-2-2; IV = 3(1-1-1)-3(1-1-1)-5(2-2-1)-3(1-1-1). Leg formula:
4123.

Abdomen: Orange brown dorsally, longer than wide, broadest at the anterior one third
region and tapering posteriorly. Three dark brown longitudinal bands, one central and
two dorsolateral in position. Posteriorly longitudinal chocolate brown band in the mid-
ventral position, lighter mosaic pattern on latero-ventral side. Large hairs in the posterior
half upto the spinnerets. Anterior pair of spinnerets more robust than the posterior ones.
Spinnerets yellow with black hairs. Epigynum with a broad posterior plate, incomplete
anterior epigynal margin and widely separated or diverging spermathecae. Internal
genitalia as in Fig.18-I.

Natural History: 12♂♀ and 1♂ were collected from Chak No.197 R.B. Baghayawa on
18.7.98 from Guara Cyamopsis tetragonoloba.

Distribution: Central Punjab
**Oxyopes rizwani**

(FIG. 16 A-D)

**Measurements:** Carapace length 2.48mm, width 1.79mm, abdomen length 3.99mm, width 2.06mm, Legs I 10.86mm, II 10.18mm, III 7.56mm, IV 9.9mm. Leg formula 1243.

**Cephalothorax:** Longer than broad, narrower anteriorly, brown in colour, ocular area black, eyes in a hexagonal arrangement group of four transverse rows: AME very small but set well apart ALE as large as PLE, PLE semicircular and in line with the AME: ALE, PME and PLE equidistant from each other; all eyes forming a rectangular area which is broader than long. Cephalic region not very distinct. Lateral margins of the cephalothorax smooth with a central transparent fovea. Cephalothorax has four parallel longitudinal bands made up of leaf-like creeping hairs. Fang small strong and gradually tapering towards apex; promargin with two and retromargin with one tooth. Sternum heart-shaped, pointed, brown, with 18 setae radiating from a central point towards the peripheral region. Labium brown, longer than broad, maxillae basically narrow with broad apex and distinct scopulae. Legs strong, long, spinose having black bands on the ventral side of all the femora. Male palp as in Fig. 19-D, Cymbium pointed anteriorly with a tuft of spine-like hair. RTA absent, apical apophysis prominent.

**Abdomen:** Long, broad anteriorly and tapering posteriorly with a distinct anal fold; dark brown band in the central region and two dorso-lateral longitudinal bands.

**Type Material:** Holotype $\exists$: Chak No.197 R.B., Faisalabad on 18.7.98 deposited in the Department of Zoology and Fisheries, University of Agriculture, Faisalabad.
Fig. 16 (A-D) *Oxyopes rizwani* n.sp.

A. **Body, dorsal view, 40x**

B. **Sternum, labium and maxillae, ventral view, 100x,**

C. **Chelicerae, lateral view, 100x,**

D. **Male palp, lateral view, 100x,**

(rta; retrolateral tibial apophysis, ma; median apophysis, spd; sperm duct, and cy; cymbium)
Oxyopes noorani sp. nov.
(Fig. 17 A-D)

Type Material: Holotype ♂ collected from Faisalabad on 29.7.96.

Etymology: This species was named in respect of my beloved father Noor Muhammad.

Diagnosis: Oxyopes noorani n.sp resemble Oxyopes shinata Tikader in many aspects but differs from it in following points. Oxyopes noorani has a prominent V-shaped mark above the fovea and has no black lines on either side of the cephalic region as in O. shinata. Rather it has a parrot green band that extends longitudinally in the center of sternum. Unlike O. shinata it has no brown lens shaped patch in the mid-dorsal region and black longitudinal lines on the sides of abdomen. Cymbium is much elongated in O. shinata. RTA and VTA are not well developed in O. shinata unlike O. noorani.

Measurements: Total body length 9.9mm carapace length, 3.71mm, width, 3.44mm, abdomen length, 6.19mm, width 2.12mm, leg formula 1243.

Cephalothorax: Wider than long, brownish green, cephalic region high with fine hair, center of thoracic region with a prominent, long green fovea which has a large V-shaped mark on the upper side. Parrot green patches on the sides and base of the cephalothorax with silvery hairs and shevrons. Eyes eight in four rows, base of each eye encircled with a black patch. AE procurred: ALE larger and AME smaller. PLF and PME recurved. Clypeus long and provided with two black lines extending from anterior median eyes to near the base of chelicerae. Sternum longer than wide heart-shaped, yellow with a central parrot green band and scattered silvery hairs. Labium wider than long with a frill of long brown hairs, brownish green in colour with a pair of black hook like structure on the upper side. Maxillae small with insipicuous scupulae, chelicerae strong with one tooth on retramargin and two on pro-margin, covered with hair, fang small. Legs brownish
Fig. 17 (A-D) Oxyopes noorani n.sp.
A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae, lateral view, 100x,
D. Male palp, ventral view, 100x,
(rta; retrolateral tibial apophysis, ma; median apophysis, and em; embolus)
green, long and strong, clothed with fine hair and conspicuous long spines; ventral side of femora of all legs provided with a longitudinal black line. Male palp as in Fig.20-D. Tibial spur hairy. RTA present; cymbium yellow with spine-like hair, apical median and terminal apophysis prominent; embolus short, tegulum broad. Spination = Femur = I = 1-1-0-1; II = 2-3-2-0; III = 2-2-1-0; IV = 1-1-2-0; Patella = Without spines; Tibia = I = 3-2-2; II = 1-2-1-1; III = 2-1-2-2; IV = 1-4(2-2)-2-2; Metatarsus = I 7(1-2-2-2): 6 = 6 (2-2-2); 1-1: II = 4(2-2); 6(2-2-2)-1-1; III = 3-3-2-2; IV = 4(2-2); 6(3-2-2): 2-2. Leg formula 1243.

**Abdomen:** Long narrowing behind. Mid-dorsal brownish green band and lateral sides with longitudinal dark green bands extending from base to the end of abdomen. Dorsum with a net of bead-like lines of greenish brown colour. Ventral side with similar net-like structure and two dark green lines on the lateral sides. Both dorsal and ventral sides are covered with long golden hairs.

**Natural History:** Holotype & collected from Kaleem Sheed Park, Faisalabad on 29.7.96.

**Distribution:** Central Punjab
Oxyopes samanii sp. nov.
(Fig. 18 A-D)

Type Material: Holoty ♀ collected from Rahim Yar Khan on 12.9.98; paratype ♀ with same data.

Etymology: this species has been named after my beloved nice Saman.

Diagnosis: Oxyopes samanii is close to Oxyopes bikakaeus Barrion and Litsinger as regards the shape and pattern of cephalothorax but both species can be separated by the differences in the chelicerae and sternum. Anal tubercle is not clothed with gray and white hairs as in O. bikakaeus. Posterior spinnerets are not segmented in O. samanii. Spermathecae are rounded in the new species whereas in O. bikakaeus they have been shaped. No thick layer of gray hair in the midhalf of posterior epigynal margin in the new species.

Measurements: No. of specimens measured: 2; total body length: 6.91 - 7.94 mm (7.43 ± 0.72); carapace length: 2.24 - 2.99 mm (2.61 ± 0.68); carapace width: 1.37 - 2.06 mm (1.71 ± 0.56); abdomen length: 4.39 - 4.95 mm (4.17 ± 0.81); abdomen width: 1.96 - 2.70 mm (2.33 ± 0.37).

Cephalothorax: Longer than wide, yellowish brown with patches of leaf-scale like structures. Fovea black and not very prominent. Ocular area black with white hair inside. Eyes eight in four rows. Sternum heart shaped, brown in colour with silvery lines and black erect hairs, longer than wide; apical end straight, posterior end blunt; labium longer than wide, reddish brown, maxillae long, curved in the center and have a distinct scopulae. Chelicerae strong, brown in colour with one teeth in the retromargin and three teeth in the promargin. Legs yellow with brown strips, having long hairs and spines.
Fig. 1B (A-D) *Oxyopes samantii* n.sp.

A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 80x,
C. Chelicerae, lateral view 80x,
D. Epigynum, internal view, 100x,

(at; atrium, ft; fertilization duct, co; copulatory opening and st; spermatheca)
Spination on legs = Femur I = 1-2-2-0; II = 1-3(1-1-1)-2-0; III = 2-2-3(1-1-1)-0; IV = 1-1-3(1-1-1)-0; Patella I = 1-0-2-0; II = 1-0-2-0; III = 0-1-1-0; IV = 1-0-1-0; Tibia I = 0-2-6(2-2-2)-4(2-2); II = 2-2-5(2-2-1)-4(2-2); III = 1-1-4(2-2)-3(1-1-1)-1; IV = 2-2-3(1-1-1)-1; Metatarsus I = 2-3(1-1-1)-5(2-2-1)-6(2-2-2); II = 3(1-1-1)-3(1-1-1)-5(2-2-1)-5(2-2-1); III = 3(1-1-1)-3(1-1-1)-5(2-2-1)-4(2-2); IV = 2-3(1-1-1)-0-4(2-2). Leg formula: 4123.

Abdomen: Chocolate brown with posterior end yellowish in colour. Three strips of black leaf-scale like structure extend throughout the abdomen, with long silvery hairs scattered here and there. Ventral side lighter in colour but with a pattern just like the dorsal side spinnerets conical, yellow in colour with black hair. Spinnerets dark brown, anterior pair parallel to each other and posterior pair diverging; anal tubercle clothed with gray hairs. Epigynum is sclerotized, hairy with a wide scape and rounded spermathecae. Fertilization tubes opening anteriorly by a common aperture.

Natural History: Two female specimens were collected from the mango orchard in Rahim Yar Khan on 12.9.98.

Distribution: South Punjab, Pakistan.
Family Lycosidae  Sundevall, 1833


(Plamnick, 2006) listed 103 genera and 2302 species of this family in the world. In Pakistan, Butt (1996) recorded 3 genera and 7 new species along with two already recorded species from Faisalabad. Shabbir (1997) recorded 3 genera, 2 new species and 7 already recorded species from Sialkot. During present study, 5 genera and 23 species were recorded: of which 8 species were recorded for the first time and 7 species were regarded as new to science.
Type Genus *Lycosa* Latreille

**Genus Hippasa** Simon, 1885


This genus was recorded for the first time from Lahore by Dyal (1935). Butt (1996) described one new species of this genus from Faisalabad. Shabbir (1997) recorded two already known species from Chakwal. During present study four species of this genus were recorded, of which two species were a new record to Pakistan.

**Hippasa ageleoides** Simon, 1834


This species is a new record from Pakistan.

**Material Examined**

3 *♂♂*, 5 ♀♀: Gujranwala: 27.9.96.


This species is a new record from Pakistan.

Material Examined


3♀♀, 2♀♀: Maity, Vehari: 10.7.97.

1♂; Sialkot: 6.10.97.

1♀♀: Chakwal: 10.11.97.


43♀♀; 269 J.B. Jhang: 11.4.98.

1♂♂; Samundri: 16.7.98.

*Hippasa partita* O.P. Cambridge, 1876


Material Examined

1978. 1: Chakwal (Mial); 10.11.97.

Hippasa madhuree Tikader & Malhotra, 1980


Material Examined


Genus Pardosa C.L. Koch, 1848


Type species: Pardosa striatipes Koch

This genus is cosmopolitan in distribution and is the largest genus of Family Lycosidae. From Pakistan Dyal (1935) recorded 8 species of this genus from Pakistan. Butt (1990) recorded two species of this genus from orchard of University Campus, Faisalabad. Shabbir (1997) recorded 3 known and 3 newly reported species from
Chakwal and Sialkot. Qadir (1997) reported 3 already known species of this genus from Sialkot. During present study, 5 already recorded and 3 newly described species were reported. Two already known species were recorded for the first time.

**Pardosa birmanica** Simon, 1884


**Material Examined**

5♂♂♀, 21♂♂; Chak No.31 J.B.. Faisalabad: 9.7.96.


9♂♂♀, 5♂♂; D.G.Khan: 31.7.96.

19♂♂♀, 5♂♂; Manro: 2.8.96.

3♂♂♀, 2♂♂♂; Okara: 30.8.96.

16♂♂♀, 15♂♂♂; Thikarywala. Faisalabad: 10.6.97.

38♂♂♀, 31♂♂♂; Mailsy, Vehari: 10.7.97.

2♂♂♀, 12♂♂♂; Chishtian, Bahawalnagar: 15.8.97.

2♂♂♀; Rawal Dam: 1.9.97.

10♂♂♀; Harrappa, Sahiwal: 15.7.98.

27♂♂♀, 1♂♂♂; Samundri, Faisalabad: 16.7.98.
**Pardosa sumatrana** Thorell, 1890


**Material Examined**


2590. Fort Manro: 2.8.96.

90. Okara: 30.8.96.


3990. Takiarywala: 10.6.97.


1♂: Mial. Chakwal: 10.11.97.

14♀♂, 4 ♀♂: Samundri. Faisalabad: 16.7.98.


12♀♂: Khanewal: 31.9.98.

99♀♂, 26 ♀♂: Liah: 21.11.98.

**Pardosa oakleyi**  Gravely, 1924


**Material Examined**

92♀♂, 1♂: Chak No.232 J.B., Faisalabad: 12.7.96.


17♀♂, 15♂♂: Fort Manro: 3.8.96.

68♀♂, 34♂♂: Okara: 30.8.96.

3♀♂: Gujranwala: 27.9.96.

3♀♂: Thikarywala: 10.6.97.


13♀♂, 22♂♂: Muzaffar Garh: 11.7.97.

Pardosa songosa    Tikader & Malhotra, 1976


Material Examined

1♂, 1♀: Gujranwala; 27.9.96.

1♀, 1♂: Thikarywala, Faisalabad; 10.6.97.

53♂♂, 2♀: Mailsy, Vehari; 10.7.97.

Pardosa timida    Simon, 1882


This species is a new record from Pakistan.

Material Examined

65♂♂, 31♀: Okara; 30.8.96.

1♂: Mailsy, Vehari; 10.7.97.
4. : Samundri, Faisalabad; 16.7.98.

2. : Chishtian, Bahawalnagar; 15.8.97.

53. : 24/2 Kalim Shaheed Park, Faisalabad; 15.8.98.
**Pardosa tahari** sp. nov
(Fig.19 A-L)

**Type Material:** Holotype ♂ collected from paddy field Gujranwala on 27.9.96

**Etymology:** This species was named after my friend Dr. Tahir Nasreen Buttwar.

**Diagnosis:** *Pardosa tahari* is similar to *Pardosa pusioela* (Thorell) and *Pardosa warayensis* Barrion and Litsinger. *P. tahari* is different from *P. pusioela* in the position of eyes, fovea and the shape of maxillae. *P. tahari* is different from *P. warayensis* in having long slender cymbium; embolus is more elongated; Median tegular apophysis is more prominent in *P. tahari* than in *P. warayensis*.

**Cephalothorax:** Longer than wide, convex, clothed with pubescence, cephalic region narrowing in front and slightly high, center of thoracic region brown having a prominent fovea. Ocular area black. A1 row slightly procurved less wider than the second row, medians larger than the laterals and bases of the laterals provided with black patches. Eyes of the second row larger than the others. Ocular quad wider behind and narrowing in front. Bases of posterior eyes provided with conspicuous black patches. Space enclosed between posterior eyes black and very slightly wider behind than in front. Sternum heart shaped, pointed behind, clothed with pubescence and hairs and uniform dark brown in colour. Labium longer than wide and dark brown in colour. Distal end of maxillae narrower and provided with indistinct scopulae. Chelicerae moderately strong, retromargin with three pro-margin with two teeth. Legs thin and long, joints with transverse greenish patches. Legs with spines and hairs: leg formula 4123. In male palp tarsus stout, cymbium pointed anteriorly and provided with tufts of hairs having a spur on the lateral side with spines. A copulatory tube arises from the base of the cymbium. Two apophysis, one at anterior and other on outer border. Spination on Legs: femur = 1.
Fig. 19 (A-E) *Pardosa tahari* n.sp.

A. Body, dorsal view 40x,

B. Sternum, labium and maxillae, ventral view, 100x

C. Chelicerae, lateral view, 100x

D & E Male palp, lateral and internal view, 100x

(cy; cymbium, bb; bulbus, spd; sperm duct, and em; embolus)
Without Spines; Patella = I, II, III = Without Spines; II = I-0-0-0; Tibia = I-3-4(2-2)-0-0; III = 4(2-2)-1-2-2; III = 2-2-1-1; IV = Without spines; Metatarsus = 1 & IV without spines; II = 2-1-2-2; III = 5(1-2-2)-5(1-2-2)-0-1; Leg formula:

**Abdomen:** Longer than wide, oval, pointed behind, broadest in the middle, dorsal side of abdomen dark brown with black patches, central mid-longitudinal pale band, with pubescence and hair.

**Natural History:** Holotype ♂ specimen was collected from paddy field, Gujranwala on 27.9.96. One paratype ♂ with same data.

**Distribution:** Northeast Punjab.
*Pardosa azhari* sp. nov.
(Fig. 20 A-D)

**Type Material:** Holotype ♀ collected from D.G.Khan on.

**Etymology:** This species has been named after my teacher and a great zoologist Dr. Mirza Azhar Beg.

**Diagnosis:** *Pardosa azhari* resembles *Pardosa pseudoannulata* (Boesenberg and Strand) but can be distinguished from it by absence of six marginal gray to brown spots in sternum. Maxillae are cylindrical in *P. azhari* whereas in *P. pseudoannulata* they are narrow basally and broad apically. Scopulae are thick on labium and maxillae. Whereas in *P. pseudoannulata* they are sparse on labium and only obliquely placed on the maxillae. A median band in sternum of *P. pseudoannulata* which is absent in the new species. In the epigynum of *P. pseudoannulata* a convex brown band anterior to hood and lateral lobes is present. Both hood and lateral lobes are absent in *P. azhari*. Spermathecae are large in *P. azhari* which are small and globular in *P. pseudoannulata*.

**Measurements:** No. of specimens measured: 3; total body length: 5.13 - 6.87 mm (5.9 0.89); carapace length: 2.83 - 3.71 mm (2.33 ± 0.44); carapace width: 1.91 - 2.48 mm (2.20 ± 0.30); abdomen length: 1.98 - 2.75 mm (2.31 ± 0.39); abdomen width: 1.10 - 1.51 mm (1.28 ± 0.41); leg formula: 4123.

**Cephalothorax:** Longer than wide, cephalic region slightly high and narrowing in front; a garland like black streak encircles the cephalic area center of thoracic region with distinct fovea. All row straight, less wider than the second row, medians slightly larger than the laterals, and bases of the anterior eyes provided with conspicuous black patches. Space enclosed between posterior eyes wider posteriorly and narrowing anteriorly.

**Sternum** heart-shaped, plac longer than wide: covered with erect brown hair. Labium
Fig. 20(A-D) *Pardosa azhari* n.sp.

A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae, lateral view, 100x,
D. Epigynum, internal view 100x,

(ed; entrance duct; ft; fertilization duct, and st; spermatheca)
wider than long, brown in colour. Maxillae yellow brown, distal ends broader having conspicuous scopulae. Outer margin of the carapace provided with a border of long hair. Chelicerae strong, reddish brown in colour; promargin with two and retromargin with three teeth. Legs yellow with dark brown bands on femora, patella and tibiae.

**Abdomen:** Longer than wide, oval, rounded behind, dark brown in colour with black pigmentation, clothed with pubescence and coated with erect hair, hair being longer on the peripheral region. Ventral side slightly lighter in colour. Internal genitalia as in Fig.23-D. Epigynum divided into two lobes united centrally; spermathecae large and oval in shape. Fertilization tube arise from anterior of spermathecae after encircling the spermathecae, open near the epigastric furrow. Two openings of the fertilization tube far away from each other.

**Natural History:** Three female specimens ere collected near a stream with long grasses and natural vegetation in the center of a barron valley bounded by small hills in the quarry of D.G. Cement Factory, D.G. Khan on 3.8.96.

**Distribution:** South Punjab, Pakistan.
**Pardosa shahani n.sp**

*(Fig.21 A-D)*

**Type Material:** Holotype ♂ collected from Vehari with 4 paratype ♂♂

**Etymology:** This species has been named after my friend and teacher Dr. Shahmaz Tanvir Rana.

**Diagnosis:** *Pardosa shahani* sp.nov. is similar to *Pardosa ladakhensis* Tikader and *Pardosa magkasalubong* Barvion and Litsinger but differs from both the species. Differences from *P. ladakhensis* are number of teeth on the chelicerae which are five on the retromargin of new species and three on the retromargin of *P. ladakhensis*. There are no greenish brown patches on the legs of *P. shahani*; instead, tarsus of each leg has a beautifully set long streaks of spines; spermathecae are elongated with much longer guide pockets in *P. ladakhensis*; while the spermathecae are small and rounded and guide pockets are also small. The differences from *P. magkasalubonga*; number of to teeth are 3:3 in *P. magkasalubonga* which are 5:3 in the new species on the retro and promargin respectively. Spermathecae are rounded in the new species which are thumb-like in *P. magkasalubonga*. Median septum is constricted in the middle in *P. magkasalubonga* while it is narrow in *P. shahani*.

**Measurements:** No. of specimens measured: 5; total body length: 13.56 - 14.99 mm (14.21 ± 0.62); carapace length: 5.00 - 5.61 mm (5.30 ± 0.44); carapace width: 2.98 - 4.40 mm (3.7 ± 0.56); abdomen length: 7.87 - 8.97 mm (8.26 ± 0.46); abdomen width: 3.12 - 4.33 mm (3.75 ± 0.54); Leg I: 14.30mm; Leg II: 16.23mm; Leg III: 16.22mm; Leg IV: 16.91mm; Pedipalp length: 5.91mm.
Fig. 21 (A-D) *Pardosa shahani* n.sp.
A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae, ventral view, 100x
C. Chelicerae, lateral view, 100x,
D. Epigynum, internal view, 100x,
(co, copulatory opening and st; spermatheca)
Cephalothorax: Longer than wide, convex, brown in colour, clothed with pubescence. Cephalic region narrow. Anterior row of eyes comprises only two eyes, i.e. anterior medians only. Anterior laterals almost occupy the second row. Anterior row of eyes less wider than the second row. Eyes of the second row larger than the others. Basis of the posterior row provided with conspicuous black patches. Ocular quad wider than long and narrowing in front. Space enclosed between posterior eyes widers than long; center of thoracic region provided with a sharp fovea. A median, broad pale longitudinal band extends from the posterior eyes up to the base of the cephalothorax. Dark longitudinal bands extend on the lateral margins of the thorax. Sternum heart-shaped, pointed behind, brown and clothed with spine-like hair. Labium brown, longer than wide. Maxillae broader at the distal end and provided with conspicuous scopulae. Chelicerae strong, with promargin having five and retromargin with three teeth. Legs stout, clothed with hair and long spines. Tarsus of each leg has a beautifully set long streaks of spines. Spination on Legs = Femur I = 2-1-0-0; II = 1-1-0-0; III = 1-0-0-0; IV = 1-0-0-0; Patella = Without spines; Tibia I = 2-1-0-0; II = 2-2-0-3; III = 2-0-1-2; IV = 0-4 (2-2)-2-2. Metatarsus = 1-2-0-0-0; II = 1-4(2-2)-0-2; III = 2-4(2-2)-1-3; IV = 0-5(1-2-2)-0-2. Leg formula: 4213.

Abdomen: Longer than wide, chocolate brown, covered with pubescence and heavily set hair. Ventrith with alternate pale and brown strips. Epigynum in the form of a sclerotized parallelogram, slightly protruding in the mid-dorsal region. Spermathecae vase-like: opening of the fertilization tube at the base of epigastric plate.

Natural History: Five female specimens were captured by hand picking in a cotton field from Vehari on 10.7.97.

Distribution: South Punjab.
Genus *Arctosa*  Koch, 1847


Type species: *Arctosa cinerea* (Fabricius).
Arctosa shafiqii sp. nov.
(Fig.22 A-D)

Type Material: Holotype ♀ collected from Chak No.31 J.B., Faisalabad on 9.7.96.
Paratype with same data.

Etymology: This species has been named after my beloved adopted son, Shafique Hussain.

Diagnosis: Arctosa shafiqii resembles Arctosa himalayensis Tikader and Malhotra and to some extent with Arctosa tanakai Barrion and Litsinger. The new species can be separated from A. himalayensis in the details of sternum, labium and maxillae and chelicerae. As regards the epigynum: atrium is very broad and tubular anteriorly in A. himalayensis and spermathecae are small and rounded. In A. shafiqii atrium is triangular and spermathecae are large and oblong. In Arctosa tanakai, epigynum, spermathecae are bean shaped; C-shaped median septum, which is contrary to A. shafiqii. A spherical structure with tri-angular like process is present posterior to each spermathecae in A. tanakai; while this process is present at the lateral sides of spermathecae of A. shafiqii.

Measurements: Carapace length 3.71mm, width 2.89mm, abdomen length 3.58mm, width 2.48mm, legs I 10.45mm, II 9.35mm, III 9.08mm, IV 13.06mm. Leg formula 4123.

Cephalothorax: Longer than wide, cephalic region convex and marked with black streak; clothed with pubescence; posterior eyes occupy relatively small area of cephalic region. Anterior row of eyes as long as the second row; medians and laterals of same size and bases of lateral eyes provided with black patches. Eyes of the row larger than the others. Ocular quad wider behind and narrowing in front. Posterior quadrangle wider behind and narrowing in front and bases of posterior eyes provided with conspicuous black patches. Sternum brown, oval, pointed behind and clothed with hair and
Fig. 22(A-D) *Arctosa shafiqii* n.sp.
A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 100x
C. Chelicerae, lateral view, 100x,
D. Epigynum, internal view, 100x,

(at: atrium, fl: fertilization duct, and st: spermatheca)
pubescence. Labium longer than wide, dark brown. Distal end of maxillae broad and provided with conspicuous scopulae. Retromargin of fang row of cheleceae provided with three strong teeth, promargin with two teeth. Legs yellow in colour, moderately strong, clothed with spines and hair. Spination on Legs: Femur I = 1-0-0-0; II = 0-0-0-0; III = 1-0-1-0; IV = 0-0-0-0; Patella = I & II = Without spines; III = 1-0-0-0; IV = 1-1-0-0; Tibia I = 2-0-0-0; II = 0-2-0-0; III = 2-1-0-1; IV = 2-0-0-2; Metatarsus = I = 4(2-2)-0-0-0; II = 0-4(2-2)-0-0; III = 3-3-0-0; IV = 4(2-2)-1-2-1. Leg formula = 4123.

Abdomen: Longer than wide, oval, rounded behind, anterior mid-dorsal provided with a longitudinal lens shaped pale marking. Rest of the abdomen blackish brown. Posterior side of the abdomen has a fringe of thickly set hair. Ventral side slightly lighter in colour.

Epigyne as in Fig.25-D. Epigynum scleritized, spermathecae oval, large and directed towards each other, fertilization tubes arise from anterior mid-region of spermathecae and open far from each other.

Natural History: Two female specimens were collected from red pepper, Capsicum frutescens, field running with other spiders in Chak No.31 J.B., Faisalabad on 9.7.96.

Distribution: Central Punjab, Pakistan

Genus Lycosa Latreille, 1804


**Type Species:** *Lycosa tarantula*    Rossi

   Butt (1996) described 6 new species of genus *Lycosa* from Faisalabad. Qadir (1997) recorded 4 species of genus *Lycosa* from Faisalabad, Chakwal and Sialkot. During present study, 5 already known species were recorded, of which 4 species were recorded for the first time from Pakistan. Further 3 species were regarded as new to science.

   **Lycosa masteri**    Pocock. 1901


**Material Examined**

23♀♂, 1♂: Samundri, Faisalabad: 16.7.98.

   **Lycosa poonaensis**    Tikader & Malhotra, 1980


**Material Examined**

14♀♂, 5♂; Quarry D.G. Cement Factory, D.G.Khan: 31.7.96.

24♀♂, 15♂; Fort Manro: 2.8.96.
6.7.98: Samundri, Faisalabad: 16.7.98.

Lycosa iranii  Pocock, 1901


Material Examined

31♀, 6♂: Maisy Vehari: 10.7.97.

1♀: Samundri: 16.7.98.

Lycosa mackenziei  Gravely, 1924


Material Examined

5♀♀, 3♂♂: Chak No.232 J.B., Faisalabad: 12.7.96.

5♀♀, 4♂♂: Okara; 31.8.96.

1♀: Maisy, Vehari: 10.7.97.

1♀: Samundri. Faisalabad: 16.7.98.

Lycosa barnesi  Gravely, 1924


Material Examined

31♀, 1♀♂: Gujranwala: 27.9.96.
**Lycosa vehariensis sp. nov.**

(Fig.23 A-D)

**Type Material:** Holotype ♀ specimen collected from cotton field in Vehari on 10-7-97

**Etymology:** This species has been named after its type locality Vehari.

**Diagnosis:** *Lycosa vehariensis* resembles *Lycosa tista* inader but can be distinguished from it on the basis of various character: *Lycosa tista* has first row of eyes larger whereas *Lycosa vehariensis* has second row of eyes larger; labium is wider than longer; proximal end of the maxillae broader than the distal end contrary to the *Lycosa tista*. Details of epigynum is both the species is also different. Epigynum plate is long in *P. tista* while it is broad in *P. vehariensis*. Spermathecae are large and in the center of *L. vehariensis* which are small and on the sides in *P. tista*. Fertilization tubes are much convoluted in *P. vehariensis*, while they are straight in *P. tista*.

**Measurements:** No. of specimens measured: 4; total body length: 5.1 - 7.19 mm (6.02 ± 1.08); carapace length: 2.92 - 3.67 mm (3.18 ± 0.34); carapace width: 1.96 - 2.98 mm (2.51 ± 0.42); abdomen length: 2.13 - 3.52 mm (2.89 ± 0.57); abdomen width: 1.19 - 2.43 mm (1.8 ± 0.54).

**Cephalothorax:** Longer than wide, brown covered with pubescence, center of thoracic region provided with a sharp black fovea and brown bands extending from it to the lateral sides. Two black streaks also extend towards the ocular area. AE row straight, shorter than the second row; ME larger than the IE and bases of the laterals provided with conspicuous black patches. Eyes of the second row larger than the others. Ocular quad wider behind and narrowing in front. Bases of the PE provided with conspicuous black patches. Ocular area highly pigmented and appears to be an inverted black V. Space enclosed between posterior eyes wider behind and narrowing in front. Sternum heart-
Fig. 23 (A-D) *Lycosa vehariensis* n.sp.
A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae, ventral view, 100x
C. Chelicerae, lateral view 100x,
D. Epigynum, internal view, 100x.
(at; atrium, ft; fertilization duct, and st; spermatheca)
shaped, pointed behind, pale and clothed with hairs. Labium wider than long, dark brown with the basal indentation prominent. Distal end of maxillae broader and bear conspicuous scopulae. Chelicerae strong and retromargin with two and promargin with three teeth. Legs yellow, stout, clothed with hairs and spines. Spination on legs:
Femur I 0-1-0-0; II = 0-0-2-0; III = 1-0-2-0; IV = 1-0-2-2; Patella I 0-0-1-0; II = 0-0-1-0; III = 0-1-2-0; IV = 1-0-1-0; Tibia I = 3-3-1-0; II = 2-2-3-3; III = 2-2-3-3; IV = 3-3-2-1; Metatarsus I = 3-3-1-2; II = 3-6 (2-2-213-3; III = 3-1-3-3; IV = 3-5(1-2-2)-5(1-2-2)-2. Leg formula = 4213.

Abdomen: Longer than wide, oval, broad anteriorly, clothed with pubescence and black patches. Epigynum plate wider than long; spermathecae rounded; fertilization tubes highly coiled; copulatory openings on the mid anterior side.

Natural History: Four female specimens were collected in the cotton field from Vehari on 10-7-97.

Distribution: South Punjab
**Lycosa khanii** sp. nov.

(Fig. 24 A-D)

**Type Material:** Holotype ♀; collected from D.G. Khan on 1-8-96.

**Etymology:** This species has been named after my respectable supervisor Dr Akbar Ali Khan.

**Diagnosis:** *Lycosa khanii* is similar to *Lycosa madani* Pocock but both the species can be separated on the basis of following differences. Bases of all the eyes have black rims in *Lycosa khanii* whereas in *L. madani* only the bases of posterior eyes have black patches. In the new species, sternum is without black patches; labium wider than long; maxillae broadest in the middle; no paired brown streaks on the tibiae of legs. As regards the epigynum, the middle scape is wider behind and narrow in front in *L. khanii*; while it is long and broad in *L. madani*. Spermathecae are large; fertilization tubes are coiled; scape narrow in the middle, broad below and above in *L. khanii* while it is of uniform size in *L. madani*.

**Measurements:** Total body length 7.8mm, carapace length 4.2mm, width 3.3mm, abdomen length 3.58mm, width 2.2mm; leg I 11.82mm, II 10.59mm, III 10.45mm, IV 14.3mm.

**Cephalothorax:** Yellowish brown, longer than wide, narrowing in front, convex and connered with pubescence. Centre of thoracic region provided with a distinct fovea. A dark garland like streak extends from the fovea to the outer margin of the head. Anterior row of eyes slightly procurved; less wider than the second row and anterior medians larger than the anterior laterals. Eyes of the second row larger than the others. Ocular quad wider behind and narrowing in front. Posterior quadrangle wider posteriorly. Posterior eyes provided with conspicuous black patches. Cephalic area high and provided
**Fig. 24 (A-D)** *Lycosa khani* n.sp.

A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae, lateral view, 100x
D. Epigynum, internal view, 100x,

(at; atrium, ut; uterus and st, spermatheca)
with black patches and black spines and hairs. Sternum brown, heart-shaped, pointed behind and provided with spine like hairs. Labium dark brown, wider than long. Distal end of maxillae and labium provided with distinct scopulae. Chelicerae reddish brown, much hairy, pro and retromargins of the fang furrow each provided with three strong teeth. Legs pale, long, strong and clothed with hairs and spines. Spination on legs:
Femur I = 0-1-0-0; II = 0-1-0-0; III = 0-1-0-0; IV = 0-1-0-0; Patella I = 0-1-0-0; II = 0-1-0-0; III = 0-1-0-0; IV = 1-1-0-0; Tibia = I = 2-2-1-1; II = 2-2-1-1; III = 0-2-1-1; IV = 2-2-2-2; Metatarsus = I = 0-1-2-2; II = 0-1-2-2; III = 1-2-4 (1-1-1-1)-4(1-1-2); IV = 1-2-4(1+1+1+1)-4(1+1-2). Leg formula = 4132.

Abdomen: Longer than wide, oval, chocolate brown, clothed with hairs and pubescence, posterior portion darker than the anterior one, heavily coated with long hairs with increasing frequency from anterior to posterior region. Ventral side slightly lighter in colour with dark brown transverse streaks. Epigynum as in Fig.27-D. Epigynal plate as long as broad, fertilization tubes convoluted and opening separately on the posterior epigynal margin close to each other.

Natural History: Holotype female specimen running in the need. *Arundo donax* near a stream in the open area called quarry bounded by small hills in D.G. Cement Factory, D.G. Khan on 1-8-96.

Distribution: South Punjab.
Lycosa madanensis sp. nov.
(Fig.25 A-D)

Type Material: Holotype ♀, paratype 2♀♀ collected from Vehari.

Etymology: This species has been named after the city of Madina of Holly Place for the Muslims.

Diagnosis: Lycosa madanensis resembles Lycosa mahabaleshwarensis Tikader but can be separated from it as follows: structure of the cephalothorax is different. In L. mahabaleshwarensis, a broad dark brown band extends the whole length of carapace while this band is absent in L. madanensis, instead a butterfly-like pattern is present on either side of fovea; there is no broad black band in the mid-longitudinal region of sternum; labium is wider than long without basal excavation in the new species. In L. madanensis spermathecae are bean shaped, in L. mahabaleshwarensis, they are dumbbell-shaped; atrium is narrow in the new species, contrary to L. mahabaleshwarensis. Uterus is wider in the new species.

Measurements: No. of specimens measured: 3: total body length: 6.00 - 6.98 mm (6.47 ± 0.56); carapace length: 3.30 - 3.75 mm (3.53 ± 0.28); carapace width: 2.48 - 3.71 mm (2.96 ± 0.02); abdomen length: 2.10 - 3.18 mm (2.63 ± 0.60); abdomen width: 1.84 - 2.83 mm (2.24 ± 0.51); leg formula: 4213.

Cephalothorax: Brown, longer than wide, convex, clothed with pubescence, center of thorax with a conspicuous fovea and prominent brown bands radiate to the sub-lateral sides. AL row straight and almost as wide as the second row. AME larger than the ALE. Eyes of the second row larger than the others. Ocular quad wider behind and narrowing in front. Bases of the posterior eyes provided with conspicuous black patches space enclosed between PE as long as wide and slightly wider behind than in front. Spine like
Fig. 25 (A-D) Lycosa madaniensis n.sp.
A. Body, dorsal view 40x,
B. Sternum, labium and maxillae, ventral view; 100x.
C. Chelicerae, lateral view, 100x,
D. Epigynum, internal view, 100x,
(cf; epigastric furrow, ft; fertilization duct, ut; uterus and st, spermatheca)
hairs present in the ocular area and pubescent drops on the lateral sides. Sternum heart-shaped, pointed behind, brown provided with spine like hairs. Labium dark brown, wider than long basal excavation prominent. Distal end of maxillae provided with scopulae and strong hook like structure, lateral sides of maxillae with prominent spine like hairs. Chelicerae brown strong and hairy. Promargin with two and retromargin with three teeth. Legs brown provided with spines and hairs.

**Abdomen:** Longer than wide, oval, clothed with black patches, pubescence and hairs. Ventral side uniformly brown and pubescent. Female genitalia as in Fig.28-D. Spermathecae sclerotized and a pair of fertilization tubes originate from the posterior median margin of spermathecae and lead dorsally into the vaginal tube.

**Natural History:** Holotype ♂ with two paratype ♀ collected from cotton field in Vehari on 10-7-97.

**Distribution:** South Punjab

**Genus Evippa** Simon, 1882


**Type species:** *Evippa arenaria* Simon, 1882

**Material Examined**

33♀♂, 10♂♂: Chak No.232 J.B., Faisalabad; 12.7.96.

53♀♂, 22♀♂: D.G. Khan; 31.7.96.

2♀♂: Gujranwala; 27.9.96.


12♀♂, 10♂♂: Mailsy, Vehari; 10.7.97.

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**Material Examined**

25♀♂, 15♂♂: Fort Munro; 2.8.96.
Family LINYPHIIDAE  Blackwall, 1859
(Sheet-Web or Dwarf Spiders)


This is one of the largest families with 562 genera and 4263 species (Platnick, 2006). In Pakistan, Butt & Beg (1996) described a new species (Erigone dentate) from Faisalabad. During present study one known species has been recorded from Punjab.

Genus Atylena  Simon, 1894


Atylena Simon is a small genus with only five known species in the world (Platnick, 2006). The genus has already been studied in Pakistan by Gill (1999) who reported two species from Faisalabad. In this survey one species has been recorded from Punjab.

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Type Species: *Atypena superciliosa* Simon

**Distribution:** Sri Lanka, Thailand, Philippines, Pakistan.

*Atypena adelinae* Barrion & Litsinger. 1995


**Material Examined**

12 ♀♂, 3 ♀♂ from Gujranwala paddy field in 2 ♀ from Bahadarnagar, Okara, 4♀♂ & 10♀♂ from Rawal Dam Rawalpindi, 15♀♂ and 2♂♀ from T.T. Singh. 5 ♀♀ from Jamkay Cheema Sialkot. 37♀♂, 5 ♀♂ from Faisalabad. 6♀♂ from Kala Shah Kaku.
Family **Micryphantidae/Erigonidae** Chamberlin, 1948


**Genus Erigone Audouin**


**Type Species:** *Erigone longipalpis* (Sundevall)

**Distribution:** Asia, North & South America and Australia.

*Erigone dentata*

**Specimen Examined**

18♀♂ and 4♂ collected from Faisalabad. 1998.

5♀♂ and 2♀ collected from Rawalpindi. 1997.
Family TETRAGNATHIDAE  Menge, 1866  
(Long-jawed Spiders)


The family Tetragnathidae Menge is considered as a senior synonym of Metidae (Heimer and Nentwig, 1982; Levi, 1986). This is a large family having 55 genera and 1027 species (Platnick, 2006). It was previously studied in Pakistan by Dyal (1935), Qureshi (1982), Khatoon (1985-86), Shabbir (1997). Qadir (1997), Gill (1999), and Razzaq (2002). During present study one genus and 8 species were collected from different localities.

Genus Tetragnatha  Latreille, 1804


Tetragnatha Latreille is considered as a senior synonym of *Eueta* Simon, and *Arundognatha* Wiehle (Levi, 1981). This genus is comprised of 340 species (Platnick, 2006). In Pakistan Qureshi (1982) recorded two species (including one in genus *Eueta* Simon) from Lahore. Later on Khatoon (1985-86) listed three species from Islamabad. One new to science and one already recorded by Qureshi (1982). The new species (*Tetragnatha cundata*) was without illustration and the name was also preoccupied by *T. cundata* merton. Shabbir (1997) and Gill (1999) recorded two species from Sialkot and Faisalabad respectively. During present study seven species were recorded and three species were considered as new ones.

*Tetragnatha mandibulata* Walekner, 1841


In Pakistan this species has been reported by Shabbir, 1997 and Gill, 1999 from Sialkot and Faisalabad respectively. During present study, it was recorded from Faisalabad, Jhang & Rawalpindi.

**Specimens Examined**

24♀♂. 3♀: Thikarywala, Faisalabad: 10.06.97.

33♀♂. 21♀: Head Tarimun, Jhang: 21.11.98.

15♀♂. 11♀: Rawal Dam, Rawalpindi: 1.9.97.

*T. javana* **Thorell, 1890**


Tetragnatha vermiciformis  Emerton, 1844


Material Examined

53♂♂. 31 ♀♀: Head Tarimun: Jhang 21.11.98.

Tetragnatha ceylonica  Cambridge, 1869


Material Examined

**Tetragnatha saadi** sp.nov.
(Fig.26 A-D)

**Type Material:** Holotype: Rawal Dam, Rawalpindi, 1-9-97; paratype: with same data.

**Etymology:** This species has been named after Miss Saadia who helped me in my drawings.

**Diagnosis:** *Tetragnatha saadi* resembles *Tetragnatha maxillosa* a Thorell but the two species can be separated by the difference in the number of teeth on the Chelicera. In *Tetragnatha saadi* there are seven teeth on the promargin and seven teeth on the retromargin. Whereas in *T. maxillosa* there are seven teeth on the promargin and nine teeth on the retromargin. In *T. saadi* epigynal fold is broad rather than long and there is no subglobular brown spots at the mid length contrary to the *T. maxillosa*.

**Measurements:** Total length: 9.07mm; carapace length: 2.61mm; width: 1.73mm; abdomen length: 6.46mm; width: 2.2mm; Leg I: 16.5mm; Leg II: 15.02mm; Leg III: 9.9mm; Leg IV: 11.28mm.

**Cephalothorax:** Longer than wide: brown yellow, cephalic area parallel sided and gradually sloping to thorax. Eight eyes in two rows: AE: recurved; PI: less recurved; clypeus high; MOQ wider in front than behind; eyes encircled by black rings. Frons deep with a pair of C-shaped reddish brown marks. Eye formula: PME > AME > ALE > PLE. Sternum brown with an upper cap of blackish brown colour: longer than wide; extended laterally and posteriorly beyond coxae IV; broad anteriorly and pointed posteriorly. Labium dark brown, wider than long: maxillae yellow, long than wide; expanded anteriorly and laterally, narrow posteriorly: both labium and maxillae are heavily scopulated. Chelicerae strong with seven teeth on pro and retromargin each. Fangs with a spur. Legs long, slender, yellowish brown; pedipalp yellow with a single clawed


The species was recorded by Shabbir (1997) from Sialkot and from Faisalabad by Gill (1999). During present study it was collected from Faisalabad, Okara and Jhang.

**Specimens Examined**

- 1♂, 1♀♀: Okara: 30.8.96.
- 12♀♀: Thikarywala, Faisalabad: 10.6.97.
- 8♀♀: Chak No.269 J.B. Jhang: 11.4.98.
- 16♀♀, 1♂: Head Tarimun, Jhang: 21.11.98.

**Tetragnatha virescens**


**Specimens Examined**

- 13♀♀, 3♂: Head Tarimun: 21.11.98.
Fig. 28(A-D) *Tetragnatha saadii* n.sp.
A. Body, dorsal view, 40x.
B. Sternum, labium and maxillae, ventral view; 100x
C. Chelicerae, lateral view, 100x,
D. Epigynum, internal view, 100x,

(at; atrium, ft; fertilization duct, ut; uterus and st; spermatheca)
tarsus. Spination on legs = Femur I = 0-4(2-2)-1-0; II = 1-0-2-0; III = 0-0-2-0; IV = 0-0-2-0; Patella = 1. II & III = Without spines; IV = 0-0-0-1; Tibia I = 0-0-0-0; II = 0-0-0-0; III = 1-1-0-0; IV = 2-2-1-0; Metatarsus = I & II = Without spines; III = 1-1-1-0; IV = 2-2-1-0. Leg formula = 1213.

Abdomen: Brownish yellow, widest at the upper end, brownish green, abdominal tip rounded and extended beyond the spinnerets. A blackish band extends longitudinally in the mid-dorsal region throughout the length. Mosaic pattern in the form of blackish ridges at both sides of abdomen. Epigynal plate broad; epigynum bilobed spermathecae ovoid; median septum absent; fertilization tubes coiled; copulatory tubes broad and open separately through copulatory opening near the epigastric furrow.

Male: Unknown

Natural History: Two female specimens were collected from Rawal Dam, Rawalpindi from Gardinea, Citrus limon on 1-9-07.

Distribution: North Punjab
Tetragnatha cunnicalus sp. nov
(Fig. 27 A-G)

Type Material: Holotype ♂ collected from maize field on 10-6-97 from Thikarywala, Faisalabad.

Male: Unknown

Etymology: This species has been named after the rabbit-like ears.

Diagnosis: *T. cunnicalus* resembles *T. nitens* (Audouin, 1827) but can be distinguished from it by differences in the number of teeth on the chelicerae. In *T. cunnicalus* there are 7 teeth on the promargin and 9 teeth on the retromargin whereas in *T. nitens*, there are 6 teeth on the progarmin and 9 teeth on the retromargin. In *T. nitens*, the epigynal fold is long; in *T. cunnicalus* it is broad; a strong tuft of flagella arising from epigastric furrow to the uterus; spermathecae rounded rather than cup-like; fertilization tubes directed downward, copulatory tubes broad and open through conical copulatory openings at the base of epigynal plate; contrary to the *T. nitens*.

Measurements: Total length: 7.43 - 9.00mm (8.26 - 0.79); carapace length: 1.43 - 3.00mm (2.43 ± 0.86); carapace width: 1.79 - 1.98mm (1.86 ± 0.10); abdomen length: 5.82 - 6.00mm (5.92 ± 0.09); abdomen width: 2.31 - 2.61mm (2.16 ± 0.15); Leg I: 16.91mm; Leg II 13.34mm; Leg III 8.11mm; Leg IV 11.26mm; Fang: 2.75mm long; 0.69mm wide.

Cephalothorax: Long than wide, yellowish brown except for black eye margins; narrow towards cephalic and broad in the thoracic region. Fovea distinct, a recurved pit, transverse bands radiating from fovea to the peripheral region. Eight eyes in two rows both rows slightly recurved. AE row and PE rows of equal length. MOQ wider behind than in front Clypeus high. Shining leaf scale like structures scattered here and there. Sternum reddish brown, longer than wide, anterior end concave for reception of labium.
Fig. 27 (A-G) *Tetraguatha cuuniculus* n.sp.

A. Body, dorsal view, 20x,
B. Labium and maxillae, ventral view, 40x,
C. Frontal view with chelicerae, 40x,
D. Cephalothorax, lateral view, 20x,
E. Chelicerae, lateral view, 40x,
F. Epigynum, external view, 40x,
G. Epigynum, internal view, 100x,

(at; atrium, ft; fertilization duct, ut; uterus and st; spermatheca)
base: labium blackish brown with yellowish top, wider than long. Maxillae longer than wide, yellowish brown, apex moderately rounded, two tufts of hair on the upper side. Chelicerae reddish brown. Promargin with seven and retromargin with nine teeth. Fang with a strong ventral excrescence lacking anterior to retromarginal guide tooth at rest. Guide tooth small. Legs yellow brown, coxae brown, legs slender. Spination rare, hairs sparse. Pedipalps yellow. Spination - Femur I = 0-6, II = 4-1-1-1-1-1-1-1-1; II = 2(1-1):4(1-1-1)-1-3(1-1-1)-0; IV = 0-1-1-0; I V = 1-0-4(1-1-1-1)-0; Patella I = 0-0-1-0; II = 1-0-1-0; III = 0-0-1-0; IV = 0-0-1-0; Tibia I = 2-2-2-0; II = 2-3(1-1)-1-0-0; III = 1-1-0-0; IV = 2-2-2-0; Metatarsus I = 1-2-1-1; II = 0-2-2; III = 0-0-1-0; IV = 2-1-1-0. Leg formula: 1243.

Abdomen: Longer than wide, anterior and posterior ends rounded: yellowish brown with black patches scattered all over. Ventral side yellow with chocolate brown patches. Abdomen extending beyond the spinnerets. Epigynum scape wide with ridges and furrows, median septum indistinct. Spermatical sacs present at mid length of the epigynal plate. Spermatical ducts convoluted and receptacle is comparatively broad with distinct openings on the posterior epigynal margin: copulatory tubes broad, opening by conical copulatory openings at the base of epigastric furrow.

Natural History: 3♀2♂ were collected from maize field, *Sorghum vulgare* from Thikarywala, Faisalabad on 10-6-97.

Distribution: Central Punjab, Pakistan.
Family ARANEIDAE  Latreille, 1806
(Typical Orb-Weavers)

1806. Araneides Latreille: Genera Crustaceorum et Insect., 1:82.


Araneidae is a large family with 163 genera and 2823 species in the world (Platnick, 2006). This family has been studied in Pakistan by Dyal (1935). Qureshi (1982). Arshad et al. (1984). Qadir (1997). Razzaq (2002). Ghafoor and Beg (2002). During present study 11 genera with 20 species were recorded from various localities of which 6 species were considered as new to science.

Type genus: Araneus Clerck, 1757

Genus Neoscona Simon, 1864


Neoscona Simon was listed by Roewer as a synonym of Araneus Clerck, but accepted as a separate genus by all recent authors. The genus is represented by 93 described species in the world (Platnick, 2006). Simon (1907) recorded one species from
Karachi. Dyal (1935), Arshad et al. (1984), and Khatoon (1985-86) recorded three species of the genus *Neoscona*. Qadir (1997) and Razzaq (2002) also recorded the genus from Punjab, and Northern areas respectively. During present study, seven known species were recorded from various localities of Punjab.

**Type species:** *Neoscona anabesca* (Waldkenaer, 1842)

**Distribution:** Cosmopolitan.

*Neoscona bengalensis*  
Tikader & Bal, 1981


This species was reported by Qadir (1997) from Sialkot. Razzaq (2002) from northern areas. During present study it has been collected from various localities of Punjab.

**Material Examined**


1♂♂: Kalim Shaheed Park, Faisalabad: 20.7.96.

1♂♂: Malikbar: 30.8.96.

8♀♀: Gujranwala: 27.9.96.

7♀♀: Jhang: 20.5.97.


1♂♂, 1♀: Murree Hills: 31.8.97.

5♀♀: Rawal Dam, Rawalpindi: 1.9.97.
4♀♂: Mian Chakwal, Rawalpindi: 10.11.97.

4♀♂: Toba Tek Singh: 13.11.97.

1♂: Chak No.269 J.B., Jhang: 11.4.98.

5♀♂, 2♀♂: Kalim Shaheed Park, Faisalabad: 15.8.98.

1♂: Khanpur, Rahim Yar Khan: 15.9.98.

1♂: Lohari: 21.11.98.

*Neoscona nukerji* Tikader, 1980


Previously this species was recorded from Sialkot by Qadir (1997). During present study it was collected from almost all over Punjab.

**Material Examined**

12♀♂: Chak No.31 J.B. Faisalabad: 8.7.96.

16♀♂: Chak No.252 J.B. Faisalabad: 12.7.96.

16♀♂, 12♀♂: Kalim Shaheed Park: 20.7.96.

1♂: Gujranwala: 27.9.96.

2♀♂: Chishtian, Bahawal Nagar: 15.8.97.


34♀♂, 9♀♂: Rawal Dam Rawalpindi: 1.9.97.
25\textcircled{2} \textcircled{8} 8: Islamabad: 1.9.97.


19: Mian Chakwal: 10.11.97.

19: Chak No.269 J.B. Jhang: 11.4.98.

6\textcircled{2} 17: Shah Kaku, Sheikhupura: 24.6.98.

9\textcircled{2} 1: Gujwala, Faisalabad: 25.6.98.

7\textcircled{2} 2: Samundri: 16.7.98.

10\textcircled{2} 10: Rakh Khairaywala, Liaoh: 21.11.98.

\textit{Neoscona poonaensis}  Tikader & Bal, 1981


\textbf{Material Examined}

21\textcircled{2} 2: Rawal Town, Rawalpindi: 29.8.97.

\textit{Neoscona excelsus}  Simon, 1889


\textbf{Material Examined}

32\textcircled{2} 7: Rawal Town, Rawalpindi: 29.8.97.
Neoscona elliptica  Tikader & Bal, 1981


Material Examined

1♀: Murree Hills; 31.8.97.

Neoscona sinhagadensis  Tikader, 1975


Qadir (1997) recorded this species from Sialkot. During present study, it was collected from Faisalabad & Gujranwala.

Material Examined

1♀♀, 4♂♂: Kalim Shaheed Park; 26.7.96.

1♂: Gujranwala; 27.9.96.

Neoscona theis  Waleckaer, 1842


Qadir (1997) and Razzaq (2002) reported this species from Sialkot & Northern areas. During present study this species was recorded from all over Punjab.

**Material Examined**

27♀♂. 8/7: 31 J.B. Faisalabad: 8.7.96.

5♀♂. 8/7: Chak No.232 J.B. Faisalabad: 12.7.96.

21♀♂. 8/7: Chak No.197 R.B. Faisalabad: 18.7.96.

22♀♂. 9/7: Kalim Shaheed Park Faisalabad: 20.7.96.

7599. 15 88: Gujranwala: 27.9.96.

1498: Jhang: 20.5.97.

19: Chishtian, Bahawal Nagar: 15.8.97.

5299 15 88: Rawal Town, Rawalpindi: 30.8.97.


29: Kallar Kahar, Chakwal: 11.10.97.


6199 14 88: Chak No.269 J.B. Jhang: 11.4.98.


19: Khanpur Rahim Yar Khan: 15.9.98.

**Genus Argiope**  
**Audouin, 1826**


The original spelling of the genus *Argiope* was suppressed by ICZN opinion 1038; considered a senior synonym of *Australargiope Kishida*. genus has 81 species up till now (Platnick, 2006). In Pakistan, Simon (1884) reported *Argiope asasija* Thorell from Karachi. Dyal (1935) recorded another species of this genus from Lahore. Khatoun (1985-86) reported two species including one new record from Islamabad. During present study two species were recorded; of which one species is considered to be new to science.

*Argiope trifasciata*    **Forskal, 1775**


*Argiope trifasciata* (Forskal) is cosmopolitan. Tikader (1982) mentioned its distribution in Peshawar, NWFP. During present study, it was collected from T.T. Singh.

**Previous Locality Record:** Cosmopolitan, Pakistan, Peshawar, NWFP, India: Shillong, Jaintia Hills, Meghalaya, Assam.

**Material Examined**

In the present study 3 M, 2 F were studied captured from Govt. College for Women Toba Tek Singh on 13.11.97.
Argiope bahawulensis sp. nov.
(Fig.28 A-{1})

Type Material: Holotype ♀ collected from Chishtian Bahawal Nagar on 15.8.97, 1 paratype ♀ with same data: 1 paratype ♂ collected in June 1998 from Sahiwal

Etymology: This species has been named after its type locality Bahawalnagar.

Diagnosis: Argiope bahawulensis resembles Argiope arcuata Simon but can be distinguished from it on the basis of following characters: AME reddish and both rows of eyes are procurred; ALE and PLE are not situated on tubercles contrary to the situation in A. arcuata. Maxillae pentagonal in A. arcuata, while they are almost a parallelogram and transverse in position in A. bahawulensis. Chelicerae are strong and robust with prominent boss in A. bahawulensis while chelicerae are weak with rudimentary boss in A. arcuata. There are two pairs of Sigilla instead of three in A. bahawulensis. In Epigynum of A. arcuata the spermathecae are kidney shaped, median septum roughly Y-shaped, epigastric plate triangular while in A. bahawulensis, the median is narrow strip; spermathecae are large oblong with rounded structures on the lateral side: fertilization tubes coiled; epigynal rim prominent V-shaped while in A. arcuata, spermathecae are small; fertilization tubes short and epigynal rim is not prominent.

Measurements: Carapace L 6.6mm, W 5.23mm, abdomen L 17.32mm, W 11.00mm, pedipalp L 6.18mm, Leg I 35mm, II 33mm, III 22mm, IV 43mm. Leg formula 41.23.

Cephalothorax: Blackish brown in colour with black pigmentation. Longer than wide, narrowing in front, cephalic region slightly elevated from thoracic region. One median band and many transverse bands present on the thoracic region. Thorax is covered with hair and black pigment ocular quad much longer than wide; AME reddish and procurred. PME encircled by black rings; L.F. close and each situated on tubercle. A.F. smaller than
Fig. 28 (A-D) *Argiope bahawalensis* n.sp.

A. Body, dorsal view, 20x,
B. Sternum, labium and maxillae, ventral view, 60x,
C. Chelicerae, lateral view, 60x,
D. Epigynum, internal view, 100x,

(at; atrium, ft; fertilization duct, ut; uterus and st; spermatheca)
the PI.E: Sternum heart-shaped clothed with pubescence and hair. Rim of the sternum dark brown while the central area is yellow with network of patches: labium wider than long and yellowish brown; maxillae provided with distinct scopulae else theae strong with a clear boss having 3 teeth on the pro margin and three teeth on retromargin. Legs strong provided spines and hairs. Spination = Femur I = 3(1-1-1)-2-0-0; II = 0-3(1-1-1)-1-2; III = 3(1-1-1)-0-3(1-1-1)-0; IV = 2(1-1)-0-1-1; Patella without spines. Tibia I = 1-2-2-3(1-1-1); II = 1-2-4(2-2)-0; III = 2-2-1-2; IV = 2-1-2-2; Metatarsus I = 1-2-4(2-1-1)+3; 1-1-1; II = 2-1-4(2-2)-3(1-1-1); III = 1-2-2-1; IV = 2-2-2-2; Leg formula = 4123

Abdomen: Large, provided with many lobes on the sides and one median tail like lobe at the posterior end. Dorsum of abdomen brown and yellow with transverse black patches; provided with two pairs of diffused sigilla. Ventral side brown with yellow patches and a yellow T-shaped patch extending from epigastric furrow to the spinnerets. Three pairs of distinct sigilla on the ventral side. In epigynum, spermathecae oval, scape narrow, fertilization tubes bordering spermathecae and opening separately in the wide copulatory opening.

Natural History: Two female specimens were collected from Chishmian, Bahawal Nagar on 15.8.97 from cotton field, *Gossypium herbaceum*; one female specimen was collected from date palm in maize field in Sahiwal during June 1998.

Distribution: South-east Punjab

**Genus P报ys** C.L. Koch, 1843


**Type species**: Poltys ocygnus C.L. Koch, 1843

Poltys C.L. Koch has 44 known species in the world (Platnick, 2000). This genus is not well known in Pakistan Qadir (1997) recorded the genus from Sialkot. Presently, a single species has been recorded from the Punjab.

**Poltys nagpurensis**    Tikader, 1982


**Material Examined**


**Previous Locality Record**: Kaweli Swanga, Nagpur, Maharashtra, India.

**Genus Nephila**    Leach, 1815


**Type species**: *Nephila maculata* (Fabrinius)

This genus has been reported for the first time from Pakistan.

*Nephila malabarensis* Walekenaer, 1837


**Material Examined**

13♂♀. 1 ♀: Govt. College (W), Santundi: 16.7.98.

**Genus Zilla** Koch, 1834


In Pakistan Dyal (1935) reported a single species from Lahore. Qadir (1997) reported this genus from Sialkot. During present study, this genus was reported from Jhang, Vehari and Faisalabad.

*Zilla nawazi* Dyal, 1935


**Material Examined**

11v. 2 / 269 J.B. Jhang; 12.4.98

15: Malhiy. Vehari; 10.7.98.


**Genus Leuceage** White, 1841


Levi (1980) confirmed Leucan e white as a senior synonym of Opas O.P. Cambridge and Plesiometa O.P. Cambridge. Some workers still include this genus in family Araneidae (Biswas & Majumder, 1995; Biswas & Biswas, 1996; Biswas et al., 1997; Biswas & Biswas, 2003), while other authors treat it in family Tetragnathidae (Chen, 1997; Eberhard and Huber, 1998; Tso and Patel, 2003a). This is a large genus containing 177 species (Platnick, 2006). Dyal (1935) reported three species of the genus from Lahore one of these was transferred to genus Tylozida Simon by Chrysanthus (1975). Khatoon (1985-86) listed two already recorded species from Mangla: Kashmir and Islamabad. Qadir (1997) and Razzaq (2002) reported two species from Sialkot and Kaghan respectively. During present study, two known species were recorded.

**Type species:** Leucan e argyrobuspta (White, 1841)

**Distribution:** Cosmopolitan

**Genus Leucan e decorat e** Blackwall, 1864


Dyal (1935) was first to record this species from Lahore, Pakistan. Later on Khatoun (1985-86), Qadir (1997) and Razaq (2002) described it from Mangla, Sialkot & Kaghan respectively. During present study, this species was collected from various localities of the Punjab.

Material Examined

31: 9; Chak No.31 J.B. Faisalabad: 9.7.96.

10: 9; Chak No.197 R.B. Faisalabad: 19.7.96.

4: 2; Kalim Shaheed Park, Faisalabad: 20.7.96.

24: 2; Okara: 30.8.96.
Leucange celebesiana  Walekenaer, 1841


During present study this species was recorded from Rawalpindi.


**Material Examined**


**Genus Crytophora** Simon, 1864


(Platnick, 2006) listed 45 species of the genus *Cryptophora* Simon from the world. Dyal (1935) and Khatoon (1985-86) recorded *C. cicatrosa* (Stoliczka) and *C. cinctica* (Forskal) from Lahore & Islamabad respectively. During present study, one new species has been recorded from Rawalpindi, Vehari & Faisalabad.

**Type species:** *Cryptophora citricola* (Forskal. 1775)

*Cryptophora citricola*     Forskal, 1775


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Dyal (1935) was first to record this species from Lahore, Pakistan. Arshad et al. (1984) reported it from Peshawar. Khatoon (1985-86) and Qadir (1997) recorded it from Rawalpindi and Sialkot respectively. During present study it was recorded from various localities of Punjab.

**Material Examined**


2♂♀: Gujranwala: 27.9.96.

2♂♀: Jhang: 20.5.97.


3♂♀: Bahawalnagar: 15.8.97.

2♂♀: Rawal Dam, Rawalpindi: 1.9.97.

2♂♀: Chak No.269 J.B. Jhang: 12.4.98.


1♀: Shakkot, Sheikhupura: 25.6.98.
Kallim Shaineed Park, Faisalabad; 15.8.98.

Leah; 21.11.98.
Cryophora pindori sp. nov.
(Fig.29 A-E)

**Type Material:** Holotype ♀ from Rawal Dam Rawalpindi; ♀ paratype females with same data; 1 ♀ paratype from Malay; one pratype ♀ Faisalabad.

**Etymology:** This species has been named after its type locality Rawalpindi.

**Diagnosis:** This species is close to Cryophora citricola Forskal but can be separated from it in the sense that ALE and PLF are contiguous and not situated on tubercles; thoracic fovea indistinct in this species whereas fovea is distinct and trifid in C. citricola. In C. pindori chelicerae are not swollen at the base; black bands at the joints of all the legs; and abdomen with three pairs of lateral humps which are two in C. citricola. Epigynal plate is broad in C. citricola while it is long in C. pindori; scape is broad in C. pindori while it is narrow in C. citricola.

**Measurements:** No. of specimens measured: 12; total body length: 2.84 - 4.79 mm (3.75 ± 0.60); carapace length 1.00 - 1.98 mm (1.56 ± 0.33); carapace width 0.51 - 1.27 mm (0.95 ± 0.24); abdomen length: 1.46 - 2.81 mm (2.20 ± 0.54); abdomen width: 1.58 - 2.32 mm (1.91 ± 0.52).

**Cephalothorax:** Slightly longer than wide, narrowing anteriorly, very broad posteriorly, densely clothed with pubescence and hairs. Thoracic fovea indistinct. Ocular quad forming a trapezium situated on an elevation wider than long, wider behind than in front; PME larger than AME. Lateral eyes subequal in size, close to each other and situated on prominent tubercles; both rows of eyes strongly recurved. Sternum triangular, very pointed behind coxae orange in colour; labium wider than long; dark brown; maxillae longer than wide, provided with distinct scopulae. Chelicerae strong provided with boss.
Fig. 29(A-FD) *Cryptohora pindori* n.sp.
A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae, ventral view, 80x,
C. Chelicerae, lateral view, 80x,
D.É Epigynum, internal view, 100x,

(at; atrium, ft; fertilization duct, ut; uterus and st; spermatheca)
Legs short, strong, stout, with black bands on joints, clothed with pubescence, hair and spines.

**Abdomen:** Dark brown high up anteriorly, and strongly overlapping over the cephalothorax, thickly clothed with pubescence and hair. Dorsum of abdomen provided with three pairs of lateral humps and on paired bifid caudal humps. Five pairs of sigilla arranged mid-longitudinally. Two silvery transverse bands on the abdomen, one in the anterior and one in the posterior region. Internal genitalia as in Fig.33-F. Epigynal plate broad, spermathecae elongated, fertilization tubes coiled opening at the base of the epigynal plate far from each other, scape wide below and above and narrow in the middle; copulatory opening wide characteristic of the Araneidae.

**Natural History:** 15 specimens were collected from Rawal Dam, Rawalpindi on 19.9.97 from gardenia, Citrus lemon and ornamental plants; 1 specimen was collected from Mailly, Vehari on 10.7.97 from cotton field; 1 specimen was collected from Chak No. 232.L.B., Faisalabad on 12.7.96 from Maize.

**Distribution:** North, Central and South Punjab, Pakistan.

**Genus Araneus** Clerck, 1757


The generic name *Araneus* was validated by ICZN Direction 104. This is a very large genus containing 682 species distributed all over the world (Platnick, 2006). Dyal (1935) studied the genus from Lahore and described three new species, of which two species, i.e., *A. fulvus* Dyal and *A. formosus* Dyal were preoccupied and replaced with *A. fulvelus* (Roewer), and *A. formosellus* (Roewer), respectively (Platnick, 2004). Khatoon (1985-86) and Qadir (1997) also recorded the genus from Punjab. During present study, three species were recorded, of which one species was considered to be new to science.

**Type Species:** *Araneus diadematus* Clerk. 1757

**Distribution:** Cosmopolitan

*Araneus aympha* Simon, 1889


This species has already been reported from Lahore (Dyal, 1935) and Sialkot (Qadir, 1997).

**Material Examined**


*Araneus himalayensis* Tikader, 1975


**Material Examined**

Araneus kalashahensis sp. nov.
(Fig. 30 A-D)

Type Material: Holotype ♂ specimen collected from Sheikhpura on 24.6.98: 4 paratype ♂ with same data.

Etymology: This species is named after its type locality.

Diagnosis: Araneus kalashahensis resembles Araneus nympha Simon but differs from it in following points: No X-shaped white patch in the cephalic region and no transverse groove in the thoracic region which are present in A. nympha. In A. kalashahensis there are three pairs of sigilla on abdomen instead of four; and no bands on the legs contrary to A. nympha. Epigynum scape is not broad and wrinkled like A. nympha.

Measurements: No. of specimens measured: 5; total body length: 4.32 – 5.7 mm (4.95 ± 0.61); carapace length: 1.78 – 2.68 mm (2.26 ± 0.37); carapace width: 1.46 – 2.13 mm (1.7 ± 0.55); abdomen length: 2.38 – 3.02 mm (2.69 ± 0.28); abdomen width: 1.70 – 2.26 mm (1.97 ± 0.19).

Cephalothorax: Longer than wide, narrowing in front. Cephalic region yellow, Ocular quad wider than long, wider behind than in front. AM eyes smaller than PM. All the eyes encircled by black rings. Lateral eyes close to each other and each situated on a tubercle. Both the rows of eyes recurved. Sternum heart-shaped, pointed behind, brown in colour, clothed with pubescence and hairs. Eye formula: PME > AME > ALE > PLE an inverted Y-like band extend between the PME to the end of cephalic region. To small leaf-like transverse bands in the thoracic region. Labium wider than long, brown, maxillae triangular provided with scopulae. Chelicerae moderately strong, brown, medium boss with four teeth on the retromargin and three teeth on the promargin. Legs moderately long and thin, yellow densely clothed with hairs and spines. Spination on
Fig. 30 (A-D) *Araneus kalashahensis* n.sp.
A. Body, dorsal view 40x
B. Sternum, labium and maxillae, ventral view, 100x
C. Chelicerae, lateral view, 100x
D. Epigynum, internal view, 100x,
(at; atrium, ft; fertilization duct, ut; uterus and st; spermatheca)
legs: Femur I. II & IV = Without spines; III = 2-0-0-0; Patella without spines; Tibia = 1-0-0-0-0-0; II = 1-0-0-0; III = 3-0-0-0-0; IV = 0-0-0-0-0; Metatarsus without spines.

**Abdomen:** Oval longer than wide, clothed with pubescence and hair. Dorsum yellow with dark brown lines provided with three pairs of sigilla arranged mid-longitudinally. Ventral side yellow with grey lines. Epigynal fold narrow, epigynal plate broader than long, external opening present at the broader epigynal fold; scape straight and short; fertilization ducts lead to spermathecal sac and a pair of sub-terminal tubes directed postero-laterally.

**Natural History:** Five female specimens were collected from orange jasmine, *Murraya exotica* near a follow rice field in Kala Shah Kaku, District Sheikhupura on 24.6.98.

**Distribution:** East Punjab, Pakistan

**Genus Cyclosa**  
Menge, 1866


*Cyclosa* Menge is considered as a senior synonym of *Parazygia caporiacco* by Levi (1977). The genus contains 171 species and widely distributed (Platnick, 2006). In Pakistan, Dyal (1935) recorded three species of this genus from Lahore; of these one species was new to science. Qureshi (1982) recognized another species from Lahore. Khatoon (1985-86) reported this genus from Islamabad. Ghafoor and Beg (2002) revised the genus and described a new species from Faisalabad. During present study four species were collected; of which one species was considered as new.

**Type Species:** *Cyclosa conica* (Pallas, 1772)

**Distribution:** Cosmopolitan

*Cyclosa fissicauda*  Simon, 1889


**Material Examined**

32 23. 9 7: Kalim Shaheed Park, Faisalabad: 10.8.97.

*Cyclosa confraga*  Thorell, 1892


Patel & Vyas (2001) and Patel (2003a) erroneously spelled as *C. contraga*. The accepted spelling is *C. contraga* which is followed here. This species has been recorded in Pakistan by Dyal (1935) from Lahore, Khatoon (1985-86) from Islamabad and Qadir (1997) from Sialkot. During present study, it was collected from Faisalabad, Sialkot, T.T. Singh & Leiah.

**Material Examined**

4♂♂♂♂, 15♂♂♂♂: Kalim Shaheed Park Faisalabad: 20.7.96.


32♂♂♂♂: 209 J.B. Jhang: 11.4.98.

1♂: Tob. Tej Singh: 15.6.98.

1♀: Tob. Leiah: 21.11.98.

* Cyclosa spirifera Simon, 1889


Ghafoor (2002) recorded this species from Faisalabad. During present study, it was collected from Faisalabad.

**Previous Locality Record:** Pakistan: Faisalabad, Indiat Joansar, Thadyar.

**Material Examined**

Cyclosa diadesmia sp. nov.
(Fig. 51 A-E)

Type Material: Holotype ♀ collected from Faisalabad; 2 paratype ♀♀ with same data; 1 paratype ♀ from Murree Hills.

Etymology: This species has been named due to its two sub-posterior humps.

Diagnosis: Cyclosa diadesmia resembles Cyclosa doshukofa Barrion and Litsinger and Cyclosa insulana Costa but can be differentiated from both by the following characters. In Cyclosa diadesmia PME are wide apart while in C. insulana, they are very close to each other. ALE and PLE are contiguous in C. diadesmia while in Cyclosa insulana they are separate. Three pairs of Sigilla are present on the dorsum of C. insulana but absent in the new species. A tuft of hair arise from fovea to the base of cephalothorax in C. diadesmia which is absent in C. insulana. Spermathecae are oval in C. diadesmia while they are bean shaped in C. insulana.

The difference between C. diadesmia and C. doshukofa is that the median orifice is more broad in the former. The upper band in the new species has a tuft of hair and is not transparent.

Measurements: No. of specimens measure: 4; total body length: 3.70 - 5.67 mm (4.97 ± 0.89); carapace length: 1.70 - 2.06 mm (1.91 ± 0.14); carapace width: 0.9 - 1.98 mm (1.35 ± 0.45); abdomen length: 2.00 - 4.13 (3.12 ± 0.88); abdomen width: 1.43 - 2.67 mm (2.19 ± 0.79).

Cephalothorax: Blackish brown, longer than wide narrowing in front, clothed with hair, cephalic region distinctly separated from thoracic region by cephalic grooves, thoracic fovea transverse. A tuft of hair arises from the fovea towards the base of cephalothorax. Ocular quad nearly as long as wide in front. Eyes pearly white. AML: slightly smaller.
Fig. 31 (A-E) *Cyclosa diadesmia* n.sp.

A. Body, dorsal view, 40x,
B. Labium and maxillae, ventral view, 80x,
C. Chelicerae, lateral view, 80x,
D & E Epigynum, lateral and internal view, 100x,

(ft; fertilization duct, co; copulatory opening and st; spermatheca)
than PME, posterior medians encircled by black rings; lateral eyes sub-equal in size very close to each other. Both rows of eyes recurved, sternum heart-shaped, pointed behind. Blackish in colour with some pale patches, clothed with hair. Labium nearly as long as wide; blackish with yellow patches; maxillae broad, blackish with pale patches, provided with distinct scopulae; chelicerae moderate, blackish, provided with spines and hair. Retromargin with 3 teeth and promargin with four teeth. Spination on legs: Femur, Patella and Metatarsus without spines; Tibia I = 0-3-0-0; II = 2-1-0-0; III & IV = Without Spines

**Abdomen:** Rhombic shaped, broad just in front of the middle, provided with one median blunt caudal hump and a pair of blunt lateral humps posteriorly as in Fig.35-A. Dorsum of abdomen decorated with silvery white, yellow and black patches and lines. Ventral side also black with a pair of sigilla in the anterior region. Epigynum bilobed; spermathecae rounded, with an upper, cup bordered with hair; fertilization tubes convoluted Fig.35-D and E.

**Natural History:** Three female specimens were collected from Kalim Shaheed Park, Faisalabad on 10.8.97 from shoe flower, *Hibiscus rosa-sinensis* one female specimen was collected on 31.8.97 from Murree Hills from shoe flower, *Hibiscus sinensis*.

**Distribution:** North and Central Punjab.

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**Genus Zygeilla F.O.P. Cambridge, 1902**


This genus is transferred here from the Tetragnathidae by Scharff and Coddington (1997), followed by most authors (Tanikawa, 2002; Biswas and Biswas, 2003; Patel, 2003a) but Yin (2002) treated it under family Tetragnathidae. The genus *Zygeilla* has 21 known species (Platnick, 2006). It was previously represented by a single species in Pakistan which was recorded by Dyal (1935) and Qadir (1997). During present study one new species has been recorded from Jehlum and Faisalabad.

**Type Species:** *Zygeilla atrica* (C.L. Koch, 1845)

**Distribution:** Asia, Europe, Africa, North and South America.
Zygeilla tigris sp. nov.
(Fig.32 A-D)

**Type Material:** Holotype ♀ collected from Jehfum on 1.9.97.

**Etymology:** This species has been named due to its tiger like appearance.

**Diagnosis:** *Zygeilla tigris* is similar to *Zygeilla indica* Tikader and Bal but can be separated from it by various differences like strongly recurved PE row and prominent tubercles of I.E. contrary to the situation in *Zygeilla tigris*. By contrast, *Zygeilla tigris* has pentagonal sternum; crown like labium and cylindrical maxillae. Fovea very prominent with strong hair on the sides while in *Z. indica* it is absent. In male palp of *Z. indica*, RTA is blunt while in *Z. tigris* it is pointed; VTA and tibial spur is present in *Z. tigris* which is absent in *Z. indica*. In *Z. tigris* cymbium is covered with long hair.

**Measurements:** Total body length 7.70mm, Carapace I 4.13mm, W 3.22mm, Abdomen I 3.85, W 2.89, Legs I 11.72mm, II 11.83mm, III 8.39mm, IV 12.57mm. Leg formula 4:2:1:3.

**Cephalothorax:** Blackish brown, longer than wide, narrowing in front. Cephalic region with few hairs but clothed with pubescence. Ocular quad wider than long, wider in the anterior region. AME; eyes larger than the PME and laterals, subequal in size and situated on prominent tubercles. Both rows of eyes recurved. A distinct black fovea in the thoracic region and larger number of hairs scattered here and there. Sternum heart-shaped, pointed behind; yellowish brown in colour clothed with hair and pubescence; labium dark brown slightly wider than long; maxillae pale brown in colour and provided with distinct scupulae. Cheliceral moderately strong with three teeth on retromargin and one tooth on promargin, yellowish brown in colour, having distinct boss. Legs moderately long and strong, clothed with hairs and spine. Cymbium long and provided
Fig. 32 (A-D) *Zygeilla tigris* n.sp.

A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae, ventral view, 100x,
C. Chelicerae, lateral view, 100x,
D. Male palp, lateral view, 100x,

(rta: retrolateral tibial apophysis, cy: cymbium, spd: sperm duct, and cm: embolus)
with spine like hair tibia with a spur and tufts of hair, tegulum long, embolus bordering the tegulum; dens medius and pars pendula well developed; median and terminal apophysis present; ejaculatory duct convoluted. Spination on legs = Femur I 0-0-0-0; II 0-1-0-0; III = 1-0-2-0; IV 1-0-2-0; Patella I = 0-0-0-0; II = 0-1-0-0; III = 1-6(2-2-2); IV 1-1; Tibia = 1-5(2-2-1)-1-0-0; II = 2-10(2-2-2-2-2); 3-2; III 0-2-1-0; IV 1(3 2 2+2+2)-2-3-0; Metatarsus = 1-2-1-0-0; II = 0-0-0-0; III = 0-1-0-0; IV = 2-0-0-1. Leg formula = 4213.

**Abdomen:** Oval, longer than wide with no humps and clothed with long hairs. Dorsum of abdomen provided with two pairs of sigilla; having a distinct folium composed of black and pale patches and small lines in the basal region. Ventral side brown with black hairs on the periphery and silvery hairs in the center, having pubescence between the epigastric furrow and spinnerets.

**Natural History:** Holotype 5 specimen was captured from sugarcane field in the evening on 19.97 from Sarray Alamgir, Jehlum.

**Distribution:** North Punjab.

**Genus Lurinia** Simon, 1874


Larinia Simon comprises 31 valid species in the world (Platnick, 2006). Qadir (1997) recorded a single species from Sialkot and Nazir (1999) recorded a new species from Jhang. During present study one known and one new species was recorded.

**Type species:** *Larinia lineata* (Lucas, 1846).

**Distribution:** Asia, Europe, Africa, North & South America.

*Larinia radiata* Qadir 1996

**Material Examined**

Larinia khairiensis sp. nov.
(Fig. 33 A-D)

Type Material: Holotype ♂ Rukh Khairaywalla, Distt. Liah: 21.11.98.

Etymology: This species has been named after its type locality Khairaywalli

Diagnosis: Larinia khairiensis resembles Larinia parangmata Barrion and Litsinger but can be separated from it by the following differences. In AE row slightly procurved with spinose hair in L. khairiensis; also chelicerae are weak in this species with one tooth on the retromargin and three teeth on the promargin, whereas in L. parangmata there are four teeth on the promargin and three in the retromargin. Sternum pentagonal, pointed behind with lateral sides excavations for coxae; labium triangular with scopulae; maxillae bean-like, slender with scopulae contrary to the situation in L. parangmata. Three pairs of spots on the abdomen of L. khairiensis while they are two in L. parangmata. Paraembrium is not prominent. Median apophysis not bifid in L. khairiensis.

Description: Measurements: Total length: 5.64mm; carapace length: 2.67mm; width: 2.2mm; abdomen length: 2.97mm; width: 1.5 mm; Leg I: 9.49mm; Leg II: 8.61mm; Leg III: 6.19mm; Leg IV: 7.43mm.

Cephalothorax: Longer than wide, yellow with black eye margins; narrow in cephalic area and wide in thoracic area. Median ocular quadrangle almost twice as wide in front than behind and forms a trapezium. AME the largest, separated widely about one diameter from each other, PME very close to each other ALE and PLE contiguous. Eye formula: AME ≫ PME ≫ ALE ≫ PLE. A vertical median fovea in the center of cephalic area; long and distinct with an inverted V-band at the base. Two V-shaped bands originate from fovea, the outer one leading forward, ending near the PLE the other discontinuous band ending near the PME forming inverted L-shaped. Two smaller V-
Fig. 33(A-D) *Larinia khairiensis* n.sp.

A. Body, dorsal view, 40x,
B. Sternum, labium and maxillae, ventral view, 100x
C. Chelicerae, lateral view, 100x,
D. Male palp, lateral view, 100x,
(cy; cymbium, bb; bulbus, and em; embolus)
shaped and one straight pair of band new the PME. One pair of bands also exist in the center of thoracic region, both becoming balloon like in the center. Sternum yellow without patches: longer than wide; rounded at the junction of coxae and pointed between coxae IV. Labium triangular, wider than long with scopulae; maxillae yellowish on the periphery and grayish yellow in the medullary region. Chelicerae moderately developed with 3 teeth on the promargin and one tooth in the retromargin. Legs yellow, clothed with pubescence and hair. Patella of male's pedipalp with two long macrosetae (= spines). Cymbium yellow, oblong with spine like hair; tegulum/bulb triangular, embolus small but thick median apophysis well-developed with a membranous base. Base of terminal apophysis with wart-like portions of ejaculatory ducts. Spination on legs = Femur I = 3-2-1-0; II = 0-0-0-0; III = 1-0-2-3; IV = 2-0-0-1; Patella I = 0-1-1-0; II, III and IV = Without spines; Tibia = I = 1-2-3-3; II = 0-0-0-0; III = 0-0-1-1; IV = 0-0-0-0; Metatarsus = I = 0-1-1-1; II & IV = Without Spines: III = 0-0-1-1: Leg formulae 1243.

Abdomen: Longer than wide, brown with three longitudinal bands with leaf like pattern: three pairs of whitish patches each with a sigilla in the center. Three to four broad lines at the base of abdomen: long hairs on all the peripheral regions of the abdomen. Venter brownish yellow with chocolate tree like structure in the center arising from the spinnersets; clothed with golden hair.

Natural History: Holotype ♂ collected from Medicago sp. in Rukh Khairaywali district Lejah on 21.11.98.

Distribution: South Punjab.
GENERAL REMARKS

A general review of the taxonomic results is given below:

Family Salticidae was the predominant family (n=4584: 3382 ♀♀ and 1202 ♂♂, 31.09%) with 9 genera and 27 species. Genus *Plexippus* was found to be the most prevalent one.

Family Araneidae, second in ascendance, (n=3360: 2883 ♀♀, 477 ♂♂ 22.79%) with 12 genera and 27 species: 7 species were regarded as new. Genus *Neoscona* was the most abundant of all.

Family Lycosidae maintained the third order of abundance (n=2766, 1968 ♀♀, 195 ♂♂: 18.76%). It included 5 genera, 24 species: 7 species being new have been described. Genus *Pardosa* was not only the predominant genus of this family but it also outnumbered all the other genera from different families.

Family Oxyopidae (n=916, 721 ♀♀, 195 ♂♂: 6.2%) was represented by only one genus and 8 species, out of which 3 species have been treated as new. Genus *Oxyopes* was the only recorded genus of this family.

Family Thomisidae (n=855, 661 ♀♀, 194 ♂♂: 5.80%) was personated by 4 genera and 16 species. One species has been regarded as new. Genus *Thomisus* was the predominant one.
Table 3  The families genera and species of spiders which were recorded in this study

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<th>S. No.</th>
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<th>Genus</th>
<th>Species</th>
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<td>Oxyopidae</td>
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<td>Oxyopes wroughtoni</td>
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<td>Oxyopes rufisternus</td>
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<td>Oxyopes shweta</td>
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| 17. Lycosidae | Hippusa | Hippusa agelenoides  
| | | Hippusa pisaurina  
| | | Hippusa partita  
| | | Hippusa madhni  
| | Pardosa | Pardosa birmanica  
| | | Pardosa sumatra  
| | | Pardosa oakleyi  
| | | Pardosa sanguinea  
| | | Pardosa timida  
| | | Pardosa tahari n.sp.  
| | | Pardosa khomii n.sp.  
| | | Pardosa shahmani n.sp.  
| | Arctosa | Arctosa shekifi n.sp.  
| 18. Tetragenathidae | Tetragenatha | Tetragenatha mandibulata  
| | | Tetragenatha javana  
| | | Tetragenatha viridescens  
| | | Tetragenatha vermiformis  
| | | Tetragenatha ceylonica  
| | | Tetragenatha saadhi n.sp.  
| | | Tetragenatha cuniculus n.sp.  

275
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<th>19.</th>
<th>Araneidae</th>
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<td>Argyope</td>
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<td>Polysis nagpurensis</td>
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<td>Nephila</td>
<td>Nephila malabarensis</td>
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<td>Zilla</td>
<td>Zilla navaezi</td>
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<td></td>
<td>Leucange</td>
<td>Leucange decorata</td>
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<td>Leucange celebesiana</td>
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<td>Crytophora</td>
<td>Crytophora citricola</td>
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<td>Crytophora pindori n.sp.</td>
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<td>Araneus nympha</td>
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<td>Araneus himalayensis</td>
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<td>Lorinia radiata</td>
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<th>20.</th>
<th>Linyphiidae</th>
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<tr>
<td>21.</td>
<td>Micryphantidae/Eri gonidae</td>
<td>Erigone</td>
<td>Erigone dentata</td>
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</table>
Family Clubionidae (n=829, 713♀♂, 116♂♂, 5.62%) was represented by 3 genera and 10 species, of which 2 species have been described as new ones. Genus *Clubiona* was the most abundantly occurring genus.

Family Gnaphosidae (n=365♀♂, 30♀♂, 6.8%) consisted of 10 genera and 25 species; 2 species have been treated as new.

Family Linyphidae (n=189, 160♀♂, 29♂♂, 1.28%) was represented by one genus and one species.

Family Philodromidae (n = 136, 128♀♂, 18♂♂, 0.92%) was represented by only 2 genera and 3 species.

Family Hersiliidae (n=37, 29♀♂, 8♂♂) was represented by one genus *Hersilia* and two single species.

Family Tetragnathidae (n=462, 318♀♂, 144♂♂, 3.13%) included by 1 genus and 7 species of which 2 species were treated as new. *Tetragnatha* was found to be the only predominant genus.

Family Sparassidae (10♀♂, 2♂♂) was exhibited by 2 genera and 2 new species. The taxonomical descriptions of these have been given.

Family Uloboridae (n=119, 116♀♂, 3♂♂) was represented by only single genus and only one known species.
Table 4  The number of families, genera and species recorded during the course of the present study

<table>
<thead>
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<th>S.No.</th>
<th>Families</th>
<th>No. of Genera</th>
<th>No. of Species</th>
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<td>Eresidae</td>
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<td>4</td>
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<td>5</td>
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<td>6</td>
<td>Scytodidae</td>
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<td>Salticidae</td>
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<td>Thomisidae</td>
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<td>Sparassidae</td>
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<tr>
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<td>Lycosidae</td>
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<tr>
<td>21</td>
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<td><strong>Total</strong></td>
<td><strong>21</strong></td>
<td><strong>58</strong></td>
<td><strong>157</strong></td>
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</table>
Families like Oecobiidae (n=22), Eresidae (n=23), Pholcidae (n=38), Urocteidae (n=39), Scytodidae (n=5), Oonopidae (n=6), and Microphantidae (n=15) were represented by only single genus each and single known species. Linipphiidae (n=74).

In general, the whole collection represents three guilds Orb-Weavers (OW), Hunters (H), and the space-webs (SW). Hunters were the most common, comprising of 68.97%. Orb-weavers were of 25.92% and space-web of 5.11%.

The hunters consisted of the families Salticidae, Lycosidae, Thomisidae, Clubionidae, Gnaphosidae, Oxyopidae and Eusparassidae. Genera like *Plexippus*, *Pardosa*, *Thomisus*, *Clubiona*, *Gnaphosa*, *Oxyopes* and *Heteropoda* were common among themselves.

The Orb-Weavers families included the Araneidae and Tetragnathidae. The genera like *Neoscona* and *Tetragnatha* were found to be common ones.

Remaining families constituted the space-webs and comprised of only 5.11% of the total.

About 93% of the species belonged to families Salticidae (27), Thomisidae (16), Philodromidae (3), Eusparassidae (2), Clubionidae (9), Gnaphosidae (25), Hersiliidae (2), Oxyopidae (8), Lycosidae (23), Tetragnathidae 97) and Araneidae (27). Of these, the families Salticidae, Thomisidae, Gnaphosidae, Lycosidae and Araneidae were outstanding with respect to their taxonomic diversity (Table 4).

**ECOLOGICAL STUDIES**

Ecological studies were concentrated on the diversity and abundance of spiders in different ecological conditions. Following comparisons were made.

i) Spider diversity and abundance in different climatic zones of the Punjab.
ii) Comparison of abundance and diversity of spiders between cultivated and non-cultivated areas of the Punjab.

iii) Comparison of spider assemblage and species composition in different crops.

iv) Comparison of species composition and diversity in different natural vegetation of the Punjab.

ARIDITY

The three major climatic zones namely, arid, semi-arid and continental low lands were compared for species composition and density of spiders. The districts falling in the arid zone were that of central Punjab. Semi-arid areas included the districts of northern Punjab. The sub-tropical continental lowlands included the Indus Plain, potwar plateau, northern sub-mountain areas and thal desert as well as southern Punjab.

Shannon diversity indices exhibited significant P values among the three climatic zones. Diversity and evenness was more between the arid and continental lowlands. The most preferred habitat appeared to be the arid zone (Table 5a,b).

CROP INTENSIFICATION

Comparison of cultivated and non-cultivated areas of the Punjab were compared for spider diversity and species composition. Shannon diversity indices reflected highly significant P values. The croplands appeared to be the house of spiders as compared to the non-cultivated regions (Table 6a,b).
CROP PREFERENCE

Highly significant $P$ values were found while comparing different crops for spider composition (Table 7a,b). The most preferred crop appeared to be maize followed by cotton and fodder. Sugarcane contained comparatively least number of spider species.

NATURAL VEGETATION PREFERENCE

The different types of natural vegetations were tested and compared by applying Shannon diversity indices (Table 8a,b). Highly significant $P$ values were found among the four types of vegetation. The most preferred was the thorn forest.

| Species          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
|------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|####
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Table 5(b)  Shannon diversity indices between climatic zones of Punjab of spiders. *P*-values for test of the factor are given (ns: $p>0.05$, *: $p<0.05$, **: $p<0.01$, ***: $p<0.001$).

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Table 6(a) Comparison of abundance and diversity of spiders between cultivated and non-cultivated areas of the Punjab

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| H. partite | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H. muthii | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
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| P. sumatran | 156 | 51 | 186 | 41 | 183 | 43 | 45 | 13 | 0 | 0 | 0 | 0 |
| P. oakeyi | 123 | 16 | 39 | 25 | 30 | 14 | 141 | 56 | 14 | 23 | 0 | 0 |
| P. songesa | 1 | 1 | 54 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| P. tonida | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
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| A. shaqiji n sp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| L. masieri | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
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298
Table 6(b) Shannon diversity indices between cultivated and non-cultivated localities of spiders. P-values for test of the factor are given (ns: $p>0.05$, *: $p<0.05$, **: $p<0.01$, ***: $p<0.001$)

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Table 8(b)  Shannon diversity indices between different natural vegetations of Punjab P-values for test of the factor are given (ns: $p>0.05$, *: $p<0.05$, **: $p<0.01$, ***: $p<0.001$)

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</table>
Geographical Distribution

Some of the spider species were widely distributed in my study area, while others were restricted to a certain locality or district. The geographical spread of the remaining species was in between these two extremes (Map 6).
Map showing the distribution of some species of spiders in Punjab.

Collection site

Estimated distribution

- *Phidippus hengalensis*
- *Phidippus indicus*
- *Hahrocestum coronatum*
- *Rhene indicus*
- *Rhene decoratus*
- *Rhene danielli*
- *Thiana aura*
- *Marpissa tigrina*
- *Marpissa dhakuriensis*
Map showing the distribution of some species of spiders in Punjab.

Collection site

Estimated distribution

Marpissa decorata

Marpissa anaxuac

Marpissa mucosa

Salticus punctatus

Phlegra dhokuriensis

Myrmarchne marath

Myrmarchne orientales

Myrmarchne bengalensis

Myrmarchne laetus
Map showing the distribution of some species of spiders in Punjab.
Collection site

Estimated distribution

Plexippus pumilus
Plexippus bengalensis
Philippus piteli
Philodromus domesticus
Philodromus devhupi
Philodromus kianganensis
Hersilia savignyi
Hersilia clathrata
Thomisus lobatus
V Map showing the distribution of some species of spiders in Punjab.

Collection site

Estimated distribution

Thomisus andamanensis

Thomisus projectus

Thomisus sikkimensis

Thomisus dhakurienis

Thomisus sorajalis

Thomisus pugillus

Thomisus bulani

Thomisus cherapunjeus

Thomisus elongates
Map showing the distribution of some species of spiders in Punjab.

Collection site

Estimated distribution

Thomisus projectus
Thomisus okinawensis
Thomisus zaherri n.sp.
Oxyptila chaudesiensis
Syraema decorata
Nysticus minutus
Clubiona anatis
Clubiona drassodes
Clubiona jilicata
Map showing the distribution of some species of spiders in Punjab.

Collection site •

Estimated distribution

- *Clubiona ludhianensis*
- *Clubiona pushkaraii*
- *Cheiracanthium insigne*
- *Curtarora zeles*
- *Gnaphosa phomacensis*
- *Gnaphosa podhpuresis*
- *Callilepis rajasthanicus*
- *Callilepis lambai*
- *Callilepis khairiensis n.sp*
V. Map showing the distribution of some species of spiders in Punjab.

Collection site

Estimated distribution

- *Natroton sobaconyi*
- *Scutophanus paumacensis*
- *Scutophalus simlaensis*
- *Scutophalus domesticus*
- *Phauroedus paumacensis*
- *Herpyllus bicolor*
- *Herpyllus galeatus*
- *Herpyllus faisalabadensis* n.sp
- *Megamerisaentia ashae*
V Map showing the distribution of some species of spiders in Punjab.

Collection site •

Estimated distribution

- *Drassodes pashaensis*
- *Drassodes deoprayagensis*
- *Drassodes gujericus*
- *Drassodes appenheimer*
- *Drassodes suaherensis*
- *Oxyopes [unknown species]*
- *Serigulus poonaensis*
- *Zelotes kailad*
- *Zelotes naliniae*
Map showing the distribution of some species of spiders in Punjab.

Collection site

Estimated distribution

(Zelotes desini)  (Zelotes saindi)  (Zelotes kuxuncue)

(Oxyopes wroughtoni)  (Oxyopes entisternus)  (Oxyopes culbre)

(Oxyopes cheweta)  (Hippasa agelenoides)  (Hippasa pisaurina)
Map showing the distribution of some species of spiders in Punjab.

Collection site •

Estimated distribution

- *Hippusa parvite*
- *Hippusa madhui*
- *Pardosa biemantica*
- *Pardosa sumatrana*
- *Pardosa Oakleyi*
- *Pardosa xongosa*
- *Pardosa timida*
- *Lycosa masteri*
- *Lycosa poonacausis*
Map showing the distribution of some species of spiders in Punjab.

Collection site

Estimated distribution

<table>
<thead>
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<th>Lycosa irianii</th>
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<tr>
<td>Tetragnatha javana</td>
<td>Tetragnatha virescens</td>
<td>Tetragnatha vermiformis</td>
</tr>
</tbody>
</table>
V Map showing the distribution of some species of spiders in Punjab.

Collection site •

Estimated distribution

Tetragnatha ceylonica

Tetragnatha radianus sp. nov.

Tetragnatha cylindricalus sp. nov.

Tetragnatha curviculcus sp. nov.

Neoscona bengalensis

Neoscona mukerji

Neoscona poonaensis

Neoscona excelsus

Neoscona elliptica
V Map showing the distribution of some species of spiders in Punjab.
Collection site ●

Estimated distribution

Neoscona sinhagadensis
Neoscona thelis
Argiope trifasciata

Peltys nassurensis
Nephila malabarensis
Zilla nawazi

Lycengage decoratise
Tibellus istamabadensis n.sp.
Cryptophora pindori n.sp.
Map showing the distribution of some species of spiders in Punjab.

Collection site

Estimated distribution

Cryosophora citricola

Cryosophora pindori sp.nov.

Aranes nympha

Aranes himalayaensis

Cyclosa fissaicauda

Cyclosa confraga

Cyclosa spirifera

Zygeilla tigris

I. wintia radiata
Map showing the distribution of some species of spiders in Punjab.

- Collection site

Estimated distribution

Larisia khalilicensis sp. nov.

Atypena adelinae

Philippus punjabensis n. sp.

Philegro decorata n. sp.

Philippus beautifurcatus n. sp.

Plesiopus similis n. sp.

Arctosa shefiqii

Heteropoda quadri sp. nov.

Otios narwaliensis
CHAPTER V

DISCUSSION

The environmental factors like temperature and relative humidity appear to be the most important limiting factors for spiders. Increase in temperature and decrease in relative humidity increase the spider populations (Butt, 1996). To test this hypothesis, spider populations were estimated in three major climatic zones of Punjab viz. Arid, Semi-Arid and continental low lands. Whole of the central Punjab fall in the arid zone; northern Punjab constitutes the semi-arid zone and southern Punjab along with Potowar Plateau comprised of continental lowlands. Shannon diversity indices showed high significant P values (Table 5a,b). Evenness and diversity were greater between arid and continental lowlands as compared to the semi-arid zone. High temperature and low humidity may be a factor for richness and diversity of spiders in arid and continental lowlands. The differences found in species richness and taxon and guild composition between the spider assemblage of these climatic zones are at least in part a consequence of striking differences in the physiognomy, richness and taxonomic composition of the plant association of these climatic zones (Toti et al., 2000).

Barlow and Litsinger (1995) compared the spider composition and diversity of three rice communities in Philippines. The species guild and diversity of the three habitats were different.

Butt (1996) studied the spider co-existence, activity patterns, habitat preferences, niche breadth, niche overlap and complimentary niche dimension in vineyard, citrus grove and guava grove of University of Agriculture, Faisalabad. The size and
composition of annual samples of these habitats were generally different. Different species showed different patterns of co-existence, niche breadth in time and habitat, and overlap values.

The results of Barrion and Linsinger (1995), Butt (1996) and Totti et al. (2000) compliment the present study.

Russell-Smith (2002) compared the diversity and composition of ground-active spiders in Vikomazi Game Reserve, Tanzania and Etosha National Park Namibia. Pitfall traps were used. The spider species richness and family composition in two areas were different and various reasons were proposed to explain it.

Generalist predators, such as spiders, play an important role as natural enemies in agroecosystems and given the annual disturbance of most field crops, these predators typically recolonize fields from adjacent habitats (Buddle et al., 2004).

For this purpose data of the present collection was analyzed. Spider richness and diversity was compared between cultivated and non-cultivated regions of the Punjab. Some of these localities were adjacent to the crops, others were located in open, undisturbed territories. Shannon diversity indices reflected highly significant P values (Table 6a,b). The spider fauna of uncultivated areas near the croplands contained various species typically found in high densities in agricultural fields, supporting the view that nearby vegetation may act as a reservoir and refuge for spiders during harvesting periods. Thus the present study confirms the findings of Buddle et al. (2004). Furthermore, the abundance of spider fauna in the croplands might be a result of presence of greater number of phytophagous insects.
Crops (rice, sugarcane, fodder, cotton and maize) were compared for species composition and diversity. Shannon diversity indices (Table 7a,b) showed high significant P values among the crops. Maize was found to be most preferred crop followed by cotton and fodder. The reason for cotton can be explained as it is highly sprayed and spiders are resistant to most of the insecticides. Fodder (lucerne) being a permanent crop, spiders can easily flourish in it. The reason for maize might be a flaw in the data. Sahiwal Maize Farm is a big one and there might be a much intensified data collection. Ground-dwelling spiders were prevalent in sugarcane but despite of equal collection, they contained the least number of spider species.

Culm and Rust (1980) conducted comparative study of the ground surface and foliage dwelling spider communities in a soybean habitat. They concluded that the foliage habitat is transitory and must be colonized each spring and evacuated each fall. The ground surface habitat is more consistent in structure throughout the year allowing a more stable community to develop.

Krebs (1978) proposed that earlier in season, spiders colonize sugarcane fields in large numbers through ballooning and other dispersal modes. As feeding and establishing territories begin, inter and interspecific competition act to reduce their numbers with the normal phonological progression of the sugarcane.

Ali and Reagan (1986) studied the influence of selected weed control practices on araneid faunal composition and abundance in sugarcane in which they emphasized that overall spider abundance in sugarcane decreased with seasonal progression. Additionally, comparisons of weed-free, grass, broad leaf and mixed weed habitat showed that weed
floral composition seems to have little effect on the collective spider abundance and faunal diversity.

Patel et al. (1986) studied the ground activity of spiders in cotton fields in Gujarat, India. They emphasized on ground activity, species diversity, species richness and relative abundance of spiders in cotton fields using pit fall traps. They made a comprehensive study of spider population in different agro-ecosystems and their significant role in biological control of insect pests.

Saleem (1999) compared the diversity and relative abundance of ground dwelling spiders in two varieties of maize at Faisalabad. Diversity, evenness and richness indices for both varieties were different.

Various types of natural vegetations namely broad-leaved forests (Islamabad, some area of Chakwal and Jehlum), Thorn forests (Okara, Liahis, D.G. Khan), Linear Plantation (Faisalabad, Sheikhupura, Muzaffar Garh) and Riverain forests (Head Tarimmun Jhang and Head Punjab near Alipur, Muzaffar Garh) were compared for spider diversity.

Shannon diversity indices showed highly significant P values among these different types of vegetations. Thorn forests contained the maximum number of spider species. Evenness was more between Linear Plantation and thorn forest. Linear Plantation contained the least number of spider species. The reason is clear i.e. high disturbance and noise on the nearby roads.

Buddle et al. (2005) studied the ground-dwelling fauna (Araneae) of two vineyards in southern Quebec, north America. They hypothesized that the tempera-
segregation of spider species and the consistent presence of both hunters and web-building species provide background control of pest species in the vineyard.

All the above mentioned studies support the present work. Further, the results of this study in combination with those of other studies carried out in the agroecosystem of central Punjab (viz. Butt, 1996; Butt and Beg, 1996; Butt et al., 1997; Hadiat, 2004; Qadir, 2000) provide a foundation for future studies of ground-dwelling and arboreal spider communities in the agro-ecosystem and are relevant to research on biological control of insect pest population in the agro-ecosystems of Pakistan. It seems that the agro-ecosystem supports spider communities which are diverse and densely populated.

An understanding of the environmental factors influencing the distribution and abundance of the spiders in the cropped and non-crop areas of the region may lead to the development of habitat management practices that conserve and promote the beneficial use of these generalist predators and help to minimize total dependence on insecticides for controlling insect pests.
CHAPTER VI

SUMMARY

A general survey of the croplands, orchards, scrublands, grasslands, non-cropped areas, arid and semi-arid regions of the Punjab was made to search out the species composition of the spider fauna. Spiders were collected from 43 locations in 21 districts of the Punjab and one from Federal Territory of Islamabad. The methods of collection were direct hand picking, pit-fall trapping and jarring. During the three year period 1996-1998, a total number of 14743 spiders were collected belonging to 20 families, 58 genera and 158 species. Taxonomic description of only 33 new species is written.

Family Salticidae was the predominant family, (31.09%) with 9 genera and 27 species. Six species were regarded as new. Genus *Plexippus* C.L. Koch was found to be the most common genus.

Family Araneidae maintained the second position (22.79%) with 12 genera and 27 species, out of which 7 species were treated as new. The most common genera were *Neoscona* Simon and *Cyclophora* Simon.

Family Lycosidae was third in order of abundance (18.76%), having 5 genera and 23 species, amongst them 7 species were regarded as new. Genus *Parodora* appeared to be the most commonly occurring.

Family Oxyopidae (6.2%) comprised of only one genus *Oxyopes* Latreille and 8 species; of which 4 species have been described for the first time.

FamilyClubionidae (5.6%) consisted of 3 genera and 9 species. 7 of them were already known, while other two are regarded as new.
Family Thomisidae (5.80%) consisted of 4 genera and 16 species; one species is described as new.

Family Gnaphosidae (2.68%) consisted of 10 genera and 25 species; 2 species are treated as new ones.

Family Lasparasidae was represented by 2 genera and 2 newly described species.

Remaining families like Hersiliidae, Linyphiidae, Philodromidae, Oonopidae, Scytodidae, Uroctidae, Pholcidae, Erisidae, Orcobidae, Uloboridae and Microphanidae are each comprised of a single genus and single already known species. Not only these families were few in number, smaller in species composition but are also restricted to certain specific environment.

As regards the ecological and geographical distribution of the spiders, habitat preference was a preponderance and a pre-requisite. Some species were restricted to a certain habitat and/or district only showed a wide range of distribution and overlapping pattern. Families like Salticidae and Lycosidae were cosmopolitan in distribution though their number and species composition were reduced in arid regions.
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