STUDIES ON TAXONOMY AND DIVERSITY OF SPIDERS FROM DARJEELING HILLS WITH SPECIAL REFERENCE TO FAMILY CLUBIONEIDAE IN LIGHT OF CONSERVATION

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OCCASIONAL PAPER

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INTRODUCTION

Darjeeling hill area is unique from environmental Eco-perception. The relief varies from 100 mts. above sea level to the mighty Kanchenjungha. There are different climatic zones with distinctive attributes and there are endangered animals like red panda etc along with memory orchids and medicinal plants are available in this hilly region. The Darjeeling hill area is formed of comparatively recent rock structure that has a direct bearing on landslides. The causes of the landslides vary from one locality to another. Heavy monsoon precipitation is however a very common cause of these disasters. More over soils of Darjeeling hill areas are extremely varied, depending on elevation, degree of slope, negative cover and obviously geolithology. The natural system of erosion in the hill gets more complicated when man interferes. As the mountains serve as the source of resources for the population residing in the hills as well as in the plains, the form of environmental degradation is quite extensive other particularly is applied to the extraction of timber and other forest produces, mining and agriculture are taken into account. As human population expands in the hills, forests are being depleted for the extension of agricultural lands, introduction of new settlements, roadways etc. The growing changes coming in the wake of industrialization and urban development leave deep impression on the hill ecosystem; disrupting normal functioning. Due to unprecedented growth of population during the last few decades in the Darjeeling hill areas, nature has started reacting sharply to the accumulated human guilt. Landslide hazards, especially during rainy season have become a common factor to the people of the hill.

The hill areas of Darjeeling district are located within the lesser and Sub-Himalayan belts of the eastern Himalayas. The area is bounded by the Sikkim Himalaya in the north, the Bhutan Himalaya in the east and Nepal Himalaya in the west, the southern foothills. Keeping all these in mind exploration and documentation of data on biological resources from this diverse land form became essential towards the conservation aspect. In this context the authors tried to fulfill the part of Arachnid (spiders) faunal resources to be documented for monitoring through future studies.

Spider fauna of Darjeeling has not yet been studied in a comprehensive manner. Although there are several published papers on the spiders on Darjeeling (Pocock, 1900 & 1901; Simon 1906; Gravely 1931; Sinha 1951; Tikader 1970; Tikader 1980 & 1982; Sethi & Tikader 1988; Majumder & Tikader 1991; Biswas & Biswas 1992) but so far as the spider fauna of Darjeeling is concerned, the published information indeed lacking compilation and comparative descriptions altogether to visualize the abundance and diversity of this fauna in the diverse mountain habitats of Darjeeling hills. Since the spiders are important bio-control agents especially
of insect pests of agricultural crop fields and as this group is not adequately explored from Darjeeling, survey of this group in different crop fields and tea-garden as well as hilly bushes were assigned for the years 2006-2008 (four seasons). Accordingly the present work was undertaken to study an up-to-date information regarding taxonomy and diversity of spider fauna of Darjeeling hills. Unfortunately due to some unavoidable administrative guideline the actual frame of study is to reduce by one year (two seasons) instead the assigned two years (4 seasons namely pre and post monsoon and pre and post winter) had to referbicate for a publishable manuscript with the collected data.

Thus the taxonomy and diversity of spider fauna of Darjeeling hills is prepared with the collected specimen of our study along with the recorded data of National Zoological Collection of Zoological Survey of India and other published information. Spiders from different families like-Amaurobiidae, Araneidae, Atypidae, Clubionidae, Corinnidae, Ctenidae, Gnaphosidae, Hersiliidae, Heteropodidae, Homalonichidae, Linyphiidae, Lycosidae, Mithurgidae, Oecobidae, Oxyopidae, Pisauridae, Philodromidae, Salticidae, Scytodiidae, Tetragnathidae, Theraphosidae, Thomisidae and Trocanteriidae from Darjeeling hills in the light of modern taxonomic concept have been explored. It is very much expected that this comprehensive account will prove quite useful to the future worker in the field of Arachnology and also would be useful to the forest managers in the process of planning for conservation strategies. A total 119 spider species were dealt with here for the study of taxonomy and biodiversity and finally approached for conservation aspects. At present the named specimens are deposited at the national collection of the Zoological Survey of India, Kolkata.

MATERIALS AND METHOD

Study Area: Darjeeling district is the northernmost district of west Bengal. It is located on the lap of the Himalayas. The district comprises of four subdivisions namely-Darjeeling sadar, Kalimpong, Kurseong and Siliguri. Darjeeling Himalaya forms a part of eastern Himalayan ranges and is bounded by Sikkim, Nepal and Bhutan on the north, west and east respectively. It consists of the first three subdivisions of the district while Siliguri is mainly characterized by the tarai and foothills of the district (Figure-1). Therefore, the paper does not include Siliguri in the study. The area covered by Darjeeling Himalaya is about 1721 Sq. kms. while the total area of the district is 3202 Sq. kms. Darjeeling Himalaya consists of a portion of the outlying hills of lower Himalayas and a stretch of territory lying along the base of the hills known as the Terai. The Terai is only 91 meters high above the sea level but there are parts of the districts, which are as high as 3660 m. at Sandakpu. The exquisite scenic grandeur and invigorating climate in the area have earned the title of “Queen of the Hill Stations” river Teesta is the master stream in the area while the Ramram and Rangit are the two important tributaries of the Teesta. Besides, numerous rain fed rivulets in the hills become the most
Tourism is a climate-based industry while tea plantations that earned fame for Darjeeling Himalaya is largely a contribution of the climate. The climate of Darjeeling is especially noteworthy. Springs and autumns are the seasons most favoured by visitors. The monsoon is a period of continuous rainfall while the winter after December is too cold and unpleasant. The local climate in fact depends largely on the elevation and aspect. The first access of the man in the Darjeeling Hills and when who fell down the first tree to establish a living has not clearly been brought to book. But when British came here, it was inhabited merely by a few hundred souls in the pure natural environment, between the undiscovered flora and fauna.

**GPS DATA OF SPIDER-LOCATIONS IN THE AREAS OF DARJEELING HILLS**

The collection areas Figure-1 have been located through GPS co-ordinates under four main camp areas namely Darjeeling, Kalimpong, Kurseong and Mirik. Altitudes and Geographical positions have been plotted for individual collection spots for future convenience and for finding proper locations. GPS data for the geographical co-ordinates and altitudes of the study areas were taken through Germin GPS 12 and incorporated in the context in tabular form in Table-1.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the place</th>
<th>Co-ordinate N/E°/′/″</th>
<th>Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Places covered from Darjeeling camp</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Darjeeling</td>
<td>27°,02′,22,08″</td>
<td>6525</td>
</tr>
<tr>
<td>2.</td>
<td>Batasia Loop</td>
<td>27°,00′,58,45″</td>
<td>7225</td>
</tr>
<tr>
<td>3.</td>
<td>Ghoom</td>
<td>27°,00′,27,04″</td>
<td>7172</td>
</tr>
<tr>
<td>4.</td>
<td>Zoological Garden</td>
<td>27°,03′,22,08″</td>
<td>6525</td>
</tr>
<tr>
<td>5.</td>
<td>Bhitia Basti</td>
<td>27°,02′,40,91″</td>
<td>6095</td>
</tr>
<tr>
<td>6.</td>
<td>Pasupati Lake</td>
<td>26°,57′,30,79″</td>
<td>6250</td>
</tr>
<tr>
<td><strong>Places covered from Kalimpong camp</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Kalimpong</td>
<td>27°,03′,33,25″</td>
<td>3912</td>
</tr>
<tr>
<td>Sl. No.</td>
<td>Name of the place</td>
<td>Co-ordinate N/E”/’/”’</td>
<td>Altitude</td>
</tr>
<tr>
<td>--------</td>
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</tr>
<tr>
<td>2.</td>
<td>Lava</td>
<td>27°,05’22.46”</td>
<td>5470</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,37’30.87”</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Rishop Valley</td>
<td>27°,06’37.84”</td>
<td>6592</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,38’33.62”</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Langsong Valley</td>
<td>27°,06’52.79”</td>
<td>5054</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,38’15.49”</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Pedong</td>
<td>27°,07’06.34”</td>
<td>5392</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,35’39.31”</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Flower Garden</td>
<td>27°,64’02.65”</td>
<td>3500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,27’09.40”</td>
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</table>

**Places covered from Kurseong camp**

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<thead>
<tr>
<th>Sl. No.</th>
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<th>Co-ordinate N/E”/’/”’</th>
<th>Altitude</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Kurseong</td>
<td>26°,53’03.76”</td>
<td>5165</td>
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<tr>
<td></td>
<td></td>
<td>88°,16’46.57”</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Dowhill School</td>
<td>26°,53’53.96”</td>
<td>5089</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,16’58.80”</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Tindharia</td>
<td>26°,49’20.77”</td>
<td>1427</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,14’36.46”</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Latpancher</td>
<td>26°,55’03.92”</td>
<td>3608</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,24’04.64”</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Sonada</td>
<td>26°,56’52.52”</td>
<td>6432</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,17’30.64”</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Ninth Mile</td>
<td>26°,54’21.61”</td>
<td>5293</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,09’34.60”</td>
<td></td>
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</tbody>
</table>

**Places covered from Mirik camp**

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<th>Sl. No.</th>
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<th>Co-ordinate N/E”/’/”’</th>
<th>Altitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mirik</td>
<td>26°,54’00.37”</td>
<td>5075</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,09’59.19”</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Mirik Lake</td>
<td>26°,56’03.26”</td>
<td>6315</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,17’47.81”</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Sukiapokhri</td>
<td>26°,59’50.33”</td>
<td>6986</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,09’59.66”</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Bagora Hills</td>
<td>26°,58’02.89”</td>
<td>6081</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,09’50.83”</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Jorapokhri</td>
<td>27°,02’04.02”</td>
<td>6979</td>
</tr>
<tr>
<td></td>
<td></td>
<td>88°,11’01.81”</td>
<td></td>
</tr>
</tbody>
</table>
Figure - 1 overall Map of the study area
Climate

Monsoon prevails for about four months from early of June to mid October with high humidity. Annual range of humidity is between 90-95%. July-August are the heavy rainfall months with precipitations as high as 500 mm. Annual rainfall is about 320 cms. Occasional rains are often encountered throughout the rainy season. Pre-monsoon is dry and warm with versatile climatic conditions within a single day. Clouds from mild to most dense accumulation and precipitation thereon following sunny sky warmness are very common. Post-monsoon is apparently cold with negligible rainfall. Maximum temperature reaches up to 14.89 degree celsius in May while the mean maximum temperature is 8.59 degree celsius observed in June. On the other hand the minimum temperature drops up to 1.2 degree celsius in January and the mean minimum temperature is about 3 degree celsious observed during early December every year. The amount of rainfall plays a very important role in causing instability of slopes. A very high intensity of rainfall within a short span of time is not uncommon in Darjeeling hill areas. It is found in the old records that this natural phenomenon has occurred about 42 times during the period from 1891 to 1975 (Chatterjee 1982).

Forests in Darjeeling Hill Areas

Forests of Darjeeling Hills are in a dire need of similar aerial survey as highlighted above. Forests in Darjeeling Hills have been degrading and depleting with time. There is a huge gap between the area under forest and actual forest coverage in the region. This gap is rapidly increasing with time. Further, even within a particular area covered with forest the density of trees has been falling on a massive scale in the last 15-20 years. Today it is believed Darjeeling Hills has less than 30 per cent of its land under forest cover in strict sense of the term. However, as per the records of Forest Department, over 40 per cent of its land is under forest cover. Mention should be made here that according to the forest guidelines of India, 60 per cent of the geographical area of hills and mountains should be covered with forest.

Instruments

Collections were performed by an inverted umbrella, forceps with soft-tension, small brush and with a standard hand sweeping net (129 cm in diameter). Sunca electronic emergency lamp was used during collection. Taxonomic studies have been made by a Olympus dissecting type binocular microscope with ocular micrometer while behavioral observations were done by a Samsung’s field binocular (B-10x25N), an electronic stop watch. Black velvet paper and tabulated data sheets were used. Field photographs (Movie and still digital) were taken with Sony, DCRH42E mini DV camcoder.
Collection methods
Spiders were collected from the study areas directly from the webs by hand picking method, by the sweeping net by beating the nearby bushes into an inverted umbrella for the ariereal and arboreal spider specimens.

Pitfall collections have been made for terrestrial and ground dwelling spiders. In Pitfall, traps (flat plastic bowl) were filled with preservative liquid (69% water, 30% ethyl acetate and 1% detergent). In first evening of each collection camp we fixed the traps on ground in the nearby shaded areas so that ground dwellers and other wondering spiders could be trapped. In every morning specimens were removed from traps and preserve after suitable wash, which allowed us to maintain spider specimens in good conditions before taking them for laboratory processing.

Preservation
Collected spider other than pitfall collection were anaesthetized, killed in a killing jar and finally preserved in Oudman’s preservative (90 parts 70% ethanol, 5 parts glycerol and 5 parts glacial acetic acid) in glass vials.

Identification
Well-preserved spider specimens were transferred in ethyl alcohol and studied under binocular microscope in a Petridish. The specimens were identified up to species level following Tikader (1982) and Keaston (3rd edition, 1978). All adult and sub adult (if possible) spiders were identified at the species level based on the specialized keys of Tikader (1980, 1982), Gajbe (2003), Biswas and Biswas (2004) and with taxonomic revisions according to the check-list of Silwal, Molur (2006).

A CHECK LIST OF SPIDER SPECIES RECORDED FROM DARJEELING HILLS

Family I. AMAUROBIIDAE Thorell, 1870
Genus 1. Tamgrinia Lehtinen, 1967
1. T. alveolifera (Schenkel, 1936)

Family II. ARANEIDAE Simon, 1805
Genus 2. Araneus Clerck, 1757
2. A. himalayensis Tikader, 1975

Genus 3. Argiope Adouin, 1826
3. A. aemula (Walckenaer, 1841)
4. A. anasuja Thorell, 1887
5. A. caesarea Thorell, 1897
6. *A. minuta* Karsch, 1879
7. *A. pulchella* Thorell, 1881
   Genus 4. *Chorizopes* Cambridge, 1870
8. *C. bengalensis* Tikader, 1975
   Genus 5. *Cyclosa* Menge, 1866
9. *C. insulana* (Costa, 1834)
   Genus 6. *Cyrtarachne* Thorell, 1868
10. *C. gravelyi* Tikader, 1960
11. *C. inaequalis* Thorell, 1895
    Genus 7. *Cyrtophora* Simon, 1864
12. *C. bidenta* Tikader, 1970
13. *C. cicatrosa* (Stoliczka, 1869)
14. *C. moluccensis* (Doleshchall, 1857)
    Genus 8. *Eriovixa* Archer, 1951
15. *E. excelsa* (Simon, 1889)
    Genus 9. *Gasteracantha* Sundeval, 1833
16. *G. brivispina* (Doleshchall, 1857)
17. *G. diadesmia* Thorell, 1887
18. *G. hasselti* Koch, 1838
19. *G. kuhli* Koch, 1837
20. *G. cancriformis* (Linn., 1758)
21. *G. unguifera* Simon, 1889
    Genus 10. *Gibbaranea* Archar, 1951
22. *G. bituberculata* (Walckenaer, 1802)
    Genus 11. *Neoscona* Simon, 1864
23. *N. mukerjei* Tikader, 1980
24. *N. nautica* Koch, 1875
25. *N. pavida* (Simon, 1906)
    Family III. ATYPIDAE Bertkau, 1878
    Genus 12. *Atypus* Latreille, 1804
Family IV. CLUBIONIDAE Wagner, 1887
Genus 13. Clubiona Latreille, 1804
27. C. drassodes Cambridge, 1874
28. C. filicata Cambridge, 1874
29. C. pogonias Simon, 1906
30. C. shillongensis Majumder & Tikader, 1991
Family V. CORINNIDAE Karsch, 1880
Genus 14. Castianeira Keyserling, 1879
31. C. albopicta (Gravely, 1931)
32. C. himalayensis (Gravely, 1931)
33. C. indica Tikader, 1981
34. C. zetes Simon, 1897
Genus 15. Oedignatha Thorell, 1881
35. O. carli Reimoser, 1934
36. O. scrobiculata Thorell, 1881
Family VI. CTENIDAE Keyserling, 1877
Genus 16. Ctenus Walckenaer, 1805
37. C. himalayaensis Gravely, 1921
38. C. sikkimensis Gravely, 1931
Family VII. GNAPHOSIDAE Pocock, 1898
Genus 17. Gnaphosa Latreille, 1804
39. G. poonaensis Tikader, 1973
Genus 18. Geodrassus Westring, 1857
40. G. himalayensis Tikader & Gajbe, 1975
Genus 19. Scotophaeus Simon, 1893
41. S. madalasae Tikade & Gajbe, 1975
Family VIII. HERSILIDAE Thorell, 1869
Genus 20. Hersilia Audouin, 1826
42. H. savignyi Lucas, 1836
43. H. sumatrana Thorell, 1890
Family IX. HOMALONYCHIDAE Simon, 1893

Genus 21. Homanichus Marx, 1891
44. H. jayantius Tikader, 1970

Family X. LINYPHIIDAE Blackwall, 1859

Genus 22. Leptyphantes Menge, 1866
45. L. bhudbari Tikader, 1970
46. L. lingsoka Tikader, 1970

Family XI. LYCOSIDAE Sundeval, 1833

Genus 23. Hippasa Simon, 1885
47. H. agelenoides (Blackwall, 1884)
48. H. greenalliae (Blackwall, 1867)
49. H. himalayensis Gravely, 1924
50. H. holmerae Thorell, 1895
51. H. pantherina Pocock, 1899
52. H. partita (Cambridge, 1876)

Genus 24. Hogna Simon, 1885
53. H. himalayensis Gravely, 1924

Genus 25. Lycosa Latreille, 1804
54. L. bistriatai Gravely, 1924
55. L. carmicaeli Gravely, 1924
56. L. kempi Gravely, 1924
57. L. nigrotibialis Simon, 1884

Genus 26. Pardosa Koch, 1847
58. P. birmanica Simon, 1884
59. P. Pseudoannulata (Bosenbarg & Strand, 1906)
60. P. pusiola (Thorell, 1891)
61. P. shyamae (Tikader, 1970)
62. P. sumatranas Thorell, 1890
63. P. sutherlandi (Gravely, 1924)

Genus 27. Venonia Thorell, 1894
64. V. himalayensis Gravely, 1924
Family XII. MITURGIDAE Simon, 1885
Genus 28. *Cheiracanthium* Koch, 1839
65. *C. himalayense* Gravely, 1931
66. *C. indicum* Cambridge, 1874
67. *C. insigne* Cambridge, 1874
68. *C. melanostoma* Thorell, 1895
69. *C. mysorensis* Majumder & Tikader, 1991
70. *C. pauriense* Majumder & Tikader, 1991
71. *C. triviale* Thorell, 1895

Family XIII. OECOBIIDAE Blackwall, 1862
Genus 29. *Oecobius* Lucus, 1846
72. *O. putus* Cambridge, 1876

Family XIV. OXYOPIDAE Thorell, 1870
Genus 30. *Oxyopes* Latreille, 1804
73. *O. pandae* Tikader, 1969
74. *O. ratnae* Tikader, 1970
75. *O. sakuntalae* Tikader, 1970
76. *O. shweta* Tikader, 1970
77. *O. sikkimensis* Tikader, 1970

Family XV. PISAURIDAE Simon, 1870
Genus 31. *Pisaura* Simon, 1885
78. *P. gitae* Tikader, 1970

Family XVI. PHILODROMIDAE Cambridge, 1871
Genus 32. *Phylodromus* Walckenaer, 1825
79. *P. malinae* Tikader, 1966

Family XVII. SALTICIDAE Blackwall, 1841
Genus 33. *Marpisa* Koch, 1846
80. *M. decorata* Tikader, 1974

Genus 34. *Myrmerachne* Mac Leay, 1839
81. *M. orientalis* Tikader, 1973

Genus 35. *Plega* Simon, 1876
82. *P. dhakuriensis* Tikader, 1974
Genus 36. *Plexippus* Koch, 1846

83. *P. calcuttaensis* Tikader, 1974

Genus 37. *Telamania* Thorell, 1887

84. *T. dimidiata* (Simon, 1899)

Genus 38. *Zygoballus* Peckham & Peckham, 1885

85. *Z. narmadaensis* Tikader, 1975

Family XVIII. SCYTODIDAE Blackwall, 1852

86. *S. Propinqua* Stoliczka, 1869

87. *S. thoracica* (Latreille, 1804)

Family XIX. SPARASSIDAE Bertkau, 1872

88. *B. sikkimensis* Gravely, 1931

Genus 40. *Butaniella* Gravely, 1931

89. *H. kandiana* Pocock, 1899

90. *H. leprosa* Simon, 1884

91. *H. venatoria* (Linnaeus, 1758)

Genus 42. *Olios* Walckenaer, 1837

92. *O. milleti* (Pocock, 1901)

93. *O. punctipes* Simon, 1884

Genus 44. *Guizygiella* Thorell, 1870

94. *P. promta* O.P. Cambridge, 1885

Family XX. TETRAGNATHIDAE Menge, 1866

95. *G. melanocrania* (Thorell, 1887)

Genus 45. *Herennia* Thorell, 1877

96. *H. ornatissima* (Doleschall, 1859)

Genus 46. *Larinia* Simon, 1874

97. *L. joysankari* Biswas, 1984

98. *L. phthisica* (L. Koch, 1877)

Genus 47. *Leucauge* White, 1841

99. *L. celebesiana* (Walckenaer, 1841)
100. *L. culta* (O.P. Cambridge, 1869)
101. *L. decorata* (Blackwall, 1864)
102. *L. tessellata* (Thorell, 1887)

Genus 48. **Nephila** Leach, 1815

103. *N. clavata* Koch, 1878
104. *N. kuhllii* (Doleschal, 1859)
105. *N. pilipes* (Fabricius, 1793)

Genus 49. **Tetragntha** Latreille, 1804

106. *T. javana* Thorell, 1890
107. *T. mandibulata* Walckenaer, 1841
108. *T. maxillosa* Thorell, 1895
109. *T. sutherlandi* Gravely, 1921

Family XXI. **THERAPHOSIDAE** Thorell, 1869

Genus 50. **Haploclastus** Simon, 1892

110. *H. himalayensis* Tikader, 1976

Family XXII. **THOMISIDAE** Sundevall, 1833

Genus 51. **Camaricus** Thorell, 1887

111. *C. formosus* Thorell, 1887

Genus 52. **Lysiteles** Simon, 1895

112. *L. brunettii* Tikader, 1962

Genus 53. **Pistius** Simon, 1875

113. *P. kalimpus* Tikader, 1970

Genus 54. **Thomisus** Walckenaer, 1805

114. *T. bulani* Tikader, 1960
115. *T. pugilis* Stoliczka, 1869

Genus 55. **Xysticus** Koch, 1835

117. *X. himalayensis* Tikader & Biswas, 1974
118. *X. kali* Tikader & Biswas, 1974

Family XXIII. **TROCHANTERIIDAE** Karsch, 1879

Genus 56. **Plator** Simon, 1880

119. *P. indicus* Simon, 1897
Table-2 : Common and Taxonomic names of the Spider Families of Darjeeling hills

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* = Added at verge of finalization of the paper

To provide an easy approach towards the popularization of spider Arachnology for the common people regarding conservation of the biodiversity and sustainable use of them for ethno-biological utilities of these faunal resources common names of the spider families have been included herewith in this text (Table-2).
KEY TO THE SPIDER FAMILIES FROM DARJEELING

1. Cephalothorax oval with longitudinal fovea. Eyes not very different in size. Abdomen oval, a transverse slit near the spinnerets usually very difficult to see; the posterior spinneret is very long .......................................................... AMAUROBIIDAE

   — Cephalothorax not oval with or without longitudinal fovea. Eyes less different in size. Abdomen not oval, transverse slit not present near the spinnerets; the posterior spinners is very long .......................................................... 2

2. Epigastric furrow nearly straight. Boss present on chelicerae though rudimentary in some cases; chelicerae not very large .................................................. ARANEIDAE

   — Epigastric furrow nearly straight. Boss present on chelicerae though rudimentary in some cases; chelicerae not very large .................................................. 3

3. Maxilla strongly developed and labium fused with sternum. 6 spinnerets situated in the lower end of the abdomen .................................................. ATYPIDAE

   — Maxilla moderately developed and labium not fused with sternum. Six spinnerets may or may not situate in the lower end of the abdomen ........................................ 4

4. Anterior spinnerets conical, contiguous. Maxillae without a transverse or oblique depression. Eyes homogeneous or almost nearly so (few exceptions). CLUBIONIDAE

   — Anterior spinnerets not conical, contiguous. Maxillae with a transverse oblique depression. Eyes not homogeneous ............................................................. 5

5. The median furrow of the thorax is distinct, the apex of the endites is rounded, not angulate at outside and not depressed at the middle. The tarsi of the anterior legs are not usually long and the sternum is distinctly margined .................................. CORINNIDAE

   — The median furrow of the thorax may or may not distinct, the apex of the endites not rounded, angulate at outside and depressed at the middle. The tarsi of the anterior legs are usually long and the sternum is not distinctly margined ........................................ 6

6. First row with two eyes, second row with four and third row with two; anterior laterals much closer to the posterior laterals than to the anterior medians. Retromargin of cheliceral fang furrow with at least three teeth .................................................. CTENIDAE

   — First row without two eyes, second row without four and third row without two; anterior laterals not much closer to the posterior laterals than to the anterior medians. Retromargin of cheliceral fang furrow with or without at least three teeth .......................... 7

7. Anterior spinnerets cylindrical and separated by a distance about equal to the diameter of one. Maxillae with an oblique depression. Eyes distinctly heterogenous, the anterior medians dark; the posterior medians often oblique, oval or triangular .................................................. GNAPHOSIDAE
— Anterior spinnerets not cylindrical and not separated by a distance about equal to the diameter of one. Maxillae without an oblique depression. Eyes may or may not distinctly heterogenous, the anterior medians dark; the posterior medians may often oblique, oval or triangular ................................................................. 8

8. Posterior spinnerets very long, usually longer than the abdomen .......... HERSILIDAE
— Posterior spinnerets enormously long, usually not longer than the abdomen ........ 9

9. Tarsal claw without teeth ........................................................................... HOMONICHIDAE
— Tarsal claw with teeth ................................................................................ 10

10. Tibia of the male palp without apophysis (though the tibia may be dilated distally). Pedipalp of female in most species with a claw at the end of tarsus. Tibia IV in most species with two dorsal spines, or if only one spine is present then there is one short spine on metatarsi I and II ........................................................................ LINYPHIDAE
Tibia of the male palp with apophysis. Pedipalp of female in most species with or without a claw at the end of tarsus. Tibia IV in most species with three or four dorsal spines ........................................................................................................ 11

11. Posterior row of eyes so strongly recurved that it may be considered to form two rows. Median claw smooth or with single tooth. Anterior piece of lorum rounded behind and fitting into a notch of posterior piece. Egg-sac carried attached to spinnerets and young carried on mother’s back ................................................................. Lycosidae
— Posterior row of eyes not strongly recurved. Median claw without single tooth. Anterior piece of labium not rounded behind and not fitting into a notch of posterior piece. Egg-sac not carried and not attached to spinnerets and young carried mother’s back .... 12

12. Cephalothorax with or without fovea, if present very inconspicuous. Retrolateral apophysis of the male palp with single hooked structure and the cymbium with long spur at its base ........................................................................................................ MITURGIDAE
— Cephalothorax without fovea, if present very inconspicuous. Retrolateral apophysis of the male palp without single hooked structure and the cymbium without long spur at its base ........................................................................................................ 13

13. Anal tubercle large and prominent, two segmented with a fringe of long hairs. Posterior median eyes triangular or irregular in shape. Small spider 2.00 mm. to 2.50 mm. long with carapace sub circular ............................................................................ OECOBIDAE
— Anal tubercle absent. Posterior median eyes not triangular or irregular in shape. Medium sized spider with carapace longer ........................................................................ 14
14. Eyes hexagonal, the posterior row procured and anterior row recurved with clypeus high. Abdomen pointed behind. The legs provided with conspicuous spine. ........................
...................................................................................................................... OXYOPIDAE

— Eyes not hexagonal, the posterior row recurved and anterior row recurved with clypeus high. Abdomen pointed behind, the legs provided with conspicuous spines .......... 15

15. Posterior row of eyes not forming two distinct rows but only slightly recurved with a layer of light-reflecting cells, the grate shaped tapetum and two very prominent eyes. Median claw with two or three teeth. Anterior piece of lorum with a notch into which the posterior piece fits. Egg-sac held under cephalothorax. Young not carried by mother
..................................................................................................................... PISAURIDAE

— The posterior eyes have no tapetum or any prominence among the 4 eyes .............. 16

16. Tarsi of the first and second pair of legs furnished with scapulae. Legs approximately equal in length. The upper margin of the chelicerae armed with one or two teeth .......
.......................................................................................................................... PHYLODROMIDAE

— Tarsal scapulae are not prominent but sometimes present; legs normally rather short and unequal in length with two tarsal claws; larger tooth on the inner margin of the chelicerae ........................................................................................................................................ 17

17. 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 ................................................................................................................ SALTICIDAE

— Front row of eyes more or less situated transversely; median eyes not enormously large, second row of two eyes not very small, third row of eyes usually absent .... 18

18. Cephalothorax as long as wide or slightly longer than wide. Posterior row of eyes straight or slightly pro curve, anterior row usually straight and sub equal, lateral not longer than medians. Apex of the metatarsus with a soft trilobite membrane ...........
.......................................................................................................................... SPARASSIDAE

— Cephalothorax high and subglobose behind the slopes forward, unlike other spiders eye six nocturnal arranged in three groups of two each. Anterior row of eyes strongly recurved ....................................................................................................................... 19

19. Carapace round and high behind. Sternum rounded behind ................. SCYTODIDAE

— Carapace not round and not high behind. Sternum not rounded behind ................... 20

20. Chelicerae without castellan. Apical segment of the posterior spinnerets cylindrical and at least as long as the second segment .......................................................... THERAPHOSIDAE

— Chelicerae with castellan. Apical segment of the posterior spinnerets not cylindrical and not as long as the second segment ................................................................................................................... 21
21. Epigastric furrow between lung slits procured. No boss on chelicerae. In most cases the chelicerae large and powerful ................................................... TETRAGNATHIDAE
   — Epigastric furrow not between lungs slits and not procured. Boss on chelicerae. In most cases the chelicerae not large and powerful ................................................... 22

22. The first and second pair of legs much longer and stouter than rest of the legs. Apex of metatarsus not provided with soft trilobite membrane Lower margin of fang furrow of chelicerae distinct and armed with teeth. Colulus absent................................. THOMISIDAE
   — First legs shorter than the rest, 2nd legs longest, no scapulae or ungula tufts. Anterior legs armed with erect spiniform bristles, tarsal claws true and toothed ..................... 23

23. Sternum and carapace much wider than long; the posterior coxae widely separated; mandibles weakly armed; labium longer than wide ...................... TROCHANTERIIDAE

TAXONOMIC DESCRIPTIONS OF THE SPIDERS OF DARJEELING HILLS

Family I. AMAUROBIIDAE Thorell, 1870

Genus 1. Tammagrinia Lehtinen, 1967


Diagnosis: Cephalothorax rather long. Eyes anterior row procurred; eyes equal or medians smaller than the laterals. Posterior row longer than anterior row, slightly procurred medians slightly closer to each other than to adjacent laterals. Chelicerae strong inner margin without teeth but outer margin provided with one tooth. Legs robust. Abdomen longer than wide, slightly overlapped the posterior region of the cephalothorax. Dorsum provided with a queer design of dark brown patches.

Type-species: Tagenaria domestica Clerck.

Distribution: Europe, Africa, Asia, and America.

1. Tammagrinia alveoliferae (Schenkel, 1936)


Diagnosis: Cephalothorax longer than wide relatively broad in front. Eyes pearly white, anterior row slightly procurred; eyes equal or medians smaller than the laterals. Posterior
row a little longer, slightly procurved. Chelicerae slightly convex, the lower margin armed
with four to six teeth.

*Distribution*: India: West Bengal (Mirik, Dist. Darjeeling), Sikkim.

**Family II. ARANEIDAE Simon, 1805**

**Key to the genera of the family ARANIDAE**

1. Thoracic groove transverse; epigyne with distinct scape, often wrinkled, not provided
   with lateral lobes ........................................................................................................... *Araneus*
   — Thoracic groove not transverse; epigyne without distinct scape and with lateral lobes
   ................................................................................................................................. 2

2. Eyes of the anterior row not evenly spaced or median closer to each other than to
   laterals ....................................................................................................................... *Argiope*
   — Eyes of the anterior row evenly spaced or median not close to each other than laterals
   ....................................................................................................................................... 3

3. Carapace strongly convex, anteriorly roundish; cephalic region strongly elevated than
   the thoracic region; abdomen provided with a few tubercles ............................... *Chorizopes*
   — Carapace may or may not convex on anteriorly; cephalic region not elevated than the
     thoracic region; abdomen may or may not with tubercles ........................................ 4

4. Posterior median eyes very close, nearly touching; carapace provided with a U-shaped
   junction between cephalic and thoracic region .................................................... *Cyclosa*
   — Posterior median eyes not very close, carapace without any U-shaped junction between
     cephalic and thoracic region .................................................................................. 5

5. Integument of abdomen leathery; dorsum of the abdomen strongly convex, epigyne
   provided with short blunt scape .............................................................................. *Cyrtarachne*
   — Integument of abdomen not leathery; dorsum of the abdomen not strongly convex,
     epigyne with no scape ............................................................................................. 6

6. Carapace flat with distinct thoracic furrow; abdomen anteriorly not high shoulder hump
   may or may not present .......................................................................................... *Cyrtophora*
   — Carapace not flat thoracic furrow may or may not distinct; abdomen anteriorly very
     high provided with at least one pair of shoulder hump .......................................... 7

7. Four pair of sigilla on the dorsum of abdomen, caudal humps with a large black spot
   ................................................................................................................................. *Eriovixia*
   — Four pieces of sigilla absent on the dorsum of abdomen, caudal hump without a large
     black spot .................................................................................................................. 8
8. Spinnerets situated on an elevated circular space surrounded by a thick flange in the form of a ring ................................................................. *Gasteracantha*
   — Spinnerets not situated on an elevated circular space surrounded by a thick flange in the form of a ring ................................................................. 9

9. Carapace not flat; abdomen may or may not flat laterally, epigyne with short unwrinkled scape ................................................................. *Gibbarania*
   — Carapace flat; abdomen may or may not flat laterally, epigyne without short unwrinkled scape ................................................................. 10

10. Abdomen a little pointed mid-longitudinally over the carapace without caudal projection, ventral side of the abdomen with a white median-longitudinal band formed by black ................................................................. *Larinia*
   — Abdomen may or may not little pointed mid-longitudinally over the carapace with caudal projection, ventral side of the abdomen not provided with median longitudinal band which formed by black ................................................................. 11

11. Thoracic groove longitudinal, epigyne with unwrinkled scape and provided with one or two pairs of lateral lobes ................................................................. *Neoscona*

Genus 2. *Araneus* Clerck, 1757


Type-species: *Araneus angulatus* Clerck.

Distribution: Cosmopolitan.

2. *Araneus himalayensis* Tikader, 1975


Distribution: India : West Bengal (Kurseong, Mirik, Dist. Darjeeling, Jalpaiguri, And Nadia); Maharashtra; Karnataka.

Elsewhere: Pakistan, Myanmar.

Genus 3. *Argiope* Audouin, 1826


Type species: *Argiope lobata* (Thorell).

**Distribution**: Tropical and temperate countries of the world.

**Key to the species of the genus Argiope Aud**

1. Abdomen broadly oval and conspicuously truncated anteriorly, dorsum provided with black transverse strips and forming a network on the posterior half .......................... *aemula*
   - Abdomen not oval and not truncated anteriorly; dorsum not provided with black transverse strips and network on the posterior half ................................................................. 2
2. Anterior edge of the epigyne provided with a broad and conspicuous lip median epigynal septum abruptly wide posteriorly ................................................................. *anasuja*
   - Anterior edge of the epigyne provided with very thin wall and inconspicuous lip; median epigynal septum gradually wider posterior ................................................................. 3
3. Abdomen broadest at the middle; median epigynal septum very wide ............... *cacsarea*
   - Abdomen broadest more posteriorly than middle, median epigynal more broad ........ 4
4. Cephalothorax and legs light brownish in color abdomen not interiorly blunt, dorsum without yellowish aches .......................................................................................... *minuta*
   - Cephalothorax and legs light brownish in colour abdomen not anteriorly blunt, dorsum without yellowish aches .................................................................................. 5
5. Labium as long as wide; maxillae roundish in shape dark brown of the proximal part...

3. *Argiope aemula* (Walckenaer, 1841)


**Distribution**: India: West Bengal (Kalimpong, Darjeeling), Sundarban areas (Hingalgunj, Kulpi, Gosaba, Mandirbazar, Dist. North and South 24 Parganas); Gujarat; Tamil Nadu; Maharashtra: Andaman & Nicobar Island.

**Elsewhere**: Myanmar.

4. *Argiope anasuja* Thorell, 1887


Distribution: India: West Bengal (Kalimpong, Mirik), Sunderban areas: Patharpratima, Gosaba, Mandir bazar, Kulpi, Dist. South 24 Parganas; Sandeshkhali, Dist. North 24 Parganas, Kcbbibar; Tamil Nadu; Karnataka; Maharashtra; Orissa.

Elsewhere: Sri Lanka and Pakistan.

5. Argiope cacsarea Thorell, 1897


Distribution: India: West Bengal: (Kurseong, Darjeeling), Sundarban areas: Kulpi, Sagar Island, Dist. South 24 Parganas; Bihar; Karnataka; Maharastra; Madhya Pradesh; Tamil Nadu; Rajasthan.

6. Argiope minuta Karsch, 1879


Materials examined: 1♀, Sukiapokhri, Mirik, Dist. Darjeeling, West Bengal, 10.xii.2006.

Distribution: India: West Bengal (Darjeeling Kalimpong, Kurseong Mirik), Sunderban area (Kakdwip, Patharpratima, Sagar Island, Dist. South 24 Parganas, Hingalgunj, and Dist. North 24 Parganas); Meghalaya.

7. Argiope pulchella Thorell, 1881


Distribution: India: West Bengal (Darjeeling Kalimpong, Kurseong, Mirik), Sundarban areas: (Kakdwip, Patharpratima, Gosaba, Dist. South 24 Parganas: Sandeshkhali, Dist. North Parganas), Bankura, Jalpaiguri, Midnapur, Maldah, Mursidabad. Nadia; Madhya Pradesh; Orissa; Assam; Maharashtra; Tamil Nadu. Elsewhere: Myanmar, Malaysia Peninsula.

Genus 4. Chorizopes Cambridge, 1890


Type Species: Chorizopes frontalis O.P. Cambridge.

Distribution: India, Myanmar, Japan.

8. Chorizopes bengalensis Tikader, 1975


Diagnosis: Cephalothorax longer than wide, clothed with fine black and grey pubescence, wide and high in front, convex and descending steeply behind the cephalic region. Eyes pearly white. Lateral eyes nearly contiguous, small and far away from the middle eyes. Ocular quadrate slightly wider in front than behind. Legs strong, provided with transverse bands. Abdomen longer than wide, clothed with fine pubescence. Dorsum ornamented with admixture of chalk white and brown spots.

Distribution: India: West Bengal (Darjeeling).

Genus 5. Cyclosa Menge


Type Species: Cyclosa conica (Pallas).

Distribution: Cosmopolitan.

9. Cyclosa insulana (Costa, 1934)

Diagnosis: Cephalothorax longer than wide, narrowing in front, cephalic region distinctly separated from thoracic region by cephalic groove, thoracic fovea transverse. Eyes pearly white. Both the rows of eyes recurved. Ocular quadrate as long as wide. Chelicerae moderately strong. Abdomen rhombic shaped. Dorsum of the abdomen provided with 3 pairs of distinct sigilla arranged mid-longitudinally.

Distribution: India: West Bengal (Dist. Darjeeling); Meghalaya; Sikkim.

Genus 6. *Cyrtarachne* Thorell, 1868


Type species: *Cyrtorachne qubrei* (Keyserling).

Distribution: Asia, Africa and Australia.

Key to the species of the genus *Cyrtorachne* Thorell

1. Dorsum of abdomen provided with sigilla, each surrounded by black patches; epigynal scape sent .............................................................................................................. *gravelyi*
   — Dorsum of abdomen provided with sigilla but not surrounded by black patches; epigynal scape with thin rim .......................................................................................................... 2

2. Abdomen with large smooth convex indistinct prominences having chocolate colored patches; epigynal scape broad and blunt ........................................................... *inequalis*

   10. *Cyrtarachne gravrlyi* Tikader, 1960


   Distribution: India: West Bengal (Dist. Darjeeling).

11. *Cyrtarachne inequalis* Thorell, 1895


   Distribution: India: West Bengal (Kalimpong, Dist. Darjeeling).

Genus 7. *Cyrtophora* Simon, 1864


Type-species: *Cyrtophora citricola* (Forskal).

**Distribution**: Tropical and sub-tropical countries of the world.

**Key to the species of the genus *Cyrtophora* Simon**

1. Epigyne provided with median septum ................................................................. *bidenta*

2. Abdomen provided with two pair’s humps; epigyne provided with a broad rim ..........  

3. Abdomen oval; dorsum decorated with numerous small white spots and without any 
black patches; carapace uniformly blackish ..................................................... *moluccensis*

12. *Cyrtophora bidenta* Tikader, 1970

13. *Cyrtophora cicatrosa* (Stoliczka, 1869)

14. *Cyrtophora moluccensis* (Doleschall, 1857)
Genus 8. **Eriovixia** Archer, 1951


*Type species*: *Neoscona anabesca* (Walckenaer).

*Distribution*: Neoscona distributed all over the world.

15. **Eriovixia excelsa** (Simon, 1889)


*Diagnostic characters*: Cephalothorax brownish, slightly longer than wide, cephalic region distinctly elevated with inconspicuous groove. Both rows of eyes strongly recurved, anterior median eyes slightly smaller than posterior median; posterior median eyes encircled by black rings. Chelicerae moderately strong, provided with moderate boss. Legs moderate, long and thin. Abdomen wider than long. Five pairs of sigilla present on the dorsum. Caudal hump with black spot.

*Distribution*: India: West Bengal (Darjeeling), Sunderban area (Patharpratima, Gosaba, Namkhana, And Dist. South 24 Parganas; Sandeshkhali, Hasnabad. North 24 Parganas); Bihar; Gujarat; Maharastra.

Genus 9. **Gasteracantha** Sundevall, 1833


*Type species*: *Gasteracantha cancriformis* (Linnaeus).

*Distribution*: Tropical countries of the world.

**Key to the species of the genus Gasteracantha Sundevall**

1. Median spines not minute and simple .............................................................. brevispina

— Median spines minute and simple........................................................................... 2

2. Cephalic region provided with a median bulge–like conical elevation ........... cancriformis

— Cephalic region not provided with a median bulge–like conical elevation ........... 3

3. Dorsum of the abdomen provided with three conspicuous transverse yellowish bar ................................................................................................................ 4 diadesmia
— Dorsum of the abdomen not provided with three conspicuous transverse yellowish bar
.......................................................................................................................................... 4

4. Length of median spines slightly lesser than half of the width of abdomen of the base of
anteriorspines .......................................................................................................................................... hasseltii
— Length of median spines greater than width of abdomen of the base of anterior spines
.......................................................................................................................................... 5

5. Posterior spine not abruptly narrowed at the apex ................................................... kuhli
— Posterior spine abruptly narrowed at the apex ............................................................... 6

6. Spines provided with conspicuous bulge base and abruptly narrowed at the
7. Apex ................................................................................................................... unguifera

16. Gasteracantha brevispina (Doleschall, 1857)

Material examined : 2♀, Kalimpong, Dist. Darjeeling, West Bengal, 17.ix.1959 ColI. B.K.
Tikader 10♂, Darjeeling, West Bengal, 9.xii.1959 Coll. B.K. Tikader.

Distribution : India : West Bengal (Kalimpong, Kurseong, Dist. Darjeeling), Kolkata;
Andaman & Nicobar Islands; Bihar; Maharashtra; Meghalaya; Orissa; Sikkim; Tamil Nadu.
Elsewhere : Austro-Malaysia, Bangladesh, Japan, Myanmar, Sri Lanka.

17. Gasteracantha cancroformis Linn., 1758
Fauna Series, No. 3 : 470.
2005. Gasteracantha cancroformis Linn 1758 : As per Silwal, M. and Molm, S
Zoo’s Print Journal, 2006, 22(2) : 2551-2597.

Distribution : India : West Bengal (Darjeeling, Kalimpong), Dist. South 24 Parganas;
Andaman & Nicobar Island; Bihar; Maharashtra; Meghalaya; Orissa; Pakistan, Austro-Malaysia,
Sri Lanka, Pakistan.

18. Gasteracantha diadesmia Thorell, 1887
Fauna Series, No. 3 : 470.

Material examined : 8♀, Kalimpong, Dist. Darjeeling, West Bengal, 17.ix.1959 Coll. B.K.
Tikader.

Distribution : India : West Bengal (Kalimpong, Darjeeling).
19. **Gasteracantha hasseltii** C.L. Koch, 1838


**Distribution**: India: West Bengal (Kalimpong, Mirik and Darjeeling), Sundarban areas (Haroa, Dist. North Parganas); Andaman & Nicobar Islands; Sikkim.

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20. **Gasteracantha kuhli** Koch, 1837


**Distribution**: India: West Bengal (Kalimpong, Kurseong, Darjeeling), Kolkata; Andaman & Nicobar Islands; Assam; Bihar; Bhutan; Sikkim.

**Elsewhere**: Malaysia; Myanmar and Japan.

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21. **Gasteracantha unguifera** Simon, 1845


**Distribution**: India: West Bengal (Darjeeling, Kalimpong), Koch Bihar, Jalpaiguri, South 24 Parganas; Sikkim.

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Genus 10. **Gibbarania** Archar, 1951


**Type-species**: *Araneus angulatus* Clerck.

**Distribution**: Tropical countries of the world.

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22. **Gibbarania bituberculata** (Walckenaer, 1802)


**Distribution** : India: West Bengal: (Kalimpong, Kurseong, Mirik, Darjeeling), Sundarban areas: (Hingalgunj, North 24 Parganas), Jalpaiguri, Nadia; Maharashtra; Karnataka. Elsewhere : Pakistan, Myanmar.

Genus 11. **Neoscona** Simon, 1864


**Type-species** : *Neoscona anabesca* (Walckenaer).

**Distribution** : Neoscona distributed all over the world but many species this genus have been erroneously placed under the genus Araneus Clerck.

**Key to the species of the genus Neoscona Simon**

1. Cephalic region with 'V' shaped conspicuous dark brown patches .................. *mukerjei*
   — Cephalic region with no V shaped patches ................................................................. 2

2. Abdomen triangular in shape, epigynal scape short, broad and triangular .......... *nautica*
   — Abdomen nearly oval, epigynal scape long and narrow ............................................. 3

3. Carapace provided with 'V' shaped brown mark, epigynal scape sent at right angle to the base .................................................................................................................. *pavida*

23. **Neoscona mukerjei** Tikader, 1980


Distribution: India: West Bengal: (Kalimpong, Kurseong, Darjeeling), Sundarban areas: (Gosaba, Namkhana, Patharpratima, Dist. South 24 Parganas; Sandeshkali, Hasnabad, Dist. North 24 Parganas), Bardwan, Midnapur, Nadia, Koochbihar; Maharashtra.

24. Neoscona nautica (L. Koch)


Distribution: India: Bengal: (Kalimpong, Darjeeling), Sunderban area: Kakdwip, Mandir Bazar, Dist. South 24 Parganas; Hingalgunj, Hasnabad, Dist. North 24 Parganas), Assam: Gujrat: Maharashtra; Meghalaya.

Elsewhere: Myanmar: Pakistan; North America.

25. Neoscona pavida (Simon, 1906)


Elsewhere: China, Japan, Austro-Malayasia, South New Guinea.

Family III. ATYPIDAE Bertkau, 1878

Genus 12 Atypus Thorell, 1870


Diagnosis: Cephalothorax is very broad in front. Mandible is very large. Legs are weakly spined. Abdomen oval, longer than wide.

Type Species: Atypus stherlandi Chennapaiya, 1935.

Distribution: Oriental region from India, Burma to Java and North America; Palaearctic region from Ireland to Japan.
26. **Atypus stherlandi** Chennapaiya, 1935


**Material examined**: 1 ♀, Kalimpong, Dist. Darjeeling, West Bengal, 20.ii.1935, Coll. F.H. Gravely.

**Diagnosis**: Cephalothorax is very broad in front with median conical ocular tubercle. Coxa of palp is furnished with large maxillary process. Spinnerets are six in number. Mandible is very large without rastellum. Sternum with anterior sigilla is not forming a groove at the base of the labium. Legs are weakly spined and furnished with three tarsal claws. Abdomen oval, longer than wide.

**Distribution**: India: West Bengal: (Kalimpong, Dist. Darjeeling).

Family IV. CLUBIONIDAE Wagner, 1887

Genus 13. **Clubiona** Latreille, 1904


**Type-species**: *Clubiona pallidula* (Clerck).

**Distribution**: All tropical part of the world.

**Key to the species of the genus Clubiona Latreille**

1. Abdomen spindle shaped, the posterior half of abdomen provided with V-shaped brownish ornamentation ................................................................. **drassodes**
   — Abdomen not spindle shaped, the posterior half of abdomen without V-shaped brownish ornamentation .........................................................................................
2. Eyes of the anterior row slightly recurved; anterior median not silvery white in color ........................................................................................................ **filicata**
   — Eyes of the anterior row not slightly procurred, anterior medians silvery white incolour .................................................................................................................... **pogonias**
3. Tarsi usually long with short claws ............................................................... **shillongensis**
   — Tarsi usually short with long claws .............................................................
4. Labium broader anterior end, provided with 6 long black spines ............ **drassodes**


32. **Clubiona drassodes** Cambridge, 1874


Distribution: India: West Bengal: (Karshiong, Dist. Darjeeling, North 24 Parganas, Burdwan, Hawrah, Birbhum); Uttar Pradesh; Bihar; Tamil Nadu; Maharashtra; Karnataka.

28. **Clubiona filicata** Cambridge, 1874


Distribution: India: West Bengal: (Mirik, Darjeeling). North & South 24 Parganas, Bardhaman, Howrah. Kolkata; Maharashtra; Rajasthan; Madhya Pradesh.

29. **Clubiona pogonias** Simon, 1895


Distribution: India: West Bengal: (Dist. Darjeeling).

30. **Clubiona shillongensis** Majumder & Tikader, 1991

Distribution: India: West Bengal: (Dist. Darjeeling); Meghalaya; Tamil Nadu.

Family V. CORINNIDAE Karsch, 1880

Key to the genera of the family CORINNIDAE Karsch, 1880

1. Cephalothorax with median furrow. The last segment of the hind spinnerets is very short .................................................................................................................. **Castianeira**

—— Cephalothorax with or without median furrow. The last segment of the hind spinnerets is not very short .............................................................................................................. 2

2. The posterior row of eyes is not strongly curved; sternum not distinctly margined; ventral notch present in the IV trochanter .............................................................................. **Oedignatha**

Genus 14. *Castianeira* Keyserling, 1879


Type-species: *Castianeira rubicunda* keyserling.

*Distribution*: India, Africa, Malaysia, America and Canada.

**Key to the specis of the genus Castianeira, Keyserling**

1. Labium whitish in color not broader than long and not scopulated anteriorly ..........
   ................................................................................................................................. *albopicta*
   — Labium not whitish in color broader than long not scopulated anteriorly ............... 2

2. Legs not so strong and without longitudinal markings or whitish band, posterior tibia without conspicuous band at the apex .............................................................. *himalayensis*
   — Legs strong and with longitudinal markings or whitish band, posterior tibia with conspicuous band at the apex ................................................................. 3

3. Chelicerae enormous size, inner margin with 6 teeth .............................................. *indica*
   — Chelicerae not enormous size, inner margin not provided with 6 teeth ....................... 4

3. Abdomen cylindrical, dorsum provided with 3 pairs of segilla ................................ *zetes*

   31. *Castianeira albopicta* Gravely, 1931


   **Distribution**: India: West Bengal: (Pashok, Darjeeling); Bihar; Gujarat.

   32. *Castianeira himalayensis* Gravely, 1931


   **Distribution**: India: West Bengal (Kurshiong, Kalimpong, Dist. Darjeeling, Kolkata).

   33. *Castianeira indicum* Tikader, 1981


   **Distribution**: India: West Bengal (Darjeeling).
34. **Castianeira zetes** Simon, 1897


**Distribution**: India : West Bengal : (Kalimpong, Kurseong, Darjeeling). Tamil Nadu; Bangalore; Orissa; Assam; Maharashtra; Bhutan.

Genus 15. **Oedignatha** Thorell, 1881


**Type species**: *Oedignatha scrobiculata* Thorell.

**Distribution**: India, Sri-Lanka, Java, China.

**Key to the species of the genus Oedignatha Thorell**

1. Chelicerae brownish red; abdominal shield not provided with 6 whitish patches on either side of the mid-dorsal line ................................................................................................. *carli*
   — Chelicerae blackish; abdominal shield provided with 6 whitish patches on either side of the mid-dorsal line ................................................................................................. 2

2. Cephalothorax oblonged, a prominent median tubercle situated just below the median frontal eye ........................................................................................................ *scrobiculata*

35. **Oedignatha carli** Reimoser, 1934


**Distribution**: India : West Bengal : (Darjeeling); Bihar; Tamil Nadu; Kerala.

36. **Oedignatha scrobiculata** Thorell, 1881


**Distribution**: India : West Bengal (Darjeeling), (Kolkata, Serampore, Birbhum. Tamil Nadu; Maharashtra; Orissa; Bihar.

Family VI. CTENIDAE Keserling, 1877

Genus 16. *Ctenus* Cambridge, 1901


*Diagnosis*: The lower margin of the furrow of the chelicerae armed with three teeth. The first row of eyes slightly procurred, the median eyes larger than the lateral eyes and closer to them. The posterior row of eyes recurved, the eyes equal in size, somewhat larger than those of the anterior row. The median ocular quadrates wider behind than in front. Abdomen with or without dorsal pattern.

*Type species*: *Ctenus nigrinus* Cambridge.

*Distribution*: India, Asia and America.

**Key to the species of the genus Ctenus Cambridge**

1. Femora provided with indistinct black bands ...................................................... *Ctenus himalayensis*  
   — Femora provided with distinct black bands ...................................................... 2

2. Lateral side of the abdomen provided with longitudinal whitish band .......... *Ctenus sikkimensis*

   37. *Ctenus himalayensis* Gravely, 1931


*Distribution*: India: West Bengal (Darjeeling), Sikkim.

38. *Ctenus sikkimensis* Gravely, 1931


*Material examined*: 1♀, Pashok, Dist. Darjeeling, West Bengal, 1.i.1915. Coll. F.H. Gravely.
4♀, Kalimpong, Dist. Darjeeling, West Bengal, 1.i.1914. Coll. Sutherlandi.

*Distribution*: India: West Bengal (Darjeeling), Sikkim.

Family VII. GNAPHOSIDAE Pocock, 1898

**Key to the genera of the family GNAPHOSIDAE**

1. Chelicerae strong, inner and outer margin provided with two teeth, .......... *Geodrassus*  
   — Chelicerae not strong, inner and outer margin without teeth ................................... 2

2. Maxillae rounded; labium narrower anterior and broad posteriorly .......... *Gnaphosa*  
   — Maxillae rounded; labium not narrower anterior and broad posteriorly .......................... 3
4. Eyes of the posterior row nearly equal in size and equidistance from each other
.......................................................................................................................

Genus 17. Geodrassus Westring, 1857


Type species: Drassodes lapidosus (Walckenaer).

Distribution : Oriental, sub-tropical and temperate regions of the world.

39. Geodrassus himalayensis Tikader & Gajbe, 1975


Diagnosis: Cephalothorax and legs light brown, longer than wide, cephalic region slightly high, provided with conspicuous fovea. Eyes pearly white except anterior medians Anterior row slightly preouved; posterior row longer, procurred, mediansoval, slightly larger than laterals. Anteriormedians slightly smaller than the laterals. Chelicerae strong, inner and outer margin provided with two small teeth. Legs long and strong. Abdomen longer than wide slightly narrow in front and wider behind.

Distribution : India: West Bengal : (Kalimpong, Kurseong, Mirik, Dist. Darjeeling); Uttaraknchal; Meghalaya.

Genus 18. Gnaphosa Latreille, 1804


Type species: Gnaphosa lucifuga Latreille.

Distribution : Europe, Asia Africa and America.

40. Gnaphosa poonaensis Tikader, 1973


Diagnosis: Cephalothorax. Longer than wide narrow in front, posterior middle provided with conspicuous fovea. Anterior row of eyes preouved, medians more or less equal size to laterals. Posterior row of eyes slightly recurved and slightly longer than anterior row, posterior medians oval and conspicuously silvery white in color. Chelicerae strong, inner margin provided
with chitinous ridge. Sternum heart shape pointed behind. Abdomen longer than wide, elliptical in shape. Dorsum provided with whitish chevrons.

**Distribution**: India: West Bengal: (Mirik, Darjeeling); Himachal Pradesh; Maharashtra; Rajasthan; Uttaranchal.

Genus 19. *Scotophaeus* Simon, 1893


**Type species**: *Scotophaeus quadripunctatus* Latreille.

**Distribution**: Oriental and temperate region of the world.

41. *Scotophaeus madalasae* Tikader & Gajbe, 1977


**Diagnosis**: Cephalothorax. Longer than wide, convex narrow in front, cephalic region slightly high, centre provided with conspicuous fovea. Anterior row of eyes slightly preouved, medians circular, black and slightly larger than laterals. Posterior row of eyes slightly procurved and slightly longer than anterior row, posterior medians elliptical in shape and silvery white in color. Chelicerae vertical, inner and outer margin provided with three small teeth on each. Legs strong ridge. Sternum oval in shape slightly pointed behind. Abdomen longer than wide, more or less elliptical in shape. Dorsum provided with two white patches.

**Distribution**: India: West Bengal: (Kalimpong, Kurseong, Dist. Darjeeling); Uttaranchal.

Family VIII. HERESIDAE Thorell, 1870

Genus 20. *Hersilia* Audouin, 1826


**Diagnosis**: Ocular quadrangle parallel sided; head flat, angular laterally; clypeus usually very high, prominent, proteri of I and II and IV legs are bi-segmented.

**Type-species**: *Hersilia caudata* Audouin.

**Distribution**: Africa, Madagascar, Oriental region.

**Key to the species of the genus Hersilia Audouin**

1. Cephalo-thorax rounded; abdomen broad apple shaped, dorsum decorate with different colors .......................................................... *savignyi*
   — Cephalo-thorax not rounded; abdomen not broad and apple shaped, dorsum not decorate with different colors ................................................................. 2

5. Eyes blackish similar, anterior row slightly procurved posterior row slightly recurved .......................................................... *sumatrana*
42. *Hersilia savignyi* Lucas, 1836


*Distribution* : India : West Bengal : (Mirik, Dist. Darjeeling) Sundarban areas : (Hasnabad, Dist. North 24 Parganas; Gosaba, Dist. South 24 Parganas), Hoogly, Jalpaiguri, Maldah, Midnapur, Murshidabad, Nadia, West Diaper; Assam; Maharashtra; Tamil Nadu; Uttar Pradesh.


43. *Hersilia sumatrana* Thorell, 1890


*Material examined* : 1 ♀, Gopaldhara, Dist. Darjeeling West Bengal, 1.i.1916, Coll. Stevens is.

*Distribution* : India : West Bengal : (Darjeeling).

Family IX. HOMALONYCHIDAE Simon, 1893


*Diagnosis* : The genus *Homalonichus* formerly belonging to the family Zoodaridae. Now this has been placed in a family of its own Tarsal claw two, similar and smooth, completely lacking denticles. The tarsi provided with a brush of terminal tenant hairs and a pairs of spurious claws. The eight eyes placed in two rows of four each. The first row strongly recurved and much wider than first row.

*Distribution* : America, India.

44. *Homalonichus jayantius* Tikader, 1970


*Diagnosis* : Cephalothorax and abdomen black, legs brown incolour. Cephalothorax longer than wide slightly convex narrow in front provided with a broad longitudinal brown patches and this portion clothed with fine grey hair, lateral margins also provided with brown patch.
Centre of the thorax with deep foveal impression. Eyes dark. Posterior row strongly recurved and much wider than anterior row; anterior row short and procurred, and middle eyes slightly larger than laterals. Clypeus high. Chelicerae without tooth on the margin. Sternum broad. Clothed with spiny hairs, and posterior coxae widely separated. Legs strong and robust clothed with thick hairs. Tarsal claw two, similar in size and without denticles. Abdomen longer than wide, provided with longitudinal white line.

**Distribution**: India: West Bengal (Darjeeling).

**Family X. LYNYPHIDAE** Blackwall, 1859

**Genus 22. Lepthyphantes** Menge, 1866


**Diagnosis**: Cephalothorax narrowed anteriorly. Eyes large with black spot. Anterior median smaller than posterior medians. Clypeus slightly concave. Abdomen with or without dorsal pattern.

**Type species**: *Lepthyphantes nebulosa* Sundevall.

**Distribution**: Africa, America, Asia, Australia and Europe.

**Key to the species of the genus Lepthyphantes** Menge

1. Abdomen not triangular, anterior portion of abdomen high ................. *bhudbari*

   — Abdomen not triangular, anterior portion of abdomen high ................. *lingsoka*

   45. *Lepthyphantes bhudbari* Tikader, 1970


   **Material examined**: 1 ♀ Bhudbari, Darjeeling, West Bengal, 15. ix. 1959. Coll. B.K. Tikader.

   **Diagnosis**: Cephalothorax and legs brownish green. Cephalothorax as long as wide, cephalic region slightly rose. Eyes not pearly white. But base of all eyes encircled by black patches; anterior row strongly recurved; posterior row straight; lateral and anterior median eyes are contiguous. Anterior median eyes smaller than others. Legs strong. Abdomen egg shaped. Dorsum ornamented mid-dorsally with a longitudinal black bar extending from base to end of abdomen of abdomen and lateral side provided with irregular chalk white patches.

   **Distribution**: India: West Bengal (Darjeeling).

46. *Lepthyphantes lingsoka* Tikader, 1970


**Material examined**: 1 ♀ Lingsoka, Darjeeling, West Bengal, 2. ix. 1959. Coll. B.K. Tikader.

**Diagnosis**: Cephalothorax and legs brownish green. Cephalothorax as long as wide, cephalic region slightly rose. Eyes not pearly white but base of all eyes encircled by black patches;
anterior row strongly recurved; posterior row straight; lateral and anterior median eyes are contiguous. Anterior median eyes smaller than others. Legs strong. Abdomen egg shaped. Dorsum ornamented mid-dorsally with a longitudinal black bar extending from base to end of abdomen of abdomen and lateral side provided with irregular chalk white patches.

*Distribution:* India: West Bengal (Darjeeling).

**Family XI. LYCOSIDAE Sundevall, 1833**

**Key to the genera of the family LYCOSIDAE**

1. Posterior spinnerets distinctly longer than anterior; sternum generally provided with mid-longitudinal dark marking.............................. *Hippasa*
   — Posterior spinnerets not distinctly longer than anterior; sternum not provided with mid-longitudinal dark markings............................... 2

2. Anterior row of eyes straight, Ocular quadrate wider than long .................. *Hogna*
   — Anterior row of eyes not straight, not Ocular quadrate wider than long........... 3

3. Labium longer than wide and the basal exavation is prominent.................... *Lycosa*
   — Labium not longer than wide and the basal exavation is not prominent .......... 4

4. Cephalic region not much elevated from the thoracic region ....................... *Pardosa*
   — Cephalic region much elevated from the thoracic region.......................... 5

5. Ocular quadrate longer than wide ............................................................ *Venonia*

**Genus 23. Hippasa Simon, 1885**


*Type species:* *Hippasa ageleoides* (Simon).

*Distribution:* Madagascar: Africa, Malaysia and India.

**Key to the species of the genus Hippasa Simon**

1. Chitinous plate covering the pit of the valve and bifurcated posteriorly, producing a pair of large elevated triangular plate........................................... *agelenoides*
   — Chitinous plate not covering the pit of the valve, not producing a pair of elevated triangular plate............................................................... 2

2. Chitinous plate covering the pit of the valve and bifurcated posteriorly, producing a pair of large elevated triangular plate........................................... *greennalliae*
   — Chitinous plate not covering the pit of the valve, not producing a pair of elevated triangular plate............................................................... 3
3. Pit of the vulva triangular in front and dorsal side of abdomen with dark brown spots and white chevrons ................................................................. *himalayensis*
   — Pit of the vulva not triangular in front and dorsal side of abdomen without dark brown spots and white chevrons ................................................................. 4

4. Plate of valve produced into a tongue like process very much drawn out posteriorly ................................................................. *holmerae*
   — Plate of valve not produced into a tongue like process ........................................ 5

5. Posterior spinners conspicuously longer than the anterior spinners ............... *pantherina*
   — Posterior spinners conspicuously longer than the anterior spinners ..................... 6

6. Ventral side of the abdomen provided with three longitudinal dark bands extending from the epigastric fold to the base of the spinnerets .................................................. *parlita*

47. **Hippasa agelenoides** (Simon, 1884)


*Material examined*: 1♀, Lopchu, Kalimpong, Dist. Darjeeling West Bengal, 12.xii.2006.

*Distribution*: India: West Bengal (Kalimpong, Mirik, Dist. Darjeeling); Kerala; Tamil Nadu; Karnataka; Uttaranchal; Madhya Pradesh.

*Elsewhere*: Myanmar.

48. **Hippasa greenalliae** (Blackwall, 1867)


*Distribution*: India: West Bengal (Darjeeling), Sunderban areas : Patharpratima, Dist. South 24 Parganas,) Karnataka; Kerala; Orissa; Maharashtra; Tamil Nadu; Sikkim.

49. **Hippasa himalayensis** (Gravely, 1924)


*Distribution*: India: West Bengal (Kalimpong, Dist. Darjeeling); Himachal Pradesh; Karnataka.

50. **Hippasa holmerae** Thorell, 1895

42 Rec. zool. Surv. India, Occ. Paper No. 340


Distribution: India: West Bengal (Mirik, Darjeeling) Sunderban areas (Patharpratima, Dist. North and South 24 Parganas). Uttar Pradesh; Manipur.

Elsewhere: Myanmar, Singapore, West China.

51. Hippasa pantheina Pocock, 1899

Distribution: India: West Bengal (Darjeeling); Balasore; Orissa; Maharashtra: Sikkim.

52. Hippasa partita (Cambridge, 1876)


Distribution: India: West Bengal (Kurseong, Mirik, Dist. Darjeeling), Sunderban area: Patharpratima, Dist. South 24 Parganas); Gujarat; Rajasthan.

Elsewhere: Egypt, Arabia, Pakistan.

Genus 24. Hogna Gravely, 1924


Type-species: Lycosa tarantula Rossi.

Distribution: All over the world.

53. Hogna himalayensis Gravely, 1924

Distribution: India: West Bengal (Darjeeling), Sunderban areas: (Gosaba, Dist. South 24 Parganas, Bankura). Meghalaya, Assam. Key to the species of the genus Lycosa Latreille from Darjeeling.
Genus 25. *Lycosa* Latreille, 1904


Type-species: *Lycosa tarantula* Rossi.

*Distribution*: All over the world.

**Key to the species of the genus *Lycosa* Latreille**

1. Labium slightly longer than broad and anterior part of the dorsum provided with longitudinal dark brown patches ................................................................. *bistriata*

— Anterior part of the dorsum not provided with longitudinal dark brown patches ........ 2

2. Coxa of all legs pale ventrally and extremities of ventral side of IV tibia without band ......................................................................................................................... *charmichaeli*

— Coxa of all legs not pale ventrally and extremities of ventral side of IV tibia with any band ......................................................................................................................... 3

3. Carapace provided with median broad, pale band extending from base of 2nd row of eyes to the base of cephalothorax .............................................................................. *himalayensis*

4. Carapace redish brown in colour, femora of all legs provided with light patches........

................................................................................................................................. *kempi*

— Carapace not redish brown in femora all legs not provided with any patches .......... 5

5. Carapace with a broad mid-longitudinal plate band; sternum redish brown; coax of all legs dark brown ........................................................................................................ *nigrotibialis*

54. *Lycosa bistriata* Gravely, 1924


*Distribution*: India: West Bengal (Darjeeling, Birbhum, Kolkata). Tamilnadu (Chennai).

55. *Lycosa charmichaeli* Gravely, 1924


*Distribution*: India: West Bengal (Darjeeling). Andhra Pradesh; Punjab.

56. *Lycosa himalayensis* Gravely, 1924


**Distribution**: India: West Bengal (Darjeeling), Sundarban areas: (Gosaba, Dist. South 24 Parganas, Bankura). Meghalaya; Assam.

57. *Lycosa kempi* Gravely, 1924


**Material examined**: 1♀, 1♂, Sambiyong, Dist. Darjeeling, West Bengal, 14.i.xi.1959. B.K. Tikader.

**Distribution**: India: West Bengal (Mirik, Darjeeling), Sunderban areas: (Gosaba, Dist. South 24 Parganas; Gosaba). Meghalaya; Assam; Sikkim.

58. *Lycosa nigrotibialis* Simon, 1884


**Distribution**: India: West Bengal (Kalimpong, Mirik, Dist. Darjeeling, Birbhum and Kolkata) Assam; Bihar; Maharashtra; Sikkim.

Genus 26. *Pardosa* Koch, 1848


**Type Species**: *Pardosa striatipes* Koch.

**Distribution**: Asia, Europe, America.

**Key to the species of the genus Pardosa Koch**

1. Anterior row of eyes slightly procurved ................................................................. *birmanica*
   — Anterior row of eyes slightly recurved ............................................................... 2
2. Dorsal side of the abdomen decorated with minute light spots ....................... *pseudoannulata*
   — Dorsal side of the abdomen not decorated with minute light spots .................. 3
3. Dorsal side of abdomen dark brown with minute pale spots and mid-longitudinal area pale ......................................................................................................................... *pusiola*
   — Dorsal side of abdomen pale with few small dark brown spots ....................... 4
4. Abdomen ventrally provided with sub-lateral longitudinal irregular greenish brown patches .................................................................................................................. *shyamae*
Abdomen ventrally not provided with sub-lateral longitudinal irregular greenish brown patches ................................................................. 5

5. Legs not so strong, provided dorsally with irregular greenish brown patches ...........
.............................................................................................................................. sumatrana

— Legs not so strong, provided dorsally without irregular greenish brown patches ....... 6

6. Tibia and metatarsi of I & II provided with three pieces of ventral spines.....sutherlandi

59. Pardosa birmanica Simon, 1884

Distribution : India : West Bengal : (Mirik, Darjeeling) Sunderban areas : (Sandeshkhali, Hasnabad, Hingalgunj. Dist North 24 Parganas; Gosaba, Dist. South 24 Paraganas), Burdwan, Birbhum, Gujarat; Rajasthan; Maharashtra; Punjab; Himachal Pradesh; Madhya Pradesh; Meghalaya; Tamil Nadu; Andhra Pradesh; Bihar; Orissa.

Elsewhere : Java, Pakistan.

60. Pardosa psedoannulata (Bosenbarg & Strand, 1906)

Distribution : India : West Bengal (Mirik, Darjeeling) Sunderban area (Hingalgunj, Minakhan, Dist. North 24 Parganas; Patharpratima, Gosaba), Birbhum. Kerala; Maharashtra; Madhya Pradesh; Bihar; Assam : Gujarat; Andhra Pradesh; Karnata; TamilNadu.

Elsewhere : Myanmar, Pakistan and Bangladesh.

61. Pardosa pusiola (Thorell, 1891)

Distribution : India : West Bengal (Mirik, Suriel, Dist. Darjeeling).

Elsewhere : Bornio; Myanmar; Indronesia & Java.

62. Pardosa shyamae (Tikader, 1970)


_Distribution_: India: West Bengal (Kalimpong, Darjeeling), Sunderban area (Hingalgunj, Minakhan, Sandeshkhali, Dist North 24 Parganas).

63. *Pardosa sumatrana* (Thorell, 1890)


_Distribution_: India: West Bengal (Mirik, Darjeeling), Sunderban area: (Kultali, Patharpratima, Gosaba, Dist South 24 Parganas; Hingalgunj, Sandeshkhali, Dist. North 24 Parganas), Birbhum, Burdwan, Hugli. Meghalaya; Karnatak; Tamil Nadu; Andhra Pradesh; Maharashtra; Bihar; Himachal Pradesh; Tripura; Rajasthan; Gujarat; Madhya Pradesh; Arunachal Pradesh; Andaman & Nicobar Island.


64. *Pardosa sutherlandi* (Gravely, 1924)


_Distribution_: India: West Bengal (Mirik, Darjeeling) Sunderban area (Gosaba, Dist. South 24 Parganas; Hingalgunj, Dist North 24 Parganas).

Genus 27. *Venonia* Thorell, 1894


_Type Species_: *Venonia coruscans* Thorell.

_Distribution_: India, New Holland, Singapore.

65. *Venonia himalayensis* Gravely, 1924


*Diagnosis*: Cephalothorax wider than long, Cephalothorax provided with conspicuous fovea. Anterior view of eyes strongly procurred, anterior medians smaller than the laterals. Ocular quadrate wider than long. Chelicerae moderately strong. Legs long. Abdomen longer than wide, oval in shape, dorsum provided with three longitudinal rows of oblique strips.

*Distribution*: India : West Bengal (Darjeeling).

Family XII. MITURGIDAE Simon, 1885

Genus 28. *Cheiracanthium* Koch, 1839


*Type species*: *Cheiracanthium punctorum* Villers.

*Distribution*: All tropical parts of the world.

**Key to the species of the genus Cheiracanthium Koch**

1. Tarsi comparatively longer and less scopulated, maxillary lobe angulated distinctly at its outer side ........................................... *himalayensis*
   — Tarsi comparatively shorter and more scopulated, maxillary lobe not angulated distinctly at its outer side ...................................................... 2

2. Cymbium with long stout spurs at its base, extending almost at the middle of the tibia ........................................... *indicum*
   — Cymbium with rudimentary spur, not extending almost at the middle of the Tibia ...... 3

3. Apophysis of the palpal organ enormously developed ....................................................... *insigne*
   — Apophysis of the palpal organ not enormously developed ............................................. 4

4. Retro lateral apophysis of the tibia of male palpal organ generally short and not slender, slightly sinuous at its tip ....................................................... *melanostoma*
   — Retro lateral apophysis of the tibia of male palpal organ generally long and slender, strongly sinuous at its tip ....................................................... 5

5. Lateral eyes both anterior and posterior slightly separated from each other .................
   — Lateral eyes both anterior and posterior very close to each other ................................. 6

6. Chelicerae more or less parallel, inner and outer margin provided with 4 and 3 teeth...
   — Chelicerae not parallel, inner and outer margin provided with 2 teeth .......................... 7
7. Genital bulb or male palpus broad anteriorly, membranes of the palpal organ well developed

Remarks: The genus Cheiracanthium has been included under the family MITHURGIDAE


66. **Cheiracanthium himalayensis** Gravely, 1931


Distribution: India: West Bengal: (Kalimpong, Kurshiong, Dist. Darjeeling), Sundarban areas: Hingalgunj, Dist. North 24 Parganas; Meghalaya; Gujarat; Maharashtra.

67. **Cheiracanthium indicum** Cambridge, 1874


Material examined: 1♂, Kalimpong, Dist. Darjeeling, West Bengal 4.iv.1931; Coll. Sutherlandi.

Distribution: India: West Bengal: (Kalimpong, Dist. Darjeeling); Maharashtra; Gujarat; Sikkim; Meghalaya.

68. **Cheiracanthium insigne** Cambridge, 1874


Distribution: India: West Bengal: (Mirik, Dist. Darjeeling), Dist. North 24 Parganas; Assam; Bihar; Maharashtra; Tamil Nadu.

Elsewhere: Sri Lanka.

69. **Cheiracanthium melanostoma** Thorell, 1895


Distribution: India: West Bengal: (Kalimpong, Kurseong Mirik, Dist. Darjeeling), Sunderban areas (Gosaba, Dist. South 24 Parganas), Midnapur, Mursidabad. Bihar; Rajasthan; Goa; Maharashtra; Gujarat; Mysore; Karnataka; Andaman & Nicobar Island.

70. *Cheiracanthium mysorensis* Majumder & Tikader, 1991


Distribution: India: West Bengal: (Kalimpong, Dist. Darjeeling;); Gujarat; Karnataka; Maharashtra.

71. *Cheiracanthium pauriensis* Majumder & Tikader, 1991


Distribution: India: West Bengal: (Richmond Hills, Darjeeling);; Uttaranchal.

72. *Cheiracanthium trivialis* Thorell, 1895

1895. *Cheiracanthium trivialis* Thorell, Spider Fauna of Burma: 44.


Distribution: India: West Bengal: (Kalimpong, Mirik, Dist. Darjeeling, South 24 Parganas, Nadia); Tamil Nadu; Madhya Pradesh; Maharashtra.

Elsewhere: Myanmar.

Remarks: The genus *Cheiracanthium* Koch has been included under the family MITURGIDAE: As per Silwal, M. and Molur, S *Zoo’s Print Journal*. 2006, **22**(2): 2551-2597.
Family XIII. OECOBIIDAE Blackwall, 1862

Genus 29. **Oecobius** Lucus, 1845


*Diagnosis*: Cephalothorax is convex and moderately elevated. The legs are proportionately long. The metatarsus and tarsus together of each of the legs for exceeding the carapace in length. Median ocular quadrangle longer than broad.

*Type Species*: *Oecobius domesticus* Lucus.

*Distribution*: India, Japan, Middle East, North America.

73. **Oecobius putus** Cambridge, 1876


*Diagnosis*: Cephalothorax wider than long, Eyes unequal in size and dissimilar in form, Both row of eyes procurved.

*Distribution*: India: West Bengal (Darjeeling), Dist. South 24 Parganas, Bardhaman, Maharashtra; Tamil Nadu.

*Elsewhere*: Ethiopia; Egypt.

Family XIV. OXYOPIDAE Thorell, 1870

Genus 30. **Oxyopes** Latreille, 1804


*Type Species*: *Oxyopes heterophthalmus* Latreille.

*Distribution*: Cosmopolitan.

**Key to the species of the genus Oxyopes Latreille**

1. Cephalothorax not blotched with alternate lighten dark olive patches rayed out fovea ..
   .................................................................................................................. *pandae*
2. Cephalothorax blotched with alternate lighten dark olive patches rayed out fovea ..
46. Upper side of the femora of all legs provided with longitudinal black lines ............ *ratnae*
   — Upper side of the femora of all legs not provided with longitudinal black lines ......... 3
3. Abdomen wider at the middle, narrowed both anterior and posterior end; dorsum without any patches at the middle .................................................................................. *sakuntalae*
Abdomen not wider at the middle and not narrowed on both the ends; dorsum provided with patches at the middle................................................................................................................. 4

4. Cephalothorax narrowed in front and provided with inconspicuous fovea at the middle ........................................................................................................................................... shweta

— Cephalothorax wider in front and not provided with inconspicuous fovea at the middle ........................................................................................................................................ 5

5. Eyes enclosed in a black field, situated in an equal distance to each other ..................

........................................................................................................................................... sikkimensis

74. Oxyopes pandae Tikader, 1969


Distribution : India : West Bengal (Mirik, Dist. Darjeeling), Sundarban areas (Gosaba, Dist. South Paraganas).

75. Oxyopes ratnae Tikader, 1970


Distribution : India : West Bengal (Kurshiong, Dist. Darjeeling) Sunderban area (Gosaba, Dist. South 24 Parganas), Hugh, Maldah, Midnapur; Sikkim.

76. Oxyopes sakuntalae Tikader, 1870


Distribution : India : West Bengal (Kalimpong, Kurseong, Darjeeling), Sundarban areas : (Hingalgunj Dist. North 24 Parganas; Kultali, Gosaba, Dist. South 24 Parganas).
77. Oxyopes shweta  Tikader, 1970


Distribution: India : West Bengal : (Mirik, Darjeeling), Sundarban areas : (Gosaba, Patharpratima, Dist. South 24 Parganas), Jalpaiguri, Hooghly; Sikkim; Meghalaya.

78. Oxyopes sikkimensis  Tikader, 1970


Distribution: India: West Bengal (Mirik, Kalimpong, Dist. Darjeeling), Sunderban area (Gosaba, Dist. South 24 Parganas), Jalpaiguri. Sikkim.

Family XV PISAURIDAE Simon, 1890

Genus 31. Pisaura  Simon, 1885


Diagnosis: His median ocular area a little longer than wide. Lower margin of the furrow of chelicerae with three teeth. Abdomen tapering behind.

Type species: Pisaura mirabilis Clerck.

Distribution: Europe, Africa, Asia.

79. Pisaura gitae  Tikader, 1070


Diagnosis: Cephalothorax and abdomen light to deep brown, legs green. Cephalothorax longer than wide, cephalic region slightly high, middle and lateral margin provided with longitudinal brown patches. Eyes anterior row slightly short, recurved and almost similar size. Posterior rows more recurved than the anterior row and nearly equal in size; ocular quadrate longer than wide and narrowing in front. The lower margin of the chelicerae armed with three teeth. Sternum heart shaped, pointed behind Legs long and strong. Abdomen longer
than wide, anterior half of. Dorsum ornamented with two longitudinal white lines and both lateral sides provided with broad longitudinal white lines.

**Distribution**: India: West Bengal (Darjeeling).

Family XVI. PHILODROMIDAE Thorell, 1070

Genus 32. *Philodromus* Walckenear, 1826

1825. *Philodromus* : Walckenear, ENT. Fr. Ar., 86.

*Type-species*: *Philodromus auricolor* Clerck.

**Distribution**: Cosmopolitan.

80. *Philodromus maliniae* Tikader, 1966


**Diagnosis**: Cephalothorax uniform depressed slightly wider than long. Eyes round and black provided with tubercle, both rows of eyes very close and not forming a crescent shaped group. Sternum oval not pointed behind. Legs relatively long, II pairs slightly longer than I. Abdomen longer than wide, dorsally provided with white and light brown patches.


**Distribution**: India: West Bengal (Kalimpong, Dist. Darjeeling).

Family XVII. SALTICIDAE Blackwall, 1841

**Key to the genera of the family SALTICIDAE**

1. Cephalothorax rectangular in shape not pointed behind ............................. *Marpissa*
   — Cephalothorax not rectangular in shape pointed behind ........................................... 2
2. Chelicerae robust and prominent, nearly as long as cephalothorax .......... *Myrmarachne*
   — Chelicerae not robust and prominent; not longer as cephalothorax .............................. 3
3. Ocular region more darker than the rest portion of the cephalothorax ............ *Plegra*
   — Ocular region not darker than the rest portion of the cephalothorax ........................... 4
4. Labium little longer than wide; coxa of the 1st leg separated by less than the wide of Labium .................................................................................................................. *Plexippus*
   — Labium not longer than wide; coxa of the 1st leg not separated by legs than the of the Labium ................................................................................................................................... 5
5. Eyes are small in proportion to the size of spider ...................................... *Telamonia*
Eyes are not small in proportion to the size of spider ................................................... 6
6. The first legs are heaviest than the rest ................................................................. Zygoballus

Genus 33. *Marpissa* Koch, 1845


*Type species*: *Marpissamuscosa* Clerck.

*Distribution*: Cosmopolitan.

81. *Marpissa decorata* Tikader, 1974


*Diagnosis*: Cephalothorax redish brown, longer than wide cephalic region flat, at the middle of the cephalothorax provided with a small fovea. Anterior row of eyes recurved, anterior lateral eyes slightly larger than the posterior eyes; second pair of eyes very small and situated more near to the anterior laterals. Chelicerae with one moderate tooth on the inner margin and two small teeth on the outer margin. Abdomen longer than wide pointed behind. Dorsum decorated with white and black patches.


Genus 34. *Myrmarachne* Mac Leay, 1839


*Type Species*: *Myrmarachne melanocephalus* Mac Leay.

*Distribution*: Oriental and sub–tropical regions of the world.

82. *Myrmarachne orientalis* Tikader, 1973


*Diagnostic characters*: Cephalothorax redish in colour, longer than wide, with a nearly complete transverse constriction at the cephalic and thoracic junction. Anterior row of eyes slightly recurved, posterior row of eyes straight. Chelicerae as long as cephalothorax, outer
margin provided with 4-5 slightly larger teeth, inner margin with small teeth. Maxillae and labium longer than wide. Legs thin and long. Abdomen elongated, distinctly constricted, pedicel very long and prominent.

**Distribution**: India: West Bengal (Darjeeling), Sundarban areas: (Basanti, Dist. South 24 Parganas), Darjeeling, Haroa, Maldah, Midnapur, West Diaper.

Genus 35. *Plegra* Simon, 1876


**Type species**: *Plegra muscosa* Clerck.

**Distribution**: Cosmopolitan.

83. *Plegra dhakuriensis* Tikader, 1974


**Diagnosis**: Cephalothorax brownish in colour, longer than wide, cephalic region flat, middle of the cephalothorax provided with conspicuous fovea. Anterior row of eyes recurved, middle eyes milky white and the others pearly white. Anterior median eyes nearly three times larger than the lateral eyes. Chelicerae moderately strong, inner margin provided with one large tooth, outer margin with two smaller teeth. Legs I & II short and stout. Abdomen longer than wide, provided with white patches.

**Distribution**: India: West Bengal (Kurshiong, Dist. Darjeeling, Kolkata, Hawrah), Sunderban area: (Patharpratima, Dist. South 24 Parganas).

Genus 36. *Plexippus* Koch, 1866


**Type species**: *Plexippus paykullii* (Aud.).

**Distribution**: Cosmopolitan.

84. *Plexippuscalcultaensis* Tikader, 1974


**Diagnostic characters**: Cephalothorax, abdomen and legs light brown, cephalothorax longer than wide, without fovea. Anterior row of eyes slightly recurved; median eyes twice Langer than anterior larerals. Middle or second row of eyes very small and situated nearly equidistant from anterior lateral and posterior row. Chelicerae strong, inner and outer margin of chelicerae provided with one moderate tooth. Abdomen longer than wide, dorsum decorated with white patches.

**Distribution**: India: West Bengal (Kalimpong, Dist. Darjeeling) Sunderban areas (Hingalgunj, Haroa; Dist. North 24 Parganas), Kolkata.

Genus 37. *Telamonia* Koch, 1846


**Type species**: *Phidippus variegatus* (Lucus).

**Distribution**: All tropical and sub-tropical countries of the world.

85. *Telamonia dimidiata* (Simon, 1899)


**Diagnosis**: Cephalothorax longer than wide, oval in shape, cephalic region Flat, middle of the cephalothorax provided with distinct bifurcated fovea. Eyes Comparatively small according to the size of the spider. Anterior row recurved, anterior lateral eyes and posterior lateral eyes nearly same size, second pair very small. Chelicerae strong, outer margin provided with 2 small teeth and the inner margin with one large tooth. Legs I and II more robust than III and IV. Longer than wide, pointed behind. Dorsum provided with V-shaped longitudinal deep brown bands.

**Distribution**: India: West Bengal (Kalimpong, Dist. Darjeeling), Sunderban area: (Gosaba, Dist. South 24 Parganas), Koochbihar, Maldah, Jalpaiguri, Midnapur, Murshidabad, Nadia; Gujarat; Maharashtra.
Genus 38. *Zygoballus* Peckham, 1885


*Type species:* *Zygoballus rufipes* Peckham.

*Distribution:* India, America.

86. *Zygoballus narmadaensis* Tikader, 1975


*Diagnostic characters:* Cephalothorax and legs deep brown, abdomen light brown in colour. Cephalothorax wider than long, anterior and posterior end slightly narrowed than the middle; a lense-shaped fovea present at the posterior part of the cephalic region. Eyes are black, except anterior eyes which are pearly white. Anterior row slightly recurved. Anterior and posterior laterals eyes are nearly same size. Second pair of eyes small and situated more closer to the anterior laterals than to the posterior eyes. First pair of legs conspicuously stout. Abdomen short, longer than wide; dorsum without segilla and provided with a number of redish brown patches which seems to be a panther.

*Distribution:* India: West Bengal (Kalimpong, Dist. Darjeeling), North 24 Parganas and Birbhum.

Family XII. SCYTODIIDAE Blackwall, 1952

Genus 39. *Scytodes* Latreille, 1804


*Diagnosis:* Cephalothorax high and subglobose behind and slopes forward. Eyes six nocturnal arranged in three groups of two each. Anterior row of eyes strongly recurved.

*Type Species:* *Scytodes thoracica* Latreille.

*Distribution:* India, Africa, America, Europe.

**Key to the species of the genus Scytodes Latreille**

1. Abdomen yellowish white; four narrow transverse black bands on the dorsum .......... .......................... *propinqua*

2. Cephalothorax provided with a few black lonitudinal streaks ................. *thoracica*
87. *Scytodes propinqua* Stoliczka, 1869


*Distribution*: India: West Bengal (Kurseong, Dist. Darjeeling and North & South 24 Parganas), Punjab, America.

88. *Scytodes thoracica* (Latreille, 1804)


*Distribution*: India: West Bengal (Darjeeling, North 24 Parganas).

*Elsewhere*: Africa, America, Australia and Europe.

Family XIX. SPARASSIDAE Bertkau, 1872

**Key to the genera of the family SPARASSIDAE**

1. Epigynum provided with a horizontal plate, spermatheca not convoluted .............................. *Butaniella*
   — Epigynum provided with a horizontal plate, spermatheca not convoluted .......................... 2
2. Maxillae not provided with distinct median longitudinal creast ............................................... *Heteropoda*
   — Maxillae provided with distinct median longitudinal creast ............................................. 3
3. Thoracic fovea indistinct; posterior row of eyes procurved .................................................... *Olios*
   Thoracic fovea distinct; posterior row of eyes not procurved .............................................. 4
4. Median sclerite of vulva not hammer shaped ............................................................ *Pseudopoda*

Genus 40. *Butaniella* Gravely, 1931


*Type species*: *Heteropoda venatoria* (Linn.)

*Distribution*: India Sikkim, Meghalaya.

89. *Butaniella sikkimensis* Gravely, 1931


Distribution: India: West Bengal (Darjeeling), Sundarban areas: (Patharpratima, Dist. South 24 Parganas; Hasnabad, Dist. North 24 parganas); Sikkim, Meghalaya.

Genus 41. Heteropoda Latreille, 1804


Type species: Heteropoda venatoria (Linn.).

Distribution: India; Australia; China; Japan; U.S.A.; Sri Lanka.

Key to the species of the genus Heteropoda Latreille from Darjeeling

1. Abdomen roundish with no marking on the dorsum ........................................ kandiana
   — Abdomen oval with 3 pairs of sigilla on the dorsum ........................................ 2

2. Median piece of epigynum form a septum in between the lateral lobes, spermatheca sac like .......................................................... leprosa
   — Median piece of epigynum long not forming any septum in between the lateral lobes, spermatheca sac like .......................................................... 3

3. Abdomen not black, without yellow border below .................................. venatoria

90. Heteropoda kandiana Pocock, 1899


Distribution: India: West Bengal: (Kalimpong, Kurseong, Darjeeling) Sunderban areas: (Hasnabad, Dist. North 24 Parganas); Tamil Nadu; Bihar; Meghalaya; Orissa; Assam.

Elsewhere: Sri Lanka.

91. Heteropoda leprosa Simon, 1884


Distribution: India: West Bengal: (Tindheria, Kurseong, Mirik, Pesshok, Kalimpong, Darjeeling); Tamil Nadu; Uttar Pradesh; Sikkim; Assam; Nicobar Island.

Elsewhere: Burma.
92. **Heteropoda venatoria** (Linnaeus, 1766)


**Distribution**: India: West Bengal: (Mirik, Darjeeling), Sunderban areas: (Hasnabad, Dist. North 24 Parganas); Bihar; Tamil Nadu.

Genus 42. **Olios** Walckenaer, 1837


**Type species**: *Olios argelasius* (Walckenaer).

**Distribution**: Tropical countries of the world.

**Key to the species of the genus Olios Walckenaer**

1. Anterior row of eyes slightly recurved .......................................................... *milleti*

   — Anterior row of eyes almost straight ............................................................. *punctipes*

   93. **Olios milleti** (Pocock, 1901)


**Distribution**: India: West Bengal: (Mirik, Gopaldhara, Darjeeling); Bihar; Gujarat; Maharashtra; Tamil Nadu.

94. **Olios punctipes** Simon, 1884


**Distribution**: India: West Bengal: (Kalimpong, Tindharia, Kurseong, Dist. Darjeeling), Salt Lake, Kolkata, Shreerampur, Botanical Garden, Howrah); Andaman Island; Assam; Bihar; Gujarat; Madhya Pradesh; Maharashtra; Orissa; Uttaranchal; Uttar Pradesh.

Elsewhere: Bangladesh, Malaysia, Myanmar, Sumatra.

Family XX TETRAGNATHIDAE Menge, 1866

*Key to the family TETRAGNATHA Latreille 1904*

1. Dorsum of the abdomen provided with distinct folium and the thoracic region with few hair .............................................................................................................................. *Guizyggiella*

   — Dorsum of the abdomen not provided with distinct folium and the thoracic region without few hair .............................................................................................................................. 2

2. Carapce flat; abdomen flat dorsally, lobate laterally .................................. *Herennia*
Carapace not flat; abdomen may or may not flat dorsally .......................................................... 3

4. Femoral IV with a double fringe of hair on the trilateral surface of the basal half ........
................................................................................................................................................. Leucauge

— Femora IV without a double fringe of hair on the prolateral surface of the basal half ...
.................................................................................................................................................. 5

5. Abdomen long and narrow and bears the spinnerets near its end ................ Tetrag Natha

*The genera Guizyiella and Herennia Thorell, Leucauge White and Nephila Leach, have been included in the family Tetragnath from Araneidae: As per reference: 2006. Silwal, M. and Molur, S. Zoo’s Print Journal. 22(2) : 2551-2597.

Genus 43. **Guizyiella** Thorell 1878


**Type Species:** Zygeilla arnica (Koch).

**Distribution:** Cosmopolitan.

95. **Guizyiella melanocrania** Thorell, 1878


**Diagnostic:** Cephalothorax longer than wide narrowing in front. Ocular quadrate slightly longer than wide both rows of eyes are recurved but posterior row very narrowly recurved. Anterior median eyes larger than the Posterior medians. Chelicerae moderately strong, provided with distinct boss. Legs moderately long and strong. Abdomen oval, longer than wide. Dorsum provided with distinct folium composed of white and black patches.

**Distribution:** India: West Bengal (Kurseong, Mirik, Darjeeling), Sunderban area, (Gosaba, Dist. North and Oath 24 Parganas), Burdwan; Orissa.

Genus 44. **Herennia** Thorell, 1877


**Type Species:** Herennia ornatissima (Doleschall).

**Distribution:** India, Malaysia and Sri Lanka.
96. **Herannia ornatissima** (Doleschall, 1859)


*Diagnosis*: Cephalothorax longer than wide, flat, narrowing in front, cephalic region light brown with a U-shaped yellowish white patches thoracic fovea transverse. Eyes pearly white. Anterior rows of eyes recurved, posterior row nearly aright. Lateral eyes subequal in size. Ocular quadrate as long as wide. Chelicerae strong and stout. Legs long and slender. Abdomen flat, lobate having four pairs of lateral lobes. Dorsum of the abdomen provided with numerous grayish specks with distinct centre and five pairs of distinct sigilla. Lateral eyes subequal in size. Ocular quadrate as long as wide. Chelicerae strong and stout. Legs long and slender. Abdomen flat, lobate having four pairs of lateral lobes. Dorsum of the abdomen provided with numerous grayish specks with distinct centre and five pairs of distinct sigils.

*Distribution*: India: West Bengal (Dist. Darjeeling); Goa; Meghalaya; Tamil Nadu.

*Elsewhere*: Austeo-Malaysisa, Myanmar.

Genus 45. **Larinia** Simon, 1874

*Type Species*: Larinia lineata (Lucus).

*Distribution*: Tropical & Sub-Tropical countries of the world.

**Key to the species of the genus Larinia Simon**

1. Labium as long as wide, brownish with proximal white boarder .................. **joysankari**
   — Labium short, brownish with pale distal boarder ........................................ 2
2. Dorsum of abdomen light yellowish white, provided with some grayish line and a double of black spots .......................................................... **phtisica**

97. **Larinia joysankari** Biswas, 1984


*Distribution*: India: West Bengal (Darjeeling), North 24 Parganas; Assam; Kerala.

98. **Larinia phtisica** (L. Koch, 1871)

Distribution: India: West Bengal (Darjeeling), Sundarban areas: (Sandeshkhali, Dist. North South 24 Parganas), Burdwan, Nadia; Gujarat.

Genus 46. Leucauge White, 1841

Type Species: Leucauge hortorum (Hentz).

Distribution: Tropical and sub-tropical countries of the world.

Key to the species of the genus Leucauge White

1. Abdomen uniformly silver white and decorated with longitudinal black bands celebesiana
   — Abdomen uniformly silver white and decorated with longitudinal black band .......... 2
2. Three paired and one median black spots at the posterior end of dorsum .......... culta
   — Three paired and one median black spots not present at the posterior end ofdorsum .3
3. Both paired tubercles and median tubercle highly prominent ......................... decorata
   — Both paired Abdomen with two tubercles and median caudal tubercleare small and less prominent ................................................................. 5
4. Abdomen with two blunt rounded prominences and blunt caudal hump at the posterior end ................................................................. tessellata

99. Leucauge celebesiana (Walckenaer, 1884)


Distribution: India: West Bengal: (Darjeeling), Kolkata, Assam; Maharashtra; Meghalaya; Tamil Nadu.

Elsewhere: China; Burma, Sri Lanka.

100. Leucauge culta (O.P. Cambridge, 1841)

Distribution: India: West Bengal: (Darjeeling), Kolkata, Assam; Maharashtra; Meghalaya; Tamil Nadu.

Elsewhere: China; Burma, Sri Lanka.

101. *Leucauge decorata* (Blackwall, 1864)


Distribution: India: West Bengal: (Darjeeling), Sunderban area: (Gosaba, Patharpratima, Dist. South 24 Parganas), Maldah, Nadia, Midnapur, Mursidabad, Purulia, West Diaper; Assam; Gujarat; Karnataka; Kerala; Meghalaya; Orissa; Pondicherry; Sikkim.

Elsewhere: Myanmar, Pakistan, Sri Lanka.

102. *Leucauge tessellata* (Thorell, 1887)


Distribution: India: West Bengal: (Darjeeling), Sunderban area (Gosaba, Patharpratima, Dist. South 24 Pargana). Maldah, Nadia, Midnapur, Mursidabad, Purulia, West Dinajpur; Assam; Meghalaya; Gujarat; Karnataka; Kerala; Pondichery; Orissa; Sikkim.

Elsewhere: Myanmar, Pakistan.

Genus 47. *Nephila* Leach, 1815

1815. *Nephila*: Leach, Zoological Miscellany, 133.


Type species: *Nephila maculata* (Fabricius).

Distribution: Tropical and nearly sub-tropical countries of the world.

**Key to the species of the genus Nephila Leach from Darjeeling**

1. Carapace provided with V-shaped yellow patch ........................................ clavata
   — Carapace not provided with V-shaped yellow patch ........................................ 2

2. Abdomen having single mid-longitudinal broad yellow with dark brown side ...... kuhlii
   — Abdomen without any single mid-longitudinal broad yellow bar with dark brown side ................................................................. 3
3. Cephalothorax relatively broad in front; a deep groove in the middle with a pair of sharp tubercle in front ......................................................................................................................... \textit{pilipes}

103. \textit{Nephila clavata} L. Koch, 1878


\textit{Distribution} : India : West Bengal : (Dist. Darjeeling); Andaman and Nicobar Island, Lacca dwip Island; Meghalaya; Sikkim; Tamil Nadu.

\textit{Elsewhere} : Bhutan, China, Formosa, Myanmar; Pakistan; Thailand.

104. \textit{Nephila kuhlii} Doleschall, 1859


\textit{Distribution} : India : West Bengal (Darjeeling), North 24 Parganas.

\textit{Elsewhere} : Burma.

105. \textit{Nephila pilipes} (Fabricius, 1793)

1793. \textit{Araneae maculata}, Fabricius, ENT. Cyst. 2 : 425.


\textit{Distribution} : India : West Bengal (Darjeeling), Sundarban areas : (Dist. North 24 Parganas); Assam; Andaman & Nicobar Island; Gujarat; Maharashtra; Madhya Pradesh; Sikkim; Uttar Pradesh.

\textit{Elsewhere} : Myanmar; China; Japan; Australia; Malaysia; New Guinea; Sri Lanka.
Genus 48. *Tetragnatha* Latreille, 1804


*Type species*: *Tetragnath extensa* Linn.  

*Distribution*: Tropical countries of the world.  

**Key to the species of the genus *Tetragnatha* Latreille**

1. Anterior row of eyes straight, posterior row of eyes strongly recurved; spinnerets present beyond the tail ................................................................. *javanus*  
2. Anterior row of eyes recurved, posterior row of eyes not strongly recurved; spinnerets not present beyond the tail ................................................................. *mandibulata*  
   — Anterior row of eyes may or may not recurved, posterior row of eyes slightly procurred; spinnerets present beyond the tail ................................................................. 3  
3. Fang very stout in the basal half, then very slender, first dorsal tooth broad and obliquely transcate ................................................................. *maxillosa*  
   — Fang may or may not stout in the basal half, then not slender, first dorsal tooth not broad and not obliquely transcate ................................................................. 4  
4. Chelicerae stout, first two ventral teeth very large, first two dorsal teeth very small ... ................................................................. *sutherlandi*  

106. *Tetragnatha javanas* Thorell, 1895  

*Distribution*: India : West Bengal (Kolkata, Darjeeling Birbhum) : Orissa; Bihar; Tamil Nadu; Karnataka.  

107. *Tetragnatha mandibulata* Walckenaer, 1837  

*Distribution*: India : West Bengal (Darjeeling), Sunderban areas (Hingalgunj, Dist. North 24 Parganas; Gosaba, Dist. South 24 Parganas), Midnapur, Mursidabad, Purulia, Birbhum, Burdwan, Kochbighar, Jalpaiguri, Maldah, Bankura; Andaman Island.
108. *Tetragnatha maxillosa* Thorell, 1895


*Distribution*: India : West Bengal (Darjeeling).

109. *Tetragnatha sutherlandi* Gravely, 1921


*Distribution*: India : West Bengal (Darjeeling).

Family XXI. THERAPHOSIDAE Thorell, 1870

Genus 49. *Haploctustus* Pocock, 1899


*Diagnosis*: Thoracic fovea deep, strongly procurved. Eyes of anterior liur slightly procurved. Legs long weakly spined, strongly scopulated, at least in male, claws armed. Sternum with posterior sigilla very large and remote from the margin. First leg without tibial spur in male.

*Type specis*: *Phlogoides validus* Pocock.

*Distribution*: India : West Bengal (Darjeeling); Western India; Eastern Himalays.

110. *Haploctustus himalayensis* Tikader, 1976


*Diagnosis*: Anterior row of eyes slightly procurved. Middle of the cephalothorax provided with deep procurved fovea, Eyes situated in a group on a slightly elevated tubercle. Ocular tubercle situated near the edge of clypeus. Two pairs of spinnerets, anterior pair’s small and posterior pair long within three segments, posterior segment is longer than others.

Family XXII. THOMISIDAE Sundevall, 1833

Key to the genera of the family THOMISIDAE

1. Cephalic region as wider as thoracic region ................................................... Camaricus
   — Cephalic region narrower than thoracic region ................................................ 2

2. Tarsal claws of first leg provided with 6-12 teeth ............................................ Lysiteles
   — Tarsal claws of first leg without 6-12 teeth ..................................................... 3

3. Abdomen broadened and truncated behind ....................................................... Pistius
   — Abdomen may broadened but not truncated behind ............................................. 4

4. Abdomen long, lateral sides with longitudinal muscular corrugation .............. Thomisus
   — Abdomen not long, lateral sides without longitudinal muscular corrugation ........... 5

5. Anterior median eyes close to the lateral eyes than to each other ...................... Xysticus

Genus 50. Camaricus Thorell, 1887


Type species : Camaricus maugei (Walckenaer).

Distribution : India, Tropical Africa and Malaysia.

111. Camaricus formosus Thorell, 1887


Diagnosis : Cephalothorax longer than wide provided with deep brown patches at The
centre but in male specimen no such patches are present. Eyes in two rows, both rows are
recurved. Posterior row of eyes slightly longer than the anterior row. Middle eyes situated
adjacent to the lateral eyes. Legs are robust, clothed with hair and spine, ornamented with
black patches, tibia and metatarsi of leg II provided with 3 pairs of ventral spines. Chelicerae
moderately strong, sternum heart shaped. Abdomen longer than wide, widest behind the
middle, clothed with black hairs.

Material examined : 1♂, Kalimpong, Darjeeling, Eastern Himalayas, West Bengal, 7.xii.2006.

Distribution : India : West Bengal (Darjeeling), Sundarban areas (Gosaba, Patharpratima,
Dist. South 24 Parganas), Nadia, Jalpaiguri; Karnataka; Maharashtra; Andaman & Nicobar
Island.
Genus 51. *Lysiteles* Simon, 1895


*Type specis*: *Synaema globosum* (Fabr).

*Distribution*: Asia, America and Africa.

112. *Lysiteles brunettii* Tikader, 1962


*Diagnosis*: Cephalothorax as long as wide, cephalic region high. Eyes in two rows, both rows are strongly recurved. Posterior row of eyes slightly longer than the anterior row. Middle eyes situated adjacent to the lateral eyes. Legs not very strong, I and II pairs longer than III and IV, sternum heart shaped. Abdomen oval, four pairs of irregular black patches on the posterior half of abdomen arranged in longitudinal rows.

*Distribution*: India : West Bengal (Darjeeling).

Genus 52. *Pistius* Simon, 1875


*Type specis*: *Pistius trancaetus* (Pallas).

*Distribution*: Central Asia, Europe, Japan and India.

113. *Pistius kalimpus* Tikader, 1970


*Diagnosis*: Cephalothorax nearly as long as wide, convex oval in outline. Eyes black, eyes of the anterior row equidistant, recurved, white. The posterior row less recurved. Sternum oval, Legs not very strong, I and II pairs much longer than III and IV. Abdomen longer than wide, dorsally provided with chalk white patches.

*Distribution*: India : West Bengal (Kalimpong Dist. Darjeeling).

Genus 53. *Thomisus* Walckenaer, 1805

70  Rec. zool. Surv. India, Occ. Paper No. 340


Type-species: Thomisus lateralis (Koch).

Distribution: Europe, Africa, Asia, Australia and America.

Key to the species of the genus Runcinia Simon

1. Abdomen with a three pairs of longitudinally arranged reddish brown spots ....... bulani
   — Abdomen with out three pairs of longitudinally arranged spots................................. 2

2. Abdomen with a pair of shoulder tubercle, each with a black spots situated inwardly in the middle ............................. pugilis

114. Thomisus bulani Tikader, 1960


Distribution: India: West Bengal (Darjeeling), Kolkata.

115. Thomisus pugilis Stoliczka, 1869


Distribution: India: West Bengal (Darjeeling), Kolkata. Punjab; Tamil Nadu.

Genus 54. Xysticus Koch, 1853


Type species: Xysticus cristatus Clerck.

Distribution: Cosmopolitan except Australia.
Key to the species of the genus *Xysticus* Koch

1. Abdomen broader behind ................................................................. *bengalensis*
   — Abdomen not broader behind .................................................. 2
2. Cephalothorax wider in front and pale green in colour ....................... *himalayaensis*
   — Cephalothorax not wider in front & not pale brown in colour ........... 3
3. Abdomen with more than one transverse lines ...................................... *kali*

116. *Xysticus bengalensis* Tikader & Biswas, 1974


*Distribution*: India : West Bengal (Darjeeling), Kolkata.

117. *Xysticus himalayaensis* Tikader & Biswas, 1963


*Distribution*: India : West Bengal (Darjeeling).

118. *Xysticus kali* Tikader & Biswas, 1960


*Distribution*: India : West Bengal (Darjeeling).

Family XXIII. TROCHANTERIIDAE Kirsch, 1879

Genus 55. *Plator* Simon, 1880


119. *Platorindicus* Simon, 1897


*Diagnosis*: Body is very flat, legs completely later grade. Head narrow, Cephalothorax is wide and semicircular, cephalic region flat end. Carapace much wider than long. Mandibles weakly armed, labium longer than wide, Maxilla directed obliquely inwards. Sternum much wider than long. First legs shorter than the rest, 2nd legs longest, no scapulae or ungula tufts.
Anterior legs armed with erect spiniform bristles, tarsal claws true and toothed. Eyes in three rows, both rows are poorly recurved. Posterior row of eyes slightly longer than the anterior row. Lateral eyes are larger than anterior and posterior eyes.

Materials examined: 1♀ Singhalina National park, Dist. Darjeeling, 10.xii.2008. Coll.: Sasha (Examined by S. Talukdar, ZSI While received from D.F.O Wild Life of Darjeeling Dist. after seized from the foreign collector in conservation area).

Distribution: India: West Bengal: Darjeeling.

Table-3: Taxonomic Status and Numerical Biodiversity of Spiders in Darjeeling Hills

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<tr>
<th>Family</th>
<th>Total No. of species</th>
<th>Genus</th>
<th>Darjeeling</th>
<th>Kalimpong</th>
<th>Kurseong</th>
<th>Mirik</th>
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SPIDER DIVERSITY IN DIFFERENT AREAS OF DARJEELING

Studied a very good number of collected life specimens in the field itself to which we have released in their habitat only after possible studies. 119 spider species belonging to 56 genera under 23 families have been identified altogether from different parts of Darjeeling Hills. Taxonomic data regarding availability and diversity of Spiders against different parts of the study area have been recorded. Comparative studies on the numerical diversity of the spiders of this hill area have been incorporated with the text (Table-3) under 4 broad divisions, the main camps of the faunal survey where from the actual studies were initiated.

SPECIES RICHNESS OF SPIDERS IN DARJEELING HILLS

During our one year study in the versatile environment of different areas of Darjeeling hills a very good number of spider specimens were observed in their diverse habitat. A total of 119 species under 54 genera belonging to 23 families were recorded in this context. Among them, 3 families, 5 genera and 21 species are hither to record from the state of West Bengal. Species richness in different study areas have been incorporated in tabular form (Table-4) for easy understanding. Family Araneidae is the richest spider family recorded from this hill area having 25 species under 11 genera followed by Lycosidae with 18 species under 4 genera, Tetragnathidae with 14 species under 5 genera, Thomisidae with 8 species under 5 genera. Family Sparassidae and Miturgidae both are having 7 species under 4 and 1 genera respectively, family Salticidae and Corinnidae are having 6 species each under 6 and 2 genera respectively, family Oxyopidae with 5 species under 1 genus, family Clubionidae with 4 species under 1 genus, family Gnaphosidae with 3 species under 3 genera whereas family Ctenidae, Harshilidae and Scytodidae all are having 2 species under 1 genus each and family Amaurobiidae, Atypidae, Homalonichidae, Oecobidae, Pisauridae, Philodromidae, Theraphosidae and Trochanteriidae with single representative species. Among the 4 different study areas, Darjeeling shows the richest spider diversity with 67 species followed by Kalimpong with 51 species, Mirik and Kurseong with 38 and 37 respectively.

Table-4 : List of spider species from Darjeeling

<table>
<thead>
<tr>
<th>AREA 1 – DARJEELING</th>
<th>AREA 2 – KALIMPONG</th>
<th>AREA 3 – KURSEONG</th>
<th>AREA 4 – MIRIK</th>
<th>SPECIES COLLECTED FROM AREAS</th>
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* = Family recorded first time from Darjeeling as well as from West Bengal
• = Genus recorded first time from Darjeeling
® = Species first time recorded from Darjeeling
COMPARATIVE DISTRIBUTION OF THE SPIDERS OF DARJEELING HILLS

Spider genera and species available from Darjeeling hills have been carefully compared with Global, National and State scenarios and plotted in a table (Table-5) and analysed the comparative abundance against global status for easy understanding.

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□ = New distribution in West Bengal  * = Previously with other family (Clubionidae)
DIVERSITY OF SPIDER FAMILIES, GENERA AND SPECIES IN DARJEELING HILLS

From our exploration and studies on the spiders in Darjeeling hills, it is revealed that the richest species diversity of spider fauna observed among the Araneus having 25 species covering about 21.5% of the total followed by the spider species of families namely Lycosidae, Tetragnathidae, Thomisidae, Sparassidae, Corinnidae, Miturgidae, Salticidae, Oxyopidae, Clubionidae, Gnaphosidae, Ctenidae, Harsilidae, Linyphidae, Scytodiidae, Amaurobiidae, Atipidae, Homalonichidae, Oecobidae, Philodromidae, Pisauridae, Theraphosidae, and Trochantheridae. The lowest coverage observed among the last 8 families covering about 0.8% of the total number of species. The ratio of number of species against number of genus is highest in family Lycosidae with 17 species under 4 genera covering about 14.6% of the total number of species. More details are available with Table-5 and Figure-2.

TAXONOMY AND DIVERSITY OF CLUBIONID SPIDERS IN DARJEELING HILLS

Clubionid spiders are generally called the sac-spider because they construct silken tubular sac, whitish in colour, open at both the ends or closed. Due to their general habitat in forest floor they are also known as forest sac spiders. They can be easily seen running over the ground, on grassy land as well as rocky ground under stone and the foliage of leaves or loose bark of trees. Like Gnaphosid they do not spin web but they mostly weave silk cells of flat tubular sac in rolled leaves, folded blades of grass, under loose bark of trees or under objects on the ground. Some of the clubionids live on the ground amongst clamps of grass or under stone, some of the species of the genus like Oedignatha Thorell 1881 lives in the higher altitude. April and May are the chief months for reaching their maturity. The females guard their egg sac inside the thick walled white cells from July onwards. When the eggs are going to be laid, the female usually selects a broad leaf of plant and curls it over enclosing herself inside a white cells strong silk lined chambers, in this sung she retreats and deposits a compact mass of yellow eggs (Bristoe, 1958).

Most of the clubionids do not prefer town life. Some of the spider of the genus Clubiona Latreille, 1804 are found to live in the drier areas than moist areas (Majumder& Tikader, 1991). Sometimes they are found to make their way into houses and seen promenading the walls at night for searching of insects.

There are some other species of this genus have been found to built tubular retreats just underside of the stone or they make flat tubular nest on the rolled leaves of plants.

The Forest Sac-spiders of the family Clubionidae have a very confusing taxonomic history. Once this family was a large catch-all taxon for a large group of disparate collection of spiders, similar only in that they had eight legs arranged in two rows, conical anterior spinnerets that touched and were wandering predators that built silken retreats, or sacs, usually on plant
terminals, between leaves, under bark or under rocks. These are now recognized to include several families, some of which are more closely related to the three-clawed spiders, like lynx and wolf spiders, than to true “Clubionoids”.

Among the spider families of Darjeeling formerly classified as sac-spiders, some of which have common names including the words “sac-spider”, include:

- MITURGIDAE (long-legged sac-spider)
- CORINNIDAE (Corinnid sac-spider)

as well as the remnant Clubionidae (now consisting of 4 species in 1 genus of Darjeeling hills, 9 species in 2 genera of West Bengal, 23 species in 3 genera of India and over 532 species in 15 genera worldwide). However “sac-spider” used on its own should imply a member of the family Clubionidae.

In Darjeeling hills, the family as it is recognized now consisting of 4 species in only one genus, Clubiona which is nearly worldwide in distribution.

**GENERIC CHARACTERS STUDIED IN FAMILY CLUBIONIDAE (PREREVISED)**

**FROM DARJEELING HILLS**

Characters of the 4 genera have been dealt with special care namely Clubiona from existing CLUBIONIDAE, Castianeira, Oedignatha from CORINNIDAE and Cheiracanthium from MITURGIDAE which are recently shifted from family CLUBIONIDAE are as follows:

**Clubiona** : Cephalothorax rather long somewhat narrowed in front and broad posteriorly, highest at the level of the cephalic groove, covered with fine silky hair, sometimes with large hairs at the anterior part; fovea usually short, radiating streak sometimes originates from it. Eyes in two rows, the anterior row slightly recurved, medians closer to each other than the laterals the posterior row markedly the longest and slightly procurved or straight. Medians not to close to each other than the laterals. Chelicerae robust and convex, sometimes cylindrical in males. Usually cylinder pale yellow to redish brown in colour with dense claw tuft and thin scapulae. Maxillae longer than wide concave on lateral margin labium loon. Legs usually longer than wide. Legs formula 4.1.2.2. Tibia of the male palpus without ventral apophysis but with short retrolateral apophysis. Tegulum elongate, convex, embolus arises near the base of the tegular apophysis. Abdomen elongate and ovoid clothed with white or pale yellow pubescence most of them without markings. Presence of semi erect and long erect setae at the anterior end of abdomen. Epigyne with elongate concave or convex plate, often traversed by the grooves and ridge, copulatory opening conspicuous and cavity like, hidden in posterior margin of epigynal plate situated at the lateral margin of the plate. Copulatory tube extending anterior direction forward to the spermatheca bent or coiled. Spermatheca often composed of two parts.
**Castianeira**: Cephalothorax elongated, ovoid, long with prominent cephalic shield usually dark to dark brown in colour provided with median fovea, short sparse and with few longer setae present in front of the carapace. Eyes small and uniform size, arranged in two transverse series-anterior and posterior. The anterior row slightly recurved, medians slightly closer to laterals than to each other. The posterior row distinctly procurred. Chelas moderately long and stout with rarely 3 teeth on retromargin. Maxillae not constricted at the middle more or less convex on its outer side. Legs rather long and cylinder orange to dark brown or black in colour with short dense dark claw tufts. Tibia of male palp as long as wide. Cymbium rounded at the base, long and cylinder distally, embolus usually long and slender spirally twisted. Abdomen elongated, ovoid rather cylinder often with transverse band. Dorsum without long cluster of erect setae at the anterior end. Epigyne as rounded convex hairy flat copulatory opening small and rounded or elliptical, well separated and distinct, spermatheca longer than wide, copulatory tube short.

**Oedignatha**: Cephalothorax oblonged, long narrow in front sufficiently high with a very short central fovea. The cephalic shield coming up to the posterior median eyes. There are 8 eyes arranged in two transverse rows almost equal in size coming close to the extremities and occupy two third of the breadth of the front. The frontal row slightly recurved and the posterior row longer than the anterior row, slightly procurred. Ocular quadrate almost square. Chelicerae twice longer than wide, inner margin provided with 5 to 9 teeth outer margin with 3 teeth. Maxillae longer than wide anterior end broad and rounded slightly constricted at the middle. Concave Labium longer than wide. Sternum oval in shape. Legs are short not very strong. Tibia and metatarsi I & II provided with 5-7 pairs of ventral spines. Legs formula 4 1 2 3. Tibia of the male palp longer than wide with tibial apophysis. Cymbium without spur, embolus narrower. Abdomen oblonded covered with sclerotized dorsal shield ornamented by whitish spots, sometimes dorsum provided by dorsal scutum. Epigyne flat rounded concave plate, with elliptical copulatory opening. Spermatheca terminating in two branches.

**Cheiracanthium**: Cephalothorax ovoid in shape, longer than wide convex anteriorly with no median fovea if present very inconspicuous. Eyes nearly uniform size, arranged in two transverse series-anterior and posterior. The anterior row slightly recurved, posterior row scarcely longer than the anterior row, straight and uniformly spaced, the laterals further remote from the medians, both the laterals anterior and posterior closer to each other. Ocular quadrate relatively narrow anteriorly. Chelicerae longer than wide, moderately strong and stout dark brown in colour, outer margin provided with 2 teeth and the inner margin with 2 or 3 teeth. Maxillae longer than wide constricted at the middle, concave-Labium longer than wide. Legs long and cylinder, moderately stout, the 1st leg longer than the 4th leg. Trochanter IV with distinct ventral notch. Tibia of the male palpus with retrolateral apophysis sometimes
with dorsal and ventral apophysis; cymbium with strong spur at its base, tegulum with strong apophysis, embolus arises on retrolateral side of the tegulum. Abdomen elongate, oval and pointed posteriorly, dull yellow or pale green without pattern of scutum without cluster long erect setae at the anterior end. Epigyne with flat or concave plate, with copulatory opening situated at the lateral margin of the plate. Spermatheca small, nearly rounded, well separated. Global, national and state Clubionid fauna, the genera and their available species diversity were studied for comparison with the only Clubionid genus of Darjeeling then analyzed them to plot two different charts as Generic diversity and Species diversity (Figure 3) for easy visual understanding and included herewith. Figure-3

The yellow sac-spiders (family Miturgidae) include 7 species in 1 genus in Darjeeling hills as well as in West Bengal, 29 species of 3 genera in India where as 351 species in 26 genera have already been recorded worldwide. The Corinnidae, as now recognized 6 species and 2 genera from Darjeeling hills, 9 species in 2 genera from the state of West Bengal, 35 species in 9 genera in India and over 924 species in 76 genera worldwide, making it the largest of the “Clubionoid” families. Members of the genus *Castianeira* appear to be mimics of ants and velvet ants *Corinna* is the type genus for the family and consists of small running spiders.

The present scenario of the previous 4 genera of family Clubionidae from Darjeeling Hills after proper allocation under two other families namely Miturgidae (1) and family Corinnidae (2) keeping the rest spiders under Family Clubionidae itself have been analysed by comparing them with the greater diversities of global, national and state spider fauna and included herewith (Figure-4) for visual understanding. Figure-4

The genus *Cheiracanthium* Koch 1839 tends to live in drier climate. Other species of this genus constructs in a grass head, bent in a characteristic fashion or inside curled leaves of plants. The species *Cheiracanthium himalayensis* Gravely,1931 were found to construct with tubular sac on broad leaves. Some species of the genus like *C. indicum Cambridge*, *C. melanostoma* Thorell 1895, *C. mysorensis* Majumder & Tikader, 1991 and *C. pauriensis* Majumder & Tikader,1991 have been found in the foliage of small trees, herb, shrub or bushes near the tea garden, in particular season they are frequently predominant in the paddy fields for catching the paddy pest, hence they are called the essential predator of paddy pest. They were also found in the post monsoon months when the tall grasses are grown plenty in mangrove bushes of Sunderban areas, the females were found to construct brooding nest with the help of larger blade of these grasses nicely curved in two tier folding, stuck with the help of sticky web threads. The mother spider firms an egg cocoon inside this nest and stays as guard. Preyed mainly by direct jumping upon the small insects (Majumder 2007). The genus *Castianeira* Keyserling 1879 is smaller in size found on foliage of small bushes as well as on the ground. Sometimes they have been collected under decayed wood and under stone.
They are also distributed in the soil litters of hilly region as well as semi mangrove areas of Sunderban (Majumder 2007). The species of this genus like *C. albopicta* gravely 1931, *C. himalayensis* gravely 1931 construct small tubular whitish retreat under logs or decayed wood. The female spiders were found to attach the egg cocoon inside this retreat. They preyed on small insect by direct jumping (Majumder 2007) the species of this genus like *C. indica* Tikader 1981 and *C. zetes* Simon 1897 smaller in size, ground dwellers, rarely found in the foliage of bushes. They run over the ground like mutilated wasp. Sometimes they found in association with the ants. In some cases they were collected from the forest litters of undershed vegetation, preyed on small insects by direct attack.

The genus *Oedignatha* Thorell are medium to smaller in size, ground dwellers as well as found in the foliage of bushes of hilly arias. They run over the ground like the other group of spiders. Sometimes they found to construct silk retreats inside rolled leaves, some were found under stone or other object on the ground. The species *O. curly* Reimoser 1934 were also found to live in the drier situation than the humid atmosphere and high altitudinal region than lower altitude (Majumder 2007). The species *O.scrobiculata* Thorell, 1881 construct a tubular sac under decayed log and und other objects in the hilly areas in some cases they were collected from the forest litters preyed on small insects by direct attack.

During initiation of the project, family Clubionidae Wagner, 1887 was supposed to be undivided. Later, during the preparation of manuscript it is understood by the literature Survey (Silwal. and Molars, 2006) regarding spider of India that Darjeeling-Hill spider of this family in presently distributed in two other families namely CLUBIONIDAE Karsch,1880 and Miturgidae Simon, 1885 under 3 genera *Castianeira* Keyserling,1879, *Oedignatha* Thorell, 1881, *Cheiracanthium* Koch,1839 along with *Clubiona* Laetrite,1804 under Clubionidae itself. There are 4 species *Calbipicta*, *C. himalayensis*, *C. indica*, and *C. zetes* under genus *Castianeira* and 2 species *O. curly* and *O. scobiculata* under genus *Oedignatha* have been included under the family Corinnidae while 7 other species *C. himalayensis*, *C. indicum*, *C. insigne*, *C. melanostoma*, *C. mysorensis*, *C. pauriensis* and *C. travialse* in Genus *Cheiracanthium* under the family Miturgidae is recorded. The members of this family (Clubionidae) which we have been recorded from Darjeeling-Hill expressed some interesting habitat specificity as 3 species namely *C. silicate*, *C. Polonius*, *C. shillongensis* are abundant in Darjeeling while *C. drassodes* and *C. filicata* are moderately available in higher hilly areas of Kurseong where as not a single species have been reported from Kalimpong and Mirik areas.

Areas shows that the members of genus *Clubiona* do not like moist areas and the Period (pre-monsoon) we collected specimens from the areas of Kalimpong were Comparatively high humid and Mirik area is always with higher humidity than other places of Darjeeling hills. This supports the idea of Majumder & Tikader, 1991 that the Clubionidae spiders like
drier areas than moist areas. In our study we observed 3 species of the genus *Castianeira* and 2 species of the Genus *Oedignatha* under the family Corinnidae were available from Darjeeling (Table-3 & 4). Where as 2 species of the genus Castianeira were observed in the Kurseong and Kalimpong but not a single specimen from Mirik which again support the previously mentioned phenomena. In the study of the family Miturgidae represented by a single genus *Cheiracanthium*. A single species namely *pauriensis* of this genus have only been found in Darjeeling. Species richness of this genus is highest in Kalimpong (5 species) followed by 3 in Mirik and 2 in Kurshiong (Table-3 & 4). The most interesting observation in our study is that in every case in our collection from canopy it is available from those plants which have some aroma of specific type with pungent flavor and in other hand all Clubionid species have specific group of toxin may correlate the bimolecular resource of it by relating its habitat flora. The overall Species diversity of Clubionid related families were studied by comparing them with the Global, Indian and West Bengal spider fauna for better demonstration and clear understanding (Figure-5).

**SPIDER ENDEMICITY IN DARJEELING HILLS**

Among the 119 spiders from 23 available spider families about 40 species under 31 genera belonging to 20 families are endemic to India. A list of the endemic species is given with Table-6.

**Table-6 : List of the spiders from Darjeeling hills endemic to India**

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COMPARATIVE SPIDER ENDEMICY

Spider diversity part of which are endemic to India is then studied by comparing them with the total number of endemic spiders from India their covering percentage over the whole spider fauna of India among the concerning families have been carefully plotted into a table (Table-7) for easy understanding.

**Table -7 : COMPARATIVE SPIDER ENDEMICY FROM DARJEELING HILLS**

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<td><strong>115</strong></td>
<td><strong>820</strong></td>
<td><strong>041</strong></td>
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REARRANGED STATUS OF TAXA OF THE SPIDERS OF DARJEELING HILLS

Very recently spider taxonomy due to its extensive worldwide impetus has got several justified changes in the arrangement of taxa by rearranging the existing one with suitable placement and considerable re-nomenclatures. In this aspect some family name, its taxonomic position and composition is reconstructed or fragmented into more than one family. Some genera has got new name or shifted to other family. Similarly some species name is changed or synonymies with other species or shifted to other genus of the same or new family. Changes of the spiders of Darjeeling hills are described here.

CHANGES IN FAMILIES
1. Spiders (one species *Tegeneria chhanguensis* Tikader, 1970) of family AGELENIDAE Koch, 1837 from Darjeeling is changed and revised by inclusion with Family: AMOUROBIIDAE Thorell,1870 as *Tamagrinia alveoliferae* (Schenkel, 1936).
3. Some species of family ARAENIDAE Simon,1805 is Synonymies with family TETRAGNATHIDAE Menge,1866 with the same specific name (*L. celebrasiana* (Walckenaer, 1841), *L. culta* (O.P. Cambridge, 1869), *L. decorata* (Blackwall, 1864), *L. tessellata* (Thorell, 1847) under the Genus *Leucauge* white, 1841.
4. Some species of family THOMISIDAE is synonymies with family PHILODROMIDAE.
5. Family PLATORIDAE is renamed as TROCHANTERIIDAE in recent time.

CHANGES IN GENERA
3. *Lycosa himalayensis* Gravely, 1924 Transferred to Genus *Hogna* Gravely, 1924 in the same Family as *Hogna himalayensis* Gravely, 1924.


**CHANGES IN SPECIES**

1. Species *chhanguensis* of genus *Tegeneria* Latreille, 1804 is synonyised with *Tamagrinia alveoliferae* (Schenkel, 1936).

2. Species *kalimpongensis* Sinha, 1952 of genus *Argeope* Audouin, 1826 is synonyised with *Argiope Caesarea* Thorell, 1897.

3. Species *shillongensis* Sinha, 1951 of genus *Argeope* Audouin, 1826 is synonyised with *Argiope minuta* Karsch, 1879.

4. Species *leucometaena* Thorell, 1887 of genus *Gasteracantha* Sundevall, 1833 is synonyised with *Gasteracantha kuhl* Koch, 1837.

5. Species *mammosa* C.L. Koch, 1844 of genus *Gasteracantha* Sundevall, 1833 is synonyised with *Gasteracantha cancriformis* (Linn., 1758).


**DISCUSSION**

The inventory of spiders from Darjeeling hills comprises 119 species under 23 families belonging to 55 genera among which 22 species, 7 genera and 4 families have been recorded for the first time from Darjeeling District. It is also worth mentioned that four spider families namely Ammurobiidae, Atipidae, Trochanteridae and Ctenidae is reported first time in the state of West Bengal with 1 genus from each and single species from first three families
90

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while 2 species from family Ctenidae. Species richness have been observed significantly different in four different areas of the hills (Table-4) in which Darjeeling shows the highest with 68 species under 28 genera whereas Kurseong shows the minimum with 37 number of species under 26 genera. Analysis of species richness is described with a chart (Figure-6).

Generic diversity of the spider families of Darjeeling hills also demonstrate a significant variation in 8 families among the 23 spider families of the total 55 spider genera available altogether in this dynamic mountain ecosystem and described through the pie-chart (Figure-7). The highest generic diversity observed in family Aranidae with 11 genera covering about 19.64% followed by family Salticidae and Thomisidae with 6 genera Tetragnathidae with 5 genera, Lycosidae and Sparassidae with 4 genera, Gnaphosidae with 3, corinnidae with 2 and all other 15 families with single genus (Table-4). The last 15 families covered 1.78% of the whole generic diversity of the study area. The richest genus of all spider families of Darjeeling is *Cheiracanthium* with 7 species followed by *Gasteracantha*, *Hippasa* and *Pardosa* with 6 species each, *Lycosa*, *Argiope* and *Oxyopes* with 5 species each, *Clubiona*, *Castaianeria*, *Leucauge* and *Tetragnatha* with 4 species each *Xysticus*, *Nephila*, *Heteropoda*, *Neoscona* and *Cytrophora* with 3 species, *Cyrtarachne*, *Oedignatha*, *Ctenus*, *Hersilia*, *Scytodes*, *Olios*, *Larinia*, *Runcinia* and *Lepthyphante* with 2 species each along with the other 30 families (Table-4) with single species each Species diversity of the hills have been carefully studied from the collected field data of present study as well as the existing information available with National Zoological Collection of Zoological Survey of India and the published literature. Significant species diversity has been identified among the 23 spider families of Darjeeling hills (Figure-8). Family Araneidae is the richest one having 25 species followed by Lycosidae with 17, Tetragnathidae with 14 Thomisidae With 9, Sparassidae and Miturgidae each with 7 Corinnidae and Salticidae with 6 each Oxyopidae with 5, Clubionidae with 4 Gnaphosidae with 3, Ctenidae, Harshilidae, Lyniphidae and Scytodidae all 4 families with 2 each whereas the rest 8 families with single species each among the whole 119 number of species from this area.

An account of comparative density of the spider species from the study areas also analysed. Density of the species of 23 different families here have been represented by percentage coverage of the total number of species and plotted in a comparative chart (Figure-9). Family Araneidae covers 21% followed by Lycosidae with 14.28%,Tetragnathidae with 11.76% Thomisidae With 7.56%, Sparassidae and Miturgidae each with 5.88% Corinnidae and Salticidae with 5.04% each Oxyopidae with 4.20% Clubionidae with 3.36% Gnaphosidae with 2,52%, Ctenidae, Harshilidae, Lyniphidae and Scytodidae all 4 families with 1.68% each whereas the rest 8 families (Table-4) with 0.84% each of the whole 119 number of species from this area. Genus Cheiracanthium found as the richest with 5.89% density coverage of whole spider
fauna of Darjeeling hills followed by *Gasteracantha, Hippasa* and *Pardosa* 5.04% each, *Lycosa, Argiope* and *Oxyopes* 4.20% each, *Clubiona, Castianeira, Leucauge* and *Tetragnatha* 3.36% each. *Xysticus, Nephila, Heteropoda, Neoscona* and *Cyrtophora* 2.52%, *Cyrtarachne, Oedignatha, Ctenus, Hersilia, Scytodes, Olios, Larinia, Runcinia* and *Leptphyphante* 1.68% each along with the other 30 families 0.84% each.

In the study of endemicity (Table-6 & 7) among the spider fauna of Darjeeling hills it is significantly observed that about 5% of the spider which are endemic to India are available from this hill areas. Among them having only one species family Atypidae and Homalonichidae cover 100% of the Indian endemic species of those families. Like wise Corinnidae with about 26% coverage with 6 species, *Trochanteriidae* with about 25%, *Scytodidae* with about 20%, *Tetragnthidae* and *Pisauridae* with about 9% coverage by their single representative species. Similarly *Ctenidae* and *Miturgidae* cover about 15%. Family *Clubionidae, Linyphidae, Araneidae* covered about 12.5%, 10.5%, and 7% respectively. Rest of the 8 family’s share about 1-2% of the Indian endemic spider’s details of which is plotted in a chart (Figure-10) comparing the total number of Spiders from the representative families India and Darjeeling hills.

**REMARKS**

Studies on Taxonomy and Biodiversity of spider have immense important due to several aspects it contains. Spiders exhibit stunning morphological diversity and coloration. The coloration of spiders is varied and is paralleled only by insects (Oxford and Gillespie, 1998). They are not greatest of pest control agents, unless we consider all insects to be pests which are a very erroneous point of view, although they are cheap, and very useful. Spiders are, for the most part, such generalise feeders that they kill many useful insects as well as many pest species, however because pest species are by their nature more numerous than beneficial species they are still effective. Spiders also have a very significant role to play in the ecology as their exclusively predatory behavior (Wise, 1993) and thereby regulate insect populations.

Spiders may also serve as biocontrol agents (Raghavendra, 2001). They are of great value to the environment. While they tend to sample insect populations randomly, any population that becomes explosive in its growth will find more of its kind taken by spiders than otherwise. Thus, rather than specifically controlling certain insects, spiders have a general blanket or buffer effect, promoting evolution, helping keeping insect numbers under control in a broad sense and supplying food for many other animals and therefore keeping the flow of life moving. Studies on the feeding habit of *Argiope pulchella* Thorrell from Darjeeling hills displayed evolutionary turn point of the wandering and web building spiders (Talukdar *et al.*, 2007 & 2008) and supports academic values of this study. In particular the ability of spiders to exist in huge numbers on relatively little food gives them a useful role in damping out population fluctuations in a diverse environment.
All spiders are venomous but only a few species are venomous enough to harm humans. However, the venom of some spiders is useful in study of neuromuscular and cardiac pharmacology. It is likely that spider silk will be the material of the future as its silk is the toughest material known.

Some spiders are however being promoted in the battle against agricultural pests. Linyphiids and Lycosidae against aphids in wheat fields. Somewhere it has been shown that 20 spiders per square metre can reduce leaf hoppers in rice fields by up to 90%.

As with most conservation, spider conservation is habitat conservation. While this is really troublesome in the fragile hill areas like Darjeeling and can involve lots of money and special reserves it can also be simple as leaving some of our lawn unknown or setting a side strips of weedy ground around tea gardens and forest areas including other crop fields and newly developing areas. In spite of several applied values mentioned above, spiders have received cursory attention. In conservation efforts, often “charismatic” species like birds and mammals draw most attention and ecological significant groups like spiders are often neglected. Only tarantulas are included in Appendix II of CITES.

The 1990 Red Data book of America lists 16 species of spiders as threatened. This small number reflects how little we actually know about spider populations than the real extent of endangered species. As the Mexican Red-kneed Tarantula has already been so endangered by collecting for the pet trade that it is currently a Cites Appendix II species but not yet in India. Many of the Indian spiders have the same possibilities towards the conventional threatening regarding conservation point of view in coming future as beside the socio-economic development and natural calamities habitat destruction and different new mode of exploitations by direct use of these organisms are increasing day by day. In particular, Darjeeling hill is considered as the nursery of huge faunal biodiversity. People from different part of the world recognize this hill area as immense environmental resource and visit here for possible exploitations legally or illegally. Hence extensive care should be taken towards the conservation of spider in these areas.

RECOMMENDATIONS

1. Due to the fact that most species are nocturnal, due to lack of systematic surveys, there is limited information on the demography of spider populations; hence future projections are speculative.

2. Faunal diversity surveys and conservation efforts are often concerned with charismatic species like higher vertebrates. We need to pay attention to other faunal components also, like spiders because of the significant ecological role they play.
3. Monitoring the status of spider from this area in considerably shorter intervals is very much effective towards the planning and categorized the implementation of conservation strategies.

4. In order to formulate conservation measures a baseline data about a particular group is needed. For many of the arthropods particularly in Arachnids (spiders) of India such information is lacking and therefore needs to be generated.

5. Deforestation selectively reduces diversity and density of fauna like that of spiders. Additionally, use of pesticides may dramatically influence their diversity. It would be worthwhile designing insecticides such that they are less toxic to spiders.

6. Spiders appear to be promising candidates and can be used in biological control of pests.

7. Awareness on spider to remove the fear on them among the general people is requiring.

8. Popular studies on spider with general interests about them relating their utilities for mankind like medicinal uses, biological pest control in different agricultural field must be approached.

9. Suitable identification kit like pictorial hand books or colorful posters on spiders of different habitats must be prepared for availabilities as ready documents.

10. Captive cultures and rearing should be developed and learnt to gather substantial information on different spider species.

11. Genetic research on spider taxonomy considering the useful organs producing silk, poison and other fascinating morphological as well as physiological diversities should take care of with special impetus.

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PLATE-I

Figure 2.

Figure 3.

Figure 4.
Figure 5.

Figure 6.
PLATE-III

**Figure 7.** Generic Diversity of Spider Families of Darjeeling Hills

**Figure 8.** Diversity of Species in Spider Families of Darjeeling Hills
PLATE-IV

Figure 9.

Figure 10.
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PLATE - V

1. Spider Collection Site of Bagora Hills

2. Spider Collection Site of Pedong

3. Spider Collection Site of Kalijhora

4. Spider Collection Site of Kurshiong

5. Spider Collection Site of Langsong Valley

6. Spider Collection Site of Latpanchar
PLATE - VI

7. Spider Collection Site of Lava
8. Spider Collection Site of Mahananda Sanctuary
9. Spider Collection Site of Mirik
10. Spider Collection Site of Mohananda River Bed
11. Spider Collection Site of Neora Valley
12. Spider Collection Site of Rishop
PLATE - VII

13. Spider Collection Site of Sevok

14. Spider Collection Site of Sukna Forest

15. Spider Collection Site of Tea Gardens of Sukna

16. Spider Collection Site of Tindharia

17. Spider Collection Site of Way To Mirik

18. Spider Collection Site of Darjeeling
PLATE - VIII

19. Spider collection at Sukna forest
20. Spider collection at Mahananda forest
21. Spider collection at Latpanchar
22. Spider collection at Kurshiong
23. *Araneus himalayensis* Tikader, 1975 (Dorsal View of Female)

24. *Argiope aemula* (Walckenaer, 1841) (Dorsal View of Female)

25. *Argiope aemula* (Walckenaer, 1841) (Dorsal View of Male)

26. *Argiope anasuja* Thorell, 1887 (Dorsal View of Female)

27. *Argiope anasuja* Thorell, 1887 (Dorsal View of Male)

28. *Argiope minuta* Karsch, 1879 (Dorsal View of Female)
29. *Argiope anasuja* Thorell, 1887 (Ventral View of Male)

30. *Argiope pulchella* Thorell, 1881 (Dorsal View of Female)

31. *Argiope pulchella* Thorell, 1881 (Dorsal View of Male)

32. *Argiope pulchella* Thorell, 1881 (Dorsal View of Juvenile)

33. *Chorizopes bengalensis* Tikader, 1870 (Dorsal View of Female)

34. *Cyclosa insulana* (Costa, 1834) (Dorsal View of Female)
35. *Cyrtarachne inequalis* Thorell, 1864 (Dorsal View of Female)

36. *Cyrtarachne inequalis* Thorell, 1864 (Ventral View of Female)

37. *Cyrtophora cicatrosa* (Stoliczka, 1869) (Lateral View of Female)

38. *Cyrtophora cicatrosa* (Stoliczka, 1869) (Dorsal View of Male)

39. *Cyrtophora moluccensis* (Doleshchall, 1857) (Dorsal View of Female)

40. *Cyrtophora moluccensis* (Doleshchall, 1857) (Dorsal View of Male)
41. *Eriovixia excels* (Simon, 1889) (Dorsal View of Female)

42. *Eriovixia excels* (Simon, 1889) (Dorsal View of Male)

43. *Gasteracantha brivispina* (Doleschall, 1857) (Dorsal View of Female)

44. *Gasteracantha hasseltii* Koch, 1838 (Dorsal View of Female)

45. *Gasteracantha kuhli* Koch, 1837 (Dorsal View of Female)

46. *Gasteracantha cancriformis* Linnaeus, 1758 (Dorsal View of Female)
PLATE - XIII

47. Gibbaranea bituberculata (Walckenaer, 1802) (Dorsal View of Female)

48. Gibbaranea bituberculata (Walckenaer, 1802) (Dorsal View of Male)

49. Neoscona mukerjei Tikader, 1980 (Dorsal View of Female)

50. Neoscona nautica Koch, 1875 (Dorsal View of Female)

51. Neoscona nautica Koch, 1875 (Dorsal View of Male)

52. Neoscona nautica Koch, 1875 (Female in Roosting Habitat)
PLATE - XIV

53. *Neoscona pavida* (Simon, 1906) (Dorsal View of Male)

54. *Clubiona drassodes* Cambridge, 1874 (Dorsal View of Male)

55. *Clubiona filicata* Cambridge, 1874 (Dorsal View of Female)

56. *Clubiona pogonius* Simon, 1906 (Dorsal View of Female)

57. *Clubiona shillongensis* Majuender & Tikader, 1991 (Dorsal View of Female)

58. *Castianeira albopicta* Gravely, 1931 (Dorsal View of Female)
59. *Castianeira himalayensis* Gravely, 1931 (Dorsal View of Female)

60. *Castianeira zetes* Simon, 1897 (Dorsal View of Female)

61. *Scotophaeus madalasae* Tikade & Gajbe, 1975 (Dorsal View of Female)

62. *Ctenus sikkimensis* Gravely, 1931 (Dorsal View of Female)

63. *Ctenus himalayaensis* Gravely, 1921 (Dorsal view of female)

64. *Hersilia savignyi* Lucas, 1836 (Dorsal View of Female)
PLATE XVI

65. *Hersilia savignyi* Lucas, 1836 (Dorsal View of Male)

66. *Hersilia sumatrana* Thorell, 1890 (Dorsal View of Female)

67. *Hippasa holmerae* Thorell, 1895 (Dorsal View of Female)

68. *Hogna himalayensis* Gravely 1924 (Dorsal View of Female)

69. *Pardosa pseudoannulata* Boes.et Str., 1906 (Dorsal View of Female)

70. *Cheiracanthium himalayensis* Gravely, 1931 (Dorsal View of Female)
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PLATE - XVII

71. *Cheiracanthium indicum* Cambridge, 1874
(Dorsal View of Female)

72. *Cheiracanthium insigne* Cambridge, 1874
(Dorsal View of Female)

73. *Cheiracanthium melanostoma* Thorell, 1895
(Dorsal View of Female)

74. *Cheiracanthium mysorensis* Majumder & Tikader, 1991
(Dorsal View of Female)

75. *Cheiracanthium trivialise* Thorell, 1895
(Dorsal View of Female)

76. *Oxyopes shweta* Tikader, 1970
(Dorsal View of Female)
77. *Phylodromus malinae* Tikader, 1966 (Dorsal View of Male)

78. *Marpisa decorate* Tikader, 1974 (Dorsal View of Male)

79. *Myrmerachne orientalis* Tikader, 1973 (Dorsal View of Male)

80. *Telamania dimidiate* (Simon, 1899) (Dorsal View of Female)

81. *Telamania dimidiate* (Simon, 1899) (Dorsal View of Male)

82. *Zygoballus narmadaensis* Tikader, 1975 (Dorsal View of Female)
83. *Scytodes propinqua* Stoliczka, 1869 (Dorsal View of Female)

84. *Scytodes thoracica* (Latreille, 1804) (Dorsal View of Female)

85. *Heteropoda venatoria* Linnaeus, 1766 (Dorsal View of Female)

86. *Heteropoda venatoria* Linnaeus, 1766 (Dorsal View of Male)

87. *Heteropoda venatoria* Linnaeus, 1766 (Dorsal View of Juvenile)

88. *Herennia ornatissima* (Doleschall, 1859) (Dorsal View of Female)
89. *Herennia ornatissima* (Doleschall, 1859) (Dorsal View of Male)

90. *Larinia phitisca* (L.Koch, 1877) (Dorsal View of Female)

91. *Leucauge celebrasiana* (Walckenaer, 1841) (Dorsal View of Female)

92. *Leucauge celebrasiana* (Walckenaer, 1841) (Dorsal View of Male)

93. *Leucauge decorate* (Blackwall, 1864) (Dorsal View of Female)

94. *Leucauge decorate* (Blackwall, 1864) (Dorsal View of Male)
95. *Leucauge tessellate* (Thorell, 1847) (Dorsal View of Female)

96. *Nephila clavata* Koch, 1878 (Dorsal View of Female)

97. *Nephila clavata* Koch, 1878 (Ventral View of Female)

98. *Nephila kuhlii* (Doleschall, 1859) (Dorsal View of Female)

99. *Nephila kuhlii* (Doleschall, 1859) (Ventral View of Female)

100. *Nephila pilipes* (Fabricius, 1793) (Dorsal View of Female)
PLATE - XXII

101. *Nephila pilipes* (Fabricius, 1793) (Ventral View of Female)

102. *Nephila pilipes* (Fabricius, 1793) (Ventral View of Male)

103. *Nephila pilipes* (Fabricius, 1793) (Dorsal View of Juvenile)

104. *Tetragnatha javanus* Thorell, 1895 (Dorsal View of Female)

105. *Tetragnatha mandibulata* Walckenaer, 1837 (Dorsal View of Female)

106. *Tetragnatha maxillosa* Thorell, 1895 (Dorsal View of Female)
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PLATE - XXIII

107. *Tetragnatha sutherlandi* Gravely, 1921 (Dorsal View of Female)

108. *Haploclastus himalayensis* Tikader, 1976 (Dorsal View of Male)

109. *Camaricus formosus* Thorell, 1887 (Dorsal View of Female)

110. *Camaricus formosus* Thorell, 1887 (Ventral View of Female)

111. *Thomisus bulani* Tikader, 1960 (Dorsal View of Female)

112. *Xysticus bengalensis* Tikader & Biswas, 1974 (Dorsal View of Female)
113. *Xysticus kali* Tikader&Biswas, 1974 (Dorsal View of Female)

114. *Plator indicus* Simon, 1897 (Dorsal View of Female)