A Treatise on the Jumping Spiders (Araneae: Salticidae) of Tea Ecosystem of Dooars, West Bengal, India

Tapan Kumar Roy¹,a, Sumana Saha²,b, Dinendra Raychaudhuri¹,c

¹Department of Agricultural Biotechnology, IRDM Faculty Centre, Ramakrishna Mission Vivekananda University, Narendrapur, Kolkata - 700103, West Bengal, India
²Department of Zoology, Barasat Govt. College, Govt. of West Bengal, Kolkata - 700124, India

a-cE-mails address: tapanroycal1@gmail.com ; sahasumana2010@gmail.com ; dinendrarccu@gmail.com

ABSTRACT

The present study is devoted to 23 salticids under 20 genera recorded from the tea estates of Dooars, West Bengal, India. Of these, Cheliceroides brevipalpis is considered as new to science; Cocalus murinus Simon, 1899 and Phaeacius fimbriatus Simon, 1900 are new from India. The former two genera are the first records from the country. While providing diagnosis of the newly recorded genera, description and necessary illustrations of the new species are also provided. Recorded genera and species are suitably keyed together with relevant illustrations. Lyssomanes sikkimensis Tikader, 1967 is considered as the junior synonym of Telamonia festiva Thorell, 1887.

Keywords: Salticidae; New taxa; Tea Estates; Dooars; West Bengal

Reviewer:

Prof. Jerzy Borowski
Department of Forest Protection and Ecology, Warsaw University of Life Sciences – SGGW, Warsaw, Poland
1. INTRODUCTION

Tea, a major monoculture plantation crop, is a permanent but typical ecosystem (Fig. 1) that provides habitat continuity for 1031 species of arthropods and 82 species of nematodes globally (Chen & Chen 1989; Hazarika et al. 2009). In Asia, 230 species of insects and mite pests attack tea (Muraleedharan 1992). However, 173 arthropods and 16 nematodes are reported to be the pests of tea in North-East India (Hazarika et al. 1994).

None of the part of tea bush remains unattacked by the pests that ultimately affect “Two leaf and a bud”. As a result tea crop suffers loss (10-15%) in yield. To control these pests, per hectare consumption of pesticides is excessively high and equally expensive (Chakravartee & Hazarika 1995). Again heavy application of pesticides does no longer produce economic and effective pest control in tea, partly because of the rising cost of pesticides but mainly due to large scale and sometimes indiscriminate use of hard pesticides that promote speedier evolution of insect pests; affect non-target species; convert formerly innocuous species into pests and leave undesirable residues in made tea (Hazarika et al. 1994). As a result especially due to importers dissatisfaction with pesticide residues and reluctance to accept such tea, problem of residues has become a major concern to the tea industry.

To address the issue an alternative to chemical based plant protection i.e., an integrated approach based primarily on the use of biocontrol measures, habitat management, need based application of botanicals and safer pesticides, is being adopted. Such an approach is thought to reduce residues and ancillary problems associated with pesticide application (Hazarika et al. 1994). A review by Riechert & Lockley in 1984 brought attention to spiders as potential agent of biological pest control. The unquestionable contribution of spiders in biological control made an important tactics for integrated pest management system. Appreciating the necessity of spiders as bioresource against agricultural pests, the spider fauna of several crop ecosystems have been well documented in some parts of the world, e.g. cotton, soybean, alfalfa, maize, citrus orchards, deciduous orchards and rice (Barrion & Litsinger 1995; Satpathi 2004). But unfortunately attempt to document the spider fauna of tea-ecosystem is wanting. With this background, we carried out a systematic survey on the spiders of tea ecosystem of Dooars, West Bengal, India. It is worth mentioning that such study is first of its kind in India and second globally after China (Zhang, J. W. 1993 and BoGang, C. 2003).

Among the recorded araneo fauna, jumping spiders, the salticids are found to be the second largest group from the study area. The family Salticidae is currently represented by 5872 species belonging to 598 genera throughout the world (World Spider Catalogue 2016). However, Metzners’ 2015 data differs from the catalogue referred above. In India they are represented by a total of 207 species under 73 genera (Keswani et al. 2012). During our study for the spiders of tea ecosystem of Dooars, we could sample 23 salticid species under 20 genera from eight tea estates namely Shikarpur T. E., Kailashpur T. E., Meenglas T. E., Nepuchapur T. E., Nagrakata T. E., Bhogotpore T. E., Kurti T. E. and Dalgaon T. E.. Of the recorded species, Cheliceroides brevipalpis is considered as new to science. The genera Cocalus C. L. Koch, 1846 and Cheliceroides Zabka, 1985 are the first records from India. Phaeacius fimbriatus Simon, 1900 and Cocalus murinus Simon, 1899 are new from the country. While providing suitable keys for the recorded taxa, diagnosis and necessary descriptions of the new taxa are also provided. All the species have also been suitably illustrated. We propose Lyssomanes sikkimensis Tikader, 1967 as the junior synonym of Telamonia festiva Thorell, 1887.
2. MATERIAL AND METHODS

Spiders were sampled mainly by hand from the foliages and tea bushes, shade tree
trunks and fencing trees during the period 2008-2011. They were also trapped from
the ground by pitfall. The study area included eight Tea Estates (Fig. 2) namely Shikarpur T. E.,
Kailashpur T. E., Meenglas T. E., Nepuchapur T. E., Nagrakata T. E., Bhogotpore T. E., Kurti
T. E. and Dalgaon T. E. Of these, the former four belong to Western Dooars while the rests
are within the jurisdiction of Central Dooars.

Spider specimens thus sampled were preserved following Tikader (1987) and Barrion &
Litsinger (1995). They were studied under Stereo Zoom Binocular Microscopes, model
Olympus SZX-7. The measurements indicated in the text are in millimeters (mm), made with
an eye piece graticule. Materials are in the deposition of Department of Agricultural
Biotechnology, IRDM Faculty Centre, Ramakrishna Mission Vivekananda University,
Narendrapur, Kolkata.

2.1. Abbreviations

Abbreviations used: AL= abdominal length, ALE= anterior lateral eye, AME= anterior
median eye, AW= abdominal width, CL= cephalothoracic length, CW= cephalothoracic
width, PLE= posterior lateral eye, PME= posterior median eye, TL= total length, BTE=
Bhogotpore Tea Estate, DTE= Dalgaon Tea Estate, KTE= Kailashpur Tea Estate, KUTE=
Kurti Tea Estate, MTE= Meenglas Tea Estate, NTE= Nepuchapur Tea Estate, NATE=
Nagrakata Tea Estate, STE= Shikarpur Tea estate, WB= West Bengal, J= Juvenile, *= New
to World, Φ= New to India, Ψ= New to West Bengal, ▲= Endemic to India, ♦= Proposed
Synonymy

3. RESULTS

Class- Arachnida Cuvier, 1812
Order- Araneae Clerck, 1757
Family- Salticidae Blackwall, 1841

Key to genera:
1. Retromargin of chelicerae with one tooth
   ----------------------------------------------- 2
   - Retromargin of chelicerae with more than one tooth
   ----------------------------------------------- 15

2. Cephalothorax flattened
   ----------------------------------------------- 3
   - Cephalothorax not flattened
   ----------------------------------------------- 6
3. Beetle like; cephalothorax somewhat rounded with thick mouse like hairs, posteriorly wider; 1\textsuperscript{st} pair of legs in males robust with tibia broad and flat

\textit{--------- Rhene} Thorell, 1869

- Not beetle like; cephalothorax and 1\textsuperscript{st} pair of legs in male otherwise

\textit{------------------------ 4}

4. Tibiae and metatarsi I and II with 3 and 2 pairs of ventral spines respectively

\textit{-- Marpissa} C. L. Koch, 1846

- Tibiae and metatarsi I and II not so

\textit{------------------------------- 5}

5. Pale, brownish grey, broad band extending from the middle of cephalothorax up to the tip of abdomen; body entirely with lateral brown band

\textit{---- Menemerus} Simon, 1868

- No such bands; abdomen metallic, slender, ovoid, with flat setae

\textit{---- Thiania} C. L. Koch, 1846

6. Cephalothorax circular or U shaped

\textit{------------------------------- 7}

- Cephalothorax neither circular nor U shaped

\textit{------------------------------- 9}

7. Cephalothorax yellow brown to black, moderately high, with eye field darker

\textit{-- Euophrys} C. L. Koch, 1834

- Cephalothorax not so, eye field not darker

\textit{------------------------------- 8}

8. 1\textsuperscript{st} pair of legs in male robust, with tibia flat, fringed with stiff hairs alongside dorsal and ventral face

\textit{--------- Siler} Simon, 1889

- Both 1\textsuperscript{st} and 2\textsuperscript{nd} pairs of legs a little more robust than 3\textsuperscript{rd} and 4\textsuperscript{th} pair, tibiae not so

\textit{--------- Hasarius} Simon, 1871

9. Cephalothorax swollen or spherical, with horn like tuft of long, stiff, slightly curved bristles lateral to anterolateral eyes

\textit{------------------------------- 10}
- Cephalothorax otherwise, without any hornlike tuft of long, stiff, curved bristles  

----------------------------------  12

10. Abdomen of female pale with a pair of longitudinal dark lines, male slender with mid dorsal white band on abdomen  

----- *Telamonia* Thorell, 1887

- Abdomen with different pattern  

----------------------------------  11

11. Embolus usually short, sometimes with compound terminal apophysis  

------- *Evacha* Simon, 1902

- Embolus long, often with pars pendula; tibial apophysis sometimes with a few spur like projection at the flat tip  

----- *Hyllus* C. L. Koch, 1846

12. Cephalothoracic length always more than 1.2 x its width  

----------------------------------  13

- Cephalothoracic length always less than 1.2 x its width  

----------------------------------  14

13. Cephalothorax convex with cephalic margins nearly parallel; abdomen of female pale with series of chevron marks and white bands, in male such bands extending throughout the body  

- *Plexippus* C. L. Koch, 1846

- Cephalothorax slopping posteriorly; males usually black with 2 longitudinal white bands extending from thoracic region to tip of abdomen, females brownish, with pale yellow chevron pattern on abdomen  

----- *Carrhotus* Thorell, 1891

14. Chelicerae slender, with fangs long, sometimes larger than chelicerae, curved at tip; abdomen often with gray, indistinct, linear pattern  

------- *Phintella* Strand, 1906

- Cheliceral fang never so; abdomen of female with a series of chevron marks  

------- *Epocilla* Thorell, 1887

15. Cheliceral retromargin with 2 teeth  

--- *Cheliceroïdes* Zabka, 1985

-5-
- Cheliceral retromargin with many teeth ................................................................. 16

16. Eyes in 4, 2, 2 arrangement .................................................................................. 18

- Eyes in 2, 2, 2, 2 arrangement ................................................................................ 17

17. Eyes of 2nd and 3rd rows never on tubercles; cephalothorax convex, almost oval with a white, broad band along the rim; abdomen spherical with lustrous flat setae

-------- **Brettus** Thorell, 1895

- Eyes of 2nd and 3rd rows always on small tubercles; cephalothorax not so; abdomen slender with short, scanty, soft hairs

-- **Asemonia** O. P.-Cambridge, 1869

18. Ant like; cephalic - thoracic region distinctly marked by a constriction; pedicel long, conspicuous, visible from above

-------- **Myrmarachne** MacLeay, 1839

- Not ant like; cephalic - thoracic region fused, without any constriction; pedicel short, inconspicuous, not visible from above

---------------------------------- 19

19. Ocular quad with a prominently elevated lump like mound at the centre; abdomen elongate, conical; tibia of male palp with finger like apophysis

---- **Cocalus** C. L. Koch, 1846

- Ocular quad without any mount; abdomen nearly oval; tibial apophysis of male palp blunt, spine like

-------- **Phaeacius** Simon, 1900

---

**Genus: Rhene** Thorell, 1869


Type species: **Rhanis flavigera** C. L. Koch, 1846.

Distribution: Cosmopolitan (Metzner 2015; World Spider Catalogue 2016).

Key to species:
1. Body highly pale brown, not metallic, thickly clothed with white hairs, these posteriorly forming transverse zigzag, narrow bands; abdomen medially with 2 pairs of sigillae, anterior pair more prominent

\textit{----------- decorata} Tikader

- Body brown black, metallic, clothed with yellowish hairs leaving large area free, this at the posterior half forming 2 broad transverse bands; sigillae absent

\textit{----------- danieli} Tikader

\textit{Rhene decorata} Tikader, 1977

(Figs. 3A-E, 24 A & 26 D)


Interocular distance: AME – AME = 0.33, ALE – AME = 0.29, ALE – ALE = 0.86, PME – PME = 0.94, PLE – PME = 0.53, PLE – PLE = 1.27, AME – PLE = 0.73, AME – PME = 0.45

Legs: I 2.36 (0.80, 0.33, 0.53, 0.40, 0.30); II 1.83 (0.67, 0.23, 0.33, 0.33, 0.27); III 1.39 (0.53, 0.13, 0.20, 0.33, 0.20); IV 2.33 (0.77, 0.33, 0.50, 0.43, 0.30). Leg formula 1423.


\textit{Rhene danieli} Tikader, 1973

(Figs. 4A- F, 24 B & 26 E, F & G)


Interocular distance: AME – AME = 0.53, ALE – AME = 0.39, ALE – ALE = 1.27, PME – PME = 1.43, PLE – PME = 1.12, PLE – PLE = 2.16, AME – PLE = 1.39, AME – PME = 0.59

Legs: I 4.60 (1.70, 0.80, 1.00, 0.60, 0.50); II 2.80 (1.00, 0.40, 0.60, 0.40, 0.40); III 2.70 (0.90, 0.40, 0.60, 0.50, 0.30); IV 3.60 (1.20, 0.50, 0.90, 0.60, 0.40). Leg formula 1423.


Genus: Marpissa C. L. Koch, 1846


Type species: *Araneus muscosus* Clerck, 1757.

Distribution: Cosmopolitan (Metzner 2015; World Spider Catalogue 2016).

*Marpissa decorata* Tikader, 1974

(Figs. 5A–E, 24 C & 27 A)


Interocular distance: AME – AME= 0.67, ALE – AME= 0.58, ALE – ALE= 1.75, PME – PME= 1.67, PLE – PME= 0.54, PLE – PLE= 1.83, ALE – PLE= 1.04, AME – PME= 0.96

Legs: I 4.60 (1.50, 0.70, 1.40, 0.50, 0.50); II 4.30 (1.60, 0.60, 1.20, 0.50, 0.40); III 4.20 (1.50, 0.50, 1.20, 0.50, 0.50); IV 4.00 (0.80, 0.60, 1.30, 0.90, 0.40). Leg formula 1234.

Material examined: 1♀, NTE, 1 Nov. 2010, coll. T. K. Roy


Genus: Menemerus Simon, 1868


Type species: *Attus semilimbatus* Hahn, 1829.

Distribution: Ethiopian and Oriental (Metzner 2015; World Spider Catalogue 2016).

*Menemerus brevibulbis* (Thorell, 1887)

(Figs. 6A–E, 24 D & 27 B)


Interocular distance: AME – AME= 0.54, ALE – AME= 0.46, ALE – ALE= 1.32, PME – PME= 1.46, PLE – PME= 0.39, PLE – PLE= 1.57, ALE – PLE= 1.00, AME – PME= 0.89

Legs: I 5.10 (1.64, 1.00, 1.18, 0.73, 0.55); II 4.54 (1.45, 0.82, 1.09, 0.73, 0.45); III 4.83 (1.55, 0.55, 1.09, 1.00, 0.64); IV 6.28 (2.00, 0.73, 1.64, 1.18, 0.73). Leg formula 4132.


Distribution: India: West Bengal (New record); Djibouti, Senegal, Somalia, Yemen (Thorell 1887; Wesolowska 1999; Metzner 2015; Prószyn'ski 2015; World Spider Catalogue 2016).

Genus: Thiania C. L. Koch, 1846


Type species: Thiania pulcherrima C. L. Koch, 1846.


*Thiania bhamoensis* Thorell, 1887

(Figs. 7A- E, 24 E & 27 C)


Interocular distance: AME – AME= 0.53, ALE – AME= 0.49, ALE – ALE= 1.47, PME – PME= 1.58, PLE – PME= 0.35, PLE – PLE= 1.60, ALE – PLE= 0.81, AME – PME= 0.84

Legs: I 4.92 (1.57, 0.50, 1.14, 1.07, 0.64); II 3.79 (1.29, 0.50, 0.86, 0.64, 0.50); III 4.15 (1.36, 0.43, 1.00, 0.86, 0.50); IV 3.93 (1.00, 0.43, 1.00, 1.00, 0.50). Leg formula 1342.


Distribution: India: Andaman & Nicobar Islands, Assam, Kerala, West Bengal; China, Indonesia, Krakatau, Malacca, Malaysia, Myanmar, Singapore, Vietnam (Sebastian & Peter 2009; Dhali et al. 2010; Metzner 2015; Prószyn'ski 2015; World Spider Catalogue 2016).

**Genus: Euophrys** C. L. Koch, 1834

*Euophrys* C. L. Koch, 1834, *Deutschlands Insekten.*, Heft: 122-127.

Type species: *Aranea frontalis* Walckenaer, 1802.

Distribution: Throughout except Nearctic (Metzner 2015; World Spider Catalogue 2016).

*Euophrys frontalis* (Walckenaer, 1802)


*Euophrys frontalis* C. L. Koch, 1834, *Deutschlands Insekten.*, Heft: 123, pl. 1, f. 7-8.


Material examined: 1♀, NTE, 1 Nov. 2010, coll. T. K. Roy

Distribution: India: West Bengal; Afghanistan, Austria, Azerbaijan, Belgium, China, Croatia, Czech Republic, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Kyrgyzstan, Libya, Lithuania, Macedonia, Netherlands, Poland, Portugal, Romania, Russia, Sakhalin, Serbia, Slovakia, South Korea, Switzerland, Turkey, Turkmenistan, Ukraine (Dhali et al. 2014; Metzner 2015; Prószyn'ski 2015; World Spider Catalogue 2016).

**Genus: Siler** Simon, 1889


Type species: *Siler cupreus* Simon, 1889.


*Siler semiglaucus* (Simon, 1901)

(Figs. 8A-E, 24 F & 27 D)


Measurements (♀): CL - 2.10, CW - 1.50, AL - 3.77, AW - 2.03, TL - 6.27.

Interocular distance: AME – AME = 0.45, ALE – AME = 0.33, ALE – ALE = 1.07, PME – PME = 1.00, PLE – PME = 0.42, PLE – PLE = 1.27, ALE – PLE = 0.80, AME – PME = 0.57

Legs: I 3.77 (1.37, 0.51, 0.69, 0.69, 0.51); II 3.15 (1.03, 0.46, 0.63, 0.63, 0.40); III 3.15 (1.03, 0.57, 0.69, 0.57, 0.29); IV 4.86 (1.60, 0.69, 1.14, 0.97, 0.46). Leg formula 412=3.


Genus: *Hasarius* Simon, 1871


Type species: *Attus adansonii* Audouin, 1826.

Distribution: Cosmopolitan (Metzner 2015; World Spider Catalogue 2016).

*Hasarius* sp. nr. *adansoni* (Audouin, 1826)

(Figs. 9A- E, 24 G & 27 E)


Interocular distance: AME – AME = 0.64, ALE – AME = 0.64, ALE – ALE = 1.71, PME – PME = 1.64, PLE – PME = 0.57, PLE – PLE = 1.71, ALE – PLE = 1.00, AME – PME = 0.93

Legs: I 6.09 (2.00, 1.00, 1.27, 1.27, 0.55); II 5.82 (2.00, 0.91, 1.18, 1.18, 0.55); III 5.73 (2.00, 0.91, 0.91, 1.27, 0.64); IV 6.63 (2.09, 1.09, 1.27, 1.36, 0.82). Leg formula 4123.


Distribution: India: West Bengal; Algeria, Australia, Belgium, Canary Islands, Cape Verde, China, Cook Islands, Costa Rica, Czech Republic, Egypt, France, French Polynesia,
Galapagos Islands, Gambia, Germany, Great Britain, Greece, Hawai'i, Hispaniola Island, Hungary, Italy, Japan, Krakatau, Libya, Malaysia, Malta, Marocco, Marquesas Islands, Marshall Islands, Mexico, Midway Atoll, Nepal, Netherlands, New Zealand, Palmyra Atoll, Panama, Peru, Poland, Reunion, Seychelles, Singapore, Slovakia, South Korea, Sri Lanka, Switzerland, Tunisia, Turkey, United Arab Emirates, USA, Vietnam, Yemen, Zimbabwe (Barrion & Litsinger 1995; Sebastian & Peter 2009; Metzner 2015; Prószyński 2015; World Spider Catalogue 2016).

Genus: *Telamonia* Thorell, 1887


Type species: *Telamonia festiva* Thorell, 1887.

Distribution: Ethiopian and Oriental (Metzner 2015; World Spider Catalogue 2016).

Key to species:

1. Only femur I dorsally decorated with spines; cephalothorax creamy white to light brown; abdomen elongate, oval, with 2 longitudinal, mid dorsal, chocolate bands

   ----------- *dimidiata* (Simon)

   - All legs dorsally decorated with spines; cephalothorax reddish brown; abdomen slender, elongate, almost parallel sided, with 2 longitudinal mid dorsal chocolate brown bands enclosing a band of thick white

   ----------- *festiva* Thorell

*Telamonia dimidiata* (Simon, 1899)

(Figs. 10A- E, 24 H & 27 F)


Interocular distance: AME – AME= 0.79, ALE – AME= 0.64, ALE – ALE= 1.86, PME – PME= 1.71, PLE – PME= 0.71, PLE – PLE= 1.71, ALE – PLE= 1.14, AME – PME= 0.93

Legs: I 8.33 (2.11, 1.67, 2.22, 1.44, 0.89); II 7.45 (2.22, 1.56, 1.89, 1.11, 0.67); III 9.33 (3.22, 1.22, 1.89, 1.89, 1.11); IV 8.78 (3.00, 1.00, 2.11, 1.78, 0.89). Leg formula 3412.

Distribution: India: Assam, Gujarat, Kerala, Maharashtra, West Bengal; Bhutan, Indonesia, Singapore, (Sebastian & Peter 2009; Dhali et al. 2010; Metzner 2015; Prószyn'ski 2015; World Spider Catalogue 2016).

Telamonia festiva Thorell, 1887
(Figs. 11A- E, 24 I & 27 G)

Telamonia festiva Thorell, 1887, Annali del Museo Civico di Storia Naturale di Genova 25: 386.


Description: Female

CL - 3.60, CW - 3.26, AL - 5.26, AW - 2.11, TL - 9.03. Cephalothorax (Fig. 11A) brown, elongate oval, anteriorly truncate, broadest at middle, cephalic region somewhat flat
with ocular area yellowish brown, sides sloping, thoracic region posteriorly depressed with
distinct, median, reddish brown, longitudinal fovea, either side of which with broad, whitish,
downward and outwardly directed yellow band, immediately behind the posterolateral eye
row, radii distinct. Eyes 8, homogenous, transparent, basally ringed with black, arranged in 4
transverse rows, anteromedians (AME) forming the anterior row, occupying the frontal
region, 2nd row or anterolaterals nearly 1/3 of AME, 3rd row of eyes or posteromedians
smallest, widest, situated closer to ALE than PLE, 4th row of eyes or posterolaterals nearly
equal to anterolaterals, ocular quad almost rectangular, formed by PME and PLE, eye
diameter AME> ALE ≥ PLE > PME. Interocular distances: AME – AME= 0.80, ALE –
AME= 0.63, ALE – ALE= 1.77, PME – PME= 1.60, PLE – PME= 0.66, PLE – PLE= 1.74,
ALE – PLE= 1.20, AME – PME= 1.03. Clypeus narrow, nearly equal to the diameter of ALE,
clothed with long, white hairs. Chelicerae (Fig. 11B) yellow brown, moderately long, stout,
more or less parallel, promargin with 2 and retromargin with 1 teeth; fang brown, curved,
sharp and stout. Labium (Fig. 11C) yellowish, longer than wide, constricted sub basally,
apically truncate and scopulate. Maxillae (Fig. 11C) elongate, basally brown, outer margin
concave, inner margin weakly so, apically yellowish, round, bulged and scopulate with brown
hairs. Sternum (Fig. 11C) yellow brown, margin darker, slightly indented at each coxae,
longer than wide, clothed with long, pale brown hairs, apically weakly concave, tip round.
Legs yellow brown, moderately long, stout, clothed with brownish black hairs and spines,
tarsal claw 2 with claw tufts, each with 7 pectinations. Leg measurements: I 6.85 (2.00, 0.97,
1.71, 1.31, 0.86); II 6.28 (1.94, 0.91, 1.37, 1.26, 0.80); III 7.14 (2.11, 0.97, 1.83, 1.43, 0.80);
IV 7.20 (1.43, 0.86, 2.34, 1.77, 0.80). Leg formula 4312.

Abdomen (Fig. 11A) yellow brown, long, parallel sided, anteriorly truncate, margined
with long, brown, erect hairs, cardiac spot white, antero-laterally with a pair of distinct
yellowish sigillae. Dorsum decorated with a pair of more or less parallel brown black band,
anal tubercle distinct, triangular. Venter yellow, with irregular grey black patch extending
from epigastric furrow to almost near tip, spinnerets yellow brown, covered with brown hairs,
posterior pair distinctly longer than anterior.

Epigynum - Internal genitalia (Figs. 11D & E): Epigyne sclerotised, a convex shield,
depressed anteriorly with parallel longitudinal lines evident medially, spermathecae heavily
sclerotised; copulatory openings medial; fertilization duct long, heavily coiled, divergent apically.

Distribution: India: West Bengal; Celebes, China, Indonesia, Malaysia, Myanmar, New Guinea, Singapore, Vietnam (Metzner 2015; Prószyn'ski 2015; World Spider Catalogue 2016).

Remarks: Wanless (1980) questioned on the status of Lyssomanes sikkimensis Tikader primarily relying on unidentate nature of retromarginal teeth of chelicerae. Logunov later in 2004 assigned the species to Telamonia (Thorell) basing on the total length (8 mm), characteristic v shaped colour pattern on the abdominal dorsum, other than the number of cheliceral teeth. He further believed the limit of Lyssomanes in the palaearctic only. They however had to depend on the illustrations of Tikader (1967).

Present species appears to be a replica of Lyssomanes sikkimensis Tikader other than the internal genitalia (illustration not available in Tikader 1967). Intense study on the species leads to conclude that the species is Telamonia festiva Thorell [Metzner 2015]. Lyssomanes sikkimensis Tikader is therefore proposed as the junior synonym of Telamonia festiva Thorell.

Genus: Evarcha Simon, 1902


Type species: Araneus falcatus Clerck, 1757.

Distribution: Throughout except Neotropical (Metzner 2015; World Spider Catalogue 2016).

Evarcha flavocinta (C. L. Koch, 1846)

Maevia flavocincta C. L. Koch, 1846, Die Arachniden: 74, fig. 1330 (♀).


Evarcha flavocincta Roy et al., 2014, Munis Entomology and Zoology 9(1): 380, fig. 1-6 (♀).


Distribution: India: West Bengal; Bintan Island, China, Indonesia, Japan, Lombok, Malaysia, Singapore, Vietnam (Roy et al. 2014; Metzner 2015; Prószyn'ski 2015; World Spider Catalogue 2016).
Genus: *Hyllus* C. L. Koch, 1846


Type species: *Hyllus giganteus* C. L. Koch, 1846.

Distribution: Throughout except Nearctic and Neotropical (Metzner 2015; World Spider Catalogue 2016).

*Hyllus semicupreus* (Simon, 1885)

(Figs. 12A- E, 25 A & 27 H)


Interocular distance: AME – AME= 0.83, ALE – AME= 0.71, ALE – ALE= 2.06, PME – PME= 2.03, PLE – PME= 0.83, PLE – PLE= 2.40, ALE – PLE= 1.34, AME – PME= 1.06

Legs: I 6.69 (2.23, 1.09, 1.49, 0.97, 0.91); II 5.60 (1.77, 0.97, 1.20, 0.86, 0.80); III 6.52 (2.40, 1.03, 1.09, 1.20, 0.80); IV 7.54 (2.57, 1.26, 1.54, 1.26, 0.91). Leg formula 4132.


Distribution: India: Assam, West Bengal; Sri Lanka (Sebastian & Peter 2009; Dhali et al. 2010; Metzner 2015; Prószyński 2015; World Spider Catalogue 2016).

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


Type species: *Attus paykullii* Audouin, 1826.

Distribution: Cosmopolitan (Metzner 2015; World Spider Catalogue 2016).

*Plexippus paykullii* (Audouin, 1826)

(Figs. 13A- E, 25 B & 27 I)


Interocular distance: AME – AME= 0.74, ALE – AME= 0.57, ALE – ALE= 1.71, PME – PME= 1.77, PLE – PME= 0.51, PLE – PLE= 1.71, ALE – PLE= 1.02, AME – PME= 0.97

Legs: I 5.00 (1.60, 0.87, 1.20, 0.80, 1.20); II 4.54 (1.60, 0.80, 1.07, 0.67, 0.40); III 4.74 (1.67, 0.80, 1.00, 0.67, 0.60); IV 5.60 (1.73, 0.87, 1.27, 1.13, 0.60). Leg formula 4132.


Genus: Carrhotus Thorell, 1891
Carrhotus Thorell, 1891, Bihang till Kongliga Svenska Vetenskaps-Akademiens Handlingar 24(2): 1-149.
Type species: Plexippus viduus C. L. Koch, 1846.

Carrhotus viduus (C. L. Koch, 1846)
(Figs. 14A- E, 25 C & 27 J)
Plexippus viduus C. L. Koch, 1846, Die Arachniden: 104, f. 1166 (♀).
Interocular distance: AME – AME= 0.60, ALE – AME= 0.49, ALE – ALE= 1.43, PME – PME= 1.43, PLE – PME= 0.49, PLE – PLE= 1.51, ALE – PLE= 0.96, AME – PME= 0.83
Legs: I 4.80 (1.40, 0.90, 1.25, 0.75, 0.50); II 4.45 (1.40, 0.80, 1.00, 0.80, 0.45); III 4.15 (1.40, 0.75, 1.15, 0.50, 0.35); IV 4.65 (1.00, 0.70, 1.25, 1.05, 0.65). Leg formula 1423.
Distribution: India: Assam, West Bengal (New record); Bintan Island, China, Indonesia, Malacca, Malaysia, Myanmar, Nepal, Penang Island, Singapore, Sri Lanka, Sumbawa (Metzner 2015; Prószyński 2015; World Spider Catalogue 2016).

Genus: Phintella Strand in Bösenberg & Strand, 1906
Type species: Telamonia bifurcilinea Bösenberg & Strand, 1906.
Distribution: Throughout except Neartic and Neotropical (Metzner 2015; World Spider Catalogue 2016).

Phintella vittata (C.L. Koch, 1846)
(Figs. 15A- E, 25 D & 27 K)
Plexippus vittatus C. L. Koch, 1846, Die Arachniden: 125, f. 1185 (j).

Measurements (♀): CL 1.35, CW 1.00, AL 1.76, AW 1.10, TL 3.31.

Interocular distance: AME – AME= 0.39, ALE – AME= 0.29, ALE – ALE= 0.84, PME – PME= 0.84, PLE – PME= 0.29, PLE – PLE= 0.84, ALE – PLE= 0.55, AME – PME= 0.47

Legs: I 2.54 (0.80, 0.27, 0.60, 0.40, 0.47); II 2.40 (0.80, 0.33, 0.47, 0.40, 0.40); III 2.54 (0.80, 0.20, 0.60, 0.47, 0.47); IV 2.80 (0.80, 0.20, 0.73, 0.60, 0.47). Leg formula 41=32.


Distribution: India: Nicobar Islands, West Bengal; China, Indonesia, Malaysia, Penang Island, Philippines, Singapore, Sri Lanka, Vietnam (Sebastian & Peter 2009; Dhali et al. 2010; Metzner 2015; Prószyński 2015; World Spider Catalogue 2016).

Genus: Epocilla Thorell, 1887


Type species: Epocilla praetextata Thorell, 1887.

Distribution: Throughout except Nearctic and Neotropical (Metzner 2015; World Spider Catalogue 2016).

Epocilla aurantiaca (Simon, 1885)

(Figs. 16A- E, 25 E & 27 L)


Intercocular distance: AME – AME= 0.60, ALE – AME= 0.42, ALE – ALE= 1.28, PME – PME= 1.25, PLE – PME= 0.38, PLE – PLE= 1.25, ALE – PLE= 0.79, AME – PME= 0.72

Legs: I 4.23 (1.31, 0.57, 1.09, 0.80, 0.46); II 3.60 (1.14, 0.40, 0.80, 0.80, 0.46); III 4.28 (1.54, 0.63, 0.91, 0.74, 0.46); IV 4.85 (1.66, 0.51, 0.91, 1.31, 0.46). Leg formula 4312.


Distribution: India: Assam, Kerala, West Bengal (New record); Malacca, Malaysia, Myanmar, Sri Lanka, Vietnam (Sebastian & Peter 2009; Metzner 2015; Prószyński 2015; World Spider Catalogue 2016).

Genus: Cheliceroides Zabka, 1985


Diagnosis: Cephalothorax oval, moderately high, almost 1/3 longer than wide, sloping posteriorly and on the sides from caput, occupying nearly half of its area. Eyes in 4 transverse rows, each with 2, 1st row of eyes close together, occupying the entire face, 2-3 times larger than the next, 2nd situated just behind, 3rd row with 2 very small eyes, close to 2nd, little wider than the last, 4th row of eyes nearly as large as the 2nd; ocular quad formed by 2nd and 4th rows, as long as wide or 1/4 to 1/2 wider. Sternum somewhat heart shaped. Coxae separate by width of labium and part or all of maxillae. Maxillae enlarged at extremity. Labium as long as or little longer than wide. Abdomen long, slender, tapering; spinnerets short. Legs usually long and slender, 4th with long and fine spines on femora, tibia, metatarsus and patella.

Type species: Cheliceroides longipalpis Zabka, 1985.


Cheliceroides brevipalpis sp. nov.

(Figs. 17A- F, 25 F & 27 M, N & O)
Differential diagnosis: The male differs from other species of the monotypic genus Cheliceroides Zabka, 1985 by a small palp and retromargin with two teeth, one located near the base of fang and other almost at the middle.

Etymology: The specific epithet is derived from small palp.


Type Deposition: Department of Agricultural Biotechnology, IRDM Faculty Centre, Ramakrishna Mission Vivekananda University, Narendrapur, Kolkata – 700103, registration no: RKMVUE 0042-15

Description: Male (Holotype)

CL - 2.98, CW - 2.42, AL - 3.53, AW - 1.72, TL - 6.70. Cephalothorax (Fig. 17A) round, robust, brown, clothed with dark brown and white hairs, margins encircled with 2 overlapping rims, gradually broadened posteriorly, outer one black brown and inner white, cephalic region moderately high, thoracic region posteriorly depressed with distinct, short, black, longitudinal fovea, few small white hairs beset in front of it, radii faintly marked. Eyes 8, homogenous, transparent, basally ringed with black, with white hairs in between anterior eyes, arranged in 3 transverse rows, anterior recurved, ocular quad trapezoid, a little wider behind, formed by posteromedian (PME) and posterolateral (PLE) eyes, anteromedians (AME) largest, anterolaterals (ALE) half the diameter of AME, set on tubercles, 2nd row of eyes or posteromedians (PME) smallest, set on tubercles, slightly inward to lateral margins of ocular quad, situated almost at the centre of anterolaterals (ALE) and posterolaterals (PLE), PLE = ALE, on tubercles, eye diameter AME > ALE ≥ PLE > PME. Interocular distance: AME – AME= 0.67, ALE – AME= 0.58, ALE – ALE= 1.70, PME – PME= 1.72, PLE – PME= 0.47, PLE – PLE= 1.72, ALE – PLE= 1.00, AME – PME= 0.95. Clypeus narrow, brown black, clothed with white hairs. Chelicerae (Fig. 17B) long, stout, robust, dorsally black, ventrally brown, distally divergent, promargin with 8 teeth, 1 close to the base of fang, rest at the base of chelicerae, retromargin with 2 teeth, 1 located near the base of fang and the other almost at the middle, fang long, stout, wavy, strongly curved near acute apex, basally with a black prominence, apical ¼ th red brown, rest brown black. Labium (Fig. 17C) dark brown, long, basally broad, apically narrowing and truncate. Maxillae (Fig. 17C) elongate,
basally dark brown, apically red brown to off white, scopulate, outer margins concave. Sternum (Fig. 17C) red brown, elongate, anterior margin nearly straight, clothed with fine, brown hairs. Legs long, strong, yellowish excepting dark brown femur I-III and metatarsi I-II, usually clothed with hairs and spines, tarsal claw 2, with claw tufts, claw pectinate throughout. Leg measurements: I 8.88 (2.44, 1.11, 2.33, 2.11, 0.89); II 7.45 (2.33, 1.00, 1.78, 1.56, 0.78); III 6.68 (2.00, 0.78, 1.56, 1.56, 0.78); IV 6.56 (2.33, 0.56, 1.33, 1.67, 0.67). Leg formula 1234.

Abdomen (Fig. 17A) elongate, yellow brown, midlongitudinally with a pale yellow band clothed with white and brown, long, erect spiny hairs, marginally with broad, pale brown band tinged with red leaving the apex. Dorsum decorated with 2 pairs of black spots in the posterior half and 2 pairs of distinct yellowish sigillae near middle. Venter yellow brown, medially with a broad, dark brown band, spotted with 2 white longitudinal lines, clothed with dark brown hairs extending from epigastric furrow to the base of blackish yellow spinnerets.

Palp (Figs. 17D-F): Small, genital bulb within the rounded cymbium, RTA comparatively short, basally broad, apically narrowed, embolus coiled, apically sharply pointed, bulbous pocket distinct, distal haematodocha tubular.

Distribution: India: West Bengal. The species is so far known from the type locality.

Remarks: *Cheliceroides brevipalpis* sp. nov. resembles the monotypic species *Cheliceroides longipalpis* Zabka, 1985 but can be separated by i) chelicerae long, distally divergent, with 8 promarginal teeth, 1 close to base of fang, rest at its base and with 2 retromarginal teeth, 1 located near base of fang and the other almost at the middle (chelicerae not so long and divergent distally, each marginal teeth 2, promarginals small, distal to base of fang, of the retromarginals larger one located near base of fang in *C. longipalpis*); ii) cephalothorax round, margins encircled with 2 overlapping rims (cephalothorax subrectangular, margins darker in *C. longipalpis*); iii) abdomen long, medially wide, narrowed at both ends, dorsum with 2 pairs of black spots in the posterior half and 2 pairs of distinct yellowish sigillae near middle (abdomen oval, narrowed posteriorly, dorsum with a midlongitudinal stripe in the middle enclosing 5 sigillae, 2 semi lunar, transverse bands, anterior one continuous and posterior one discontinuous in *C. longipalpis*); iv) tibial apophysis short, peg like; embolus thread-like and
spiral (tibial apophyses long, sharp and embolus long, incurved in *C. longipalpis* Zabka). Such differences appear to justify the erection of a new species.

Genus: *Brettus* Thorell, 1895


Type species: *Brettus cingulatus* Thorell, 1895.

Distribution: Ethiopian and Oriental (Metzner 2015; World Spider Catalogue 2016).

*Brettus albolimbatus* Simon, 1900

(Figs. 18A-E, 25 G & 27 P)


Interocular distance: AME – AME = 0.45, ALE – AME = 0.38, ALE – ALE = 1.06, PME – PME = 0.83, PLE – PME = 0.49, PLE – PLE = 0.94, ALE – PLE = 0.75, AME – PME = 0.53.

Legs: I 5.82 (1.82, 0.55, 1.45, 1.27, 0.73); II 4.45 (1.64, 0.36, 1.18, 0.82, 0.45); III 4.55 (1.55, 0.36, 1.09, 1.00, 0.55); IV 5.73 (1.27, 0.45, 1.73, 1.64, 0.64). Leg formula 1432.


Distribution: India: Assam, Kerala, West Bengal; Celebes, China, Indonesia, Sri Lanka (Sebastian & Peter 2009; Dhali *et al.* 2010; Metzner 2015; Prószyn'ski 2015; World Spider Catalogue 2016).

Genus: *Asemonea* O. P.-Cambridge, 1869


Type species: *Lyssomanes tenuipes* O. P.-Cambridge, 1869.

Distribution: Throughout except Nearctic and Neotropical (Metzner 2015; World Spider Catalogue 2016).

*Asemonea tenuipes* (O. P.-Cambridge, 1869)

(Figs. 19A-E, 25 H & 27 Q)


Measurements (♀): CL - 1.92, CW - 1.21, AL - 2.87, AW - 1.25, TL - 4.79.

Interocular distance: AME – AME= 0.45, ALE – AME= 0.30, ALE – ALE= 0.87, PME – PME= 0.57, PLE – PME= 0.30, PLE – PLE= 0.64, ALE – PLE= 0.42, AME – PME= 0.30

Legs: I 5.79 (1.79, 0.43, 1.57, 1.50, 0.50); II 5.01 (1.57, 0.36, 1.29, 1.29, 0.50); III 5.36 (1.50, 0.36, 1.43, 1.50, 0.57); IV 6.29 (1.79, 0.36, 1.43, 2.07, 0.64). Leg formula 4132.


Distribution: India: Andaman Islands, West Bengal; Myanmar, Singapore, Sri Lanka, Thailand (Sebastian & Peter 2009; Dhali et al. 2010; Metzner 2015; Prószyński 2015; World Spider Catalogue 2016).

Genus: *Myrmarachne* MacLeay, 1839


Type species: *Myrmarachne melanocephala* MacLeay, 1839.

Distribution: Cosmopolitan (Metzner 2015; World Spider Catalogue 2016).

Key to species:
1. Typical ant like spider; abdomen oval, weakly constricted in female
   ---------- melanocephala MacLeay

   - Atypical ant like; abdomen deeply constricted, apparently bilobed; chelicerae robust, dumble shaped, as long as cephalothorax (male)
   ---------- plataleoides O. P.-Cambridge

*Myrmarachne melanocephala* MacLeay, 1839

(Figs. 20A- F, 25 I & 27 R)


Interocular distance: AME – AME= 0.47, ALE – AME= 0.40, ALE – ALE= 1.19, PME – PME= 1.21, PLE – PME= 0.47, PLE – PLE= 1.35, ALE – PLE= 0.93, AME – PME= 0.79

Legs: I 4.66 (1.63, 0.42, 1.21, 0.93, 0.47); II 3.56 (1.26, 0.51, 1.00, 0.51, 0.28); III 4.09 (1.26, 0.56, 1.11, 0.88, 0.28); IV 6.74 (2.14, 0.70, 1.95, 1.53, 0.42). Leg formula 4132.


Myrmarachne plataleoides (O. P.-Cambridge, 1869)

(Figs. 21A- G, 26 A & 28 A, B & C)

Salticus plataleoides O. Pickard-Cambridge, 1869, Annals and Magazine of Natural History (4) 3: 68, pl. 6, f. 61-65 (♂).


Measurements (♂): CL - 2.46, CW - 1.21, AL - 2.46, AW - 1.04, TL - 5.58.

Interocular distance: AME – AME= 0.38, ALE – AME= 0.33, ALE – ALE= 0.92, PME – PME= 0.96, PLE – PME= 0.46, PLE – PLE= 1.08, ALE – PLE= 0.71, AME – PME= 0.50

Legs: I 6.20 (2.10, 0.70, 1.80, 1.00, 0.60); II 4.50 (1.40, 0.50, 1.30, 0.90, 0.40); III 4.60 (1.40, 0.50, 1.10, 1.20, 0.40); IV 7.20 (2.30, 0.60, 2.00, 1.70, 0.60). Leg formula 4132.


Distribution: India: Assam, Bihar, Kerala, Maharashtra, Tamil Nadu, West Bengal; China, Malaysia, Singapore, Sri Lanka, Thailand (Biswas & Biswas 1992; Sebastian & Peter 2009; Dhali et al. 2010; Metzner 2015; Prószyn'ski 2015; World Spider Catalogue 2016).

Genus: Cocalus C. L. Koch, 1846

Cocalus C. L. Koch, 1846, Die Arachniden, 1-234.

Diagnosis: Medium sized, moderately high, compact salticids, usually clothed with soft, small hairs. Cephalothorax slightly longer than wide, elongate with low elevation in the centre of posterior ocular quad. Abdomen conical. Palpal retrolateral apophysis with curious finger like projection.

Type species: Cocalus concolor C. L. Koch, 1846.

**Cocalus murinus** Simon, 1899
(Figs. 22A- E, 26 B & 28 D)


Material examined: 1♀, NATE, 11 Apr. 2010, coll. T. K. Roy

Description: Female

CL - 3.36, CW - 2.57, AL - 5.21, AW - 2.29, TL - 8.71. Cephalothorax (Fig. 22A) brown, elongate, oval, moderately high, clothed with brown hairs with sides sloping, cephalic region elevated, thoracic region posteriorly depressed with moderate longitudinal fovea immediately behind the posterolateral eye row. Eyes 8, homogenous, transparent, basally ringed with black and clothed with thick hairs, arranged in 3, transverse rows, with anterior row recurved as viewed dorsally, ocular quad trapezoid, a little wider behind, formed by PME and PLE, a small tubercle at its centre, anteromedians (AME) largest, anterolaterals (ALE) half the diameter of anteromedians (AME), posteromedians (PME) or 2nd row of eyes smallest, set on small tubercles, slightly inward to lateral margins of ocular quad, situated almost at the centre of anterolaterals (ALE) and posterolaterals (PLE), equal to anterolaterals (ALE), situated on tubercles, eye diameter AME > ALE ≥ PLE > PME. Interocular distance: AME – AME= 0.64, ALE – AME= 0.54, ALE – ALE= 1.64, PME – PME= 1.79, PLE – PME= 0.71, PLE – PLE= 2.00, ALE – PLE= 1.29, AME – PME= 1.00. Clypeus narrow, equal to the diameter of anterolateral eyes, usually clothed with brown hairs. Chelicerae (Fig. 22B) reddish brown, more or less parallel, elongate, promargin with 3 and retromargin with 4 comparatively small teeth. Labium (Fig. 22C) basally wide, brown, medially swollen, apically pale, scopulate. Maxillae (Fig. 22C) yellowish brown, elongate, outer margin concave, anteriorly pale yellowish, scopulate. Sternum (Fig. 22C) yellow brown, elongate, margins with long dark brown hairs and rest with fine pale brown ones. Legs moderately long, pale yellowish, clothed with hairs and spines, tarsal claw 2, with claw tufts, pectinate throughout excepting at apex. leg measurements: I 7.21 (2.21, 1.07, 1.86, 1.21, 0.86); II 6.49 (2.00, 0.93, 1.64, 1.21, 0.71); III 6.00 (1.86, 0.93, 1.36, 1.14, 0.71); IV 8.43 (2.21, 1.07, 1.93, 2.43, 0.79). Leg formula 4123.

Abdomen (Fig. 22A) long, brown, medially paler, basally more so, clothed with long, white hairs and fine, pale brown ones. Venter brown, marginally with a broad, longitudinal,
white band accommodating largely with white, long and few brown hairs, medially with 4 rows of white spots running from epigastric furrow to spinnerets, spinnerets brown, clothed with hairs, posterior with 2 equal segments.

Epigynum – Internal genitalia (Figs. 22D & E): Epigynum sub rectangular, chocolate brown, anteriorly clothed with small dark brown hairs, orifice indistinct, evidently plugged, spermatheca reniform, compact, fertilization duct short, downward.

Distribution: India (New record): West Bengal; Indonesia, Singapore (Wanless 1981b; Metzner 2015; Prószyński 2015; World Spider Catalogue 2016).

Genus: *Phaeacius* Simon, 1900

Type species: *Phaeacius fimbriatus* Simon, 1900.

*Phaeacius fimbriatus* Simon, 1900
(Figs. 23A- E, 26 C & 28 E)

Material examined: 1♀, KUTE, 11 Apr. 2010, coll. T. K. Roy

Description: Female
CL - 4.64, CW - 3.86, AL - 6.14, AW - 3.07, TL - 10.79. Cephalothorax (Fig. 23A) brown, oval, longer than wide, clothed with fine white and brown hairs, thoracic region somewhat flat, weakly concave, in front of distinct, long, brown, mid longitudinal fovea, with gradually sloping sides and distinct radii. Eyes 8, homogenous, transparent, basally ringed with black, arranged in 3 transverse rows, anterior row recurved as viewed dorsally, with white hairs between eyes, ocular quad trapezoid, a little wider behind, formed by posteromedian (PME) and posterolateral (PLE) eyes, anteromedians (AME) largest, anterolaterals (ALE) almost half the diameter of AME, 2nd row of eyes or PME smallest, set on tubercles, slightly inward to lateral margin of ocular quad, situated closer to ALE than PME, ALE = ALE, set on tubercles, eye diameter AME> ALE≥ PLE> PME. Interocular distances: AME – AME= 0.68, ALE – AME= 0.61, ALE – ALE= 1.82, PME – PME= 1.64, PLE – PME= 0.79, PLE – PLE= 1.79, ALE – PLE= 1.36, AME – PME= 0.93. Clypeus narrow, margins with white, long hairs,
clypeal angles obtuse, weakly produced. Chelicerae (Fig. 23B) long, brown, roughly cylindrical, margins with long, pale brown hairs, promargin with 3 teeth, 1 close to the base of fang, rest 2 slightly lower, retromargin with 4 equidistantly placed teeth, fang stout, stumpy, curved, basally dark brown, apically paler. Labium (Fig. 23C) brown, longer than wide, constricted sub-basally, apically off white, truncate and scopulate. Maxillae (Fig. 23C) elongate, brown, anteriorly weakly bulged, pale brown, scopulate, outer margin concave, inner one yellow brown. Sternum (Fig. 23C) yellow, longer than wide, covered with long pale brown hairs, outer margin thin, dark, slightly indented at coxae III & IV, apical margins nearly straight, tip round. Legs long, slender, dorsally brown, banded, clothed with brownish hairs and spines, ventrally yellowish, tarsal claw 2, with claw tufts, claws pectinated. leg measurements: I 10.34 (3.11, 1.22, 2.67, 2.56, 0.78); II 10.56 (3.11, 1.22, 2.78, 2.56, 0.89); III 10.00 (2.89, 1.22, 2.56, 2.33, 1.00); IV 11.00 (2.89, 1.22, 3.00, 2.78, 1.11). Leg formula 4213.

Abdomen (Fig. 23A) pale yellow, longer than wide, elongate oval, anteriorly truncate, marginally brown, clothed with both brown and white hairs. Dorsum grey, decorated with 2 pairs of distinct, yellowish sigillae, 2nd pair large, deeply grooved, both pairs marked by brown hairs. Venter yellowish, medially spotted with 4 longitudinal lines, running from epigastric furrow to spinnerets, clothed with pale brown and lateral white hairs. Spinnerets pale brown, clothed with brownish hairs, posterior pair laterally extended.

Epigynum – Internal genitalia (Figs. 23D & E): Epigynum reddish brown, roughly triangular, spermatheca elongate oval, fertilization duct short, straight, mid basally attached to spermatheca, copulatory duct long, outwardly curved, terminally coiled.

Distribution: India (New record): West Bengal; Indonesia, Nepal (Wanless 1981a; Metzner 2015; Prószyński 2015; World Spider Catalogue 2016).
4. CONCLUSIONS

In tea ecosystem, diversity of the salticids is second highest. They are dominant during post monsoon, though a state of equilibrium is maintained throughout the year. Salticids, visually based stalking attackers, are frequent in tea trunk, both sides of leaves, fencing trees and shade trees. They are diurnal, typical non-weavers but make silken retreats in the form of a tube or sac fastened to various substrata to moult, sometimes to mate, lay eggs or take night shelter. Dominant species are *Hyllus semicupreus* Simon, *Phintella vittata* (C.L. Koch), *Plexippus paykullii* (Audouin), *Telamonia dimidiata* (Simon) and *Thiania bhamoensis* Thorell. Species like *Myrmarachne* spp. gain some protection from predators through their resemblance with aggressive or unpalatable ants.

Analysis of zoogeographical distribution reveals that except *Euophrys frontalis* (Walckenaer), *Menemerus brevibulbis* (Thorell) and *Plexippus paykullii* (Audouin); the species are exclusively Oriental.

Number of recorded salticids from the study area shows that their diversity is maximum in Nepuchapur T. E. and minimum in Bhogotpore T. E.. Based on species diversity, the decreasing order of the tea estates are NTE (73.9%) > KTE (52.2%) > NATE (47.8%) > MTE (39.1%) > KUTE (26%) > STE (21.7%) > DTE (21.7%) > BTE (17.4%). Our discussion with the respective garden managers leads to infer ‘tea estates experiencing less pesticides harbour higher spider heterogeneity’.

**Table 1. Summary**

<table>
<thead>
<tr>
<th>TAXA</th>
<th>DISTRIBUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TEA ESTATES</td>
</tr>
<tr>
<td><strong>Family: Salticidae</strong></td>
<td></td>
</tr>
<tr>
<td>1. <em>Rhene decorata</em> Tikader ▲</td>
<td>-</td>
</tr>
<tr>
<td>2. <em>Rhene danieli</em> Tikader ▲</td>
<td>+</td>
</tr>
<tr>
<td>3. <em>Marpissa decorata</em> Tikader ▲</td>
<td>-</td>
</tr>
<tr>
<td>4. <em>Menemerus brevibulbis</em> (Thorell) Ψ</td>
<td>-</td>
</tr>
<tr>
<td>5. <em>Thiania bhamoensis</em> Thorell</td>
<td>-</td>
</tr>
<tr>
<td>6. <em>Euophrys frontalis</em> (Walckenaer)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Scientific Name</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>7.</td>
<td>Siler semiglaucus (Simon)</td>
</tr>
<tr>
<td>8.</td>
<td>Hasarius sp. nr. adansoni (Audounin)</td>
</tr>
<tr>
<td>9.</td>
<td>Telamonia dimidiata (Simon)</td>
</tr>
<tr>
<td>10.</td>
<td>Telamonia festiva Thorell</td>
</tr>
<tr>
<td>11.</td>
<td>Evarcha flavocinta (C. L. Koch)</td>
</tr>
<tr>
<td>12.</td>
<td>Hyllus semicupreus (Simon)</td>
</tr>
<tr>
<td>13.</td>
<td>Plexippus paykullii (Audounin)</td>
</tr>
<tr>
<td>14.</td>
<td>Carrhotus viduus (C. L. Koch)Ψ</td>
</tr>
<tr>
<td>15.</td>
<td>Phintella vittata (C. L. Koch)</td>
</tr>
<tr>
<td>16.</td>
<td>Epocilla aurantiaca (Simon)Ψ</td>
</tr>
<tr>
<td>17.</td>
<td>Cheliceroidea brevipalpis sp. nov. *</td>
</tr>
<tr>
<td>18.</td>
<td>Brettus albolimbatus Simon</td>
</tr>
<tr>
<td>19.</td>
<td>Asemonia tenuipes (O. P.-Cambridge)</td>
</tr>
<tr>
<td>20.</td>
<td>Myrmarachne melanocephala MacLeay</td>
</tr>
<tr>
<td>22.</td>
<td>Cocalus murinus SimonΦ</td>
</tr>
<tr>
<td>23.</td>
<td>Phaeacius fimbriatus SimonΦ</td>
</tr>
</tbody>
</table>

**Acknowledgements**

We thank National Tea Research Foundation, C/o-Tea Board [17(177)/2008 dt.27.3.2008] and MOEF & CC, GOI (AICOPTAX) [22018/02/2010-CS (Tax) dt. 28.7.2014] for sponsoring the study and the officials of the concerned Tea Estate, Dept. of Forest, Govt. of West Bengal, The Head, Dept. of Zoology, University of Calcutta and The Hon’ble Vice-Chancellor, Ramakrishna Mission Vivekananda University, Narendrapur for necessary support.
References


(Received 03 June 2016; accepted 22 July 2016)
CAPTIONS OF TABLE AND FIGURES

Table 1. Summary

Fig. 1. Tea Ecosystem A. Nursery, B. Rehabilitation Crop, C. Saplings, D. Young Tea, E. Mature Tea, F. Plucking, G. winter, H. pruning

Fig. 2. Study Area.

Fig. 3. Rhene decorata Tikader, female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A= 0.5 mm, B – E = 0.25 mm.

Fig. 4. Rhene danieli Tikader, male. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Left male palp, prolateral view. E. Left male palp, ventral view. F. Left male palp, retrolateral view Scale bar: A – F = 0.5 mm.

Fig. 5. Marpissa decorata Tikader, female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A= 1 mm, B – C = 0.5 mm, D – E = 0.25 mm.

Fig. 6. Menemerus brevibulbis (Thorell), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A= 1 mm, B – C = 0.5 mm, D – E = 0.25 mm.

Fig. 7. Thiania bhamaensis Thorell, female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A= 0.5 mm, B – C = 0.25 mm, D – E = 0.5 mm.

Fig. 8. Siler semiglaucus (Simon), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A= 0.5 mm, B = 0.25 mm, C= 0.5 mm, D – E = 0.25 mm.

Fig. 9. Hasarius sp. nr. adansoni (Audouin, 1826), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A= 1 mm, B – C = 0.5 mm, D – E = 0.25 mm.

Fig. 10. Telamonia dimidiata (Simon), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A= 1 mm, B - E = 0.5 mm.

Fig. 11. Telamonia festiva Thorell, female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A – C = 0.5 mm, D - E = 0.25 mm.

Fig. 12. Hyllus semicupreus (Simon), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A= 1 mm, B - E = 0.5 mm.
Fig. 13. *Plexippus paykullii* (Audouin), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bar: A – E = 0.5 mm.

Fig. 14. *Carrhotus viduus* (C. L. Koch), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A – C = 0.5 mm, D – E = 0.25 mm.

Fig. 15. *Phintella vittata* (C. L. Koch), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A = 0.5 mm, B – E = 0.25 mm.

Fig. 16. *Epocilla aurantiaca* (Simon), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A = 0.5 mm, B = 0.25 mm, C = 0.5 mm, D – E = 0.25 mm.

Fig. 17. *Cheliceroides brevipalpis* sp. nov., male. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Left male palp, prolateral view. E. Left male palp, retrolateral view, F. Left male palp, retrolateral view. Scale bar: A – F = 0.5 mm.

Fig. 18. *Brettus albolimbatus* Simon, female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bar: A – E = 0.5 mm.

Fig. 19. *Asemonia tenuipes* (O. P.-Cambridge), female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A = 0.5 mm, B = 0.25 mm, C = 0.5 mm, D – E = 0.25 mm.

Fig. 20. *Myrmarachne melanocephala* MacLeay, female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Abdomen, lateral view. E. Epigynum, ventral view. F. Internal genitalia, dorsal view. Scale bars: A = 1 mm, B = 0.25 mm, C = 0.5 mm, D = 1 mm, E – F = 0.25 mm.

Fig. 21. *Myrmarachne plataleoides* (O. P.-Cambridge), male. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Abdomen, lateral view. E. Right male palp, prolateral view. F. Right male palp, ventral view. G. Right male palp, retrolateral view Scale bars: A = 1 mm, B – D = 0.5 mm, E – G = 0.25 mm.

Fig. 22. *Cocalus murinus* Simon, female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A = 1 mm, B – E = 0.5 mm.

Fig. 23. *Phaeacius fimbriatus* Simon, female. A. General habitus, dorsal view. B. Chelicera, ventral view. C. Maxillae, Labium and Sternum, ventral view. D. Epigynum, ventral view. E. Internal genitalia, dorsal view. Scale bars: A = 1 mm, B – E = 0.5 mm.

Fig. 24. A. *Rhene decorata* Tikader female, general habitus, dorsal view, scale bar: 0.5 mm. B. *Rhene danieli* Tikader, male, general habitus, dorsal view, scale bar: 0.5 mm. C. *Marpissa*
decorata Tikader, female, general habitus, dorsal view, scale bar: 1 mm. D. Menemerus brevibulbis (Thorell), female, general habitus, dorsal view, scale bar: 1 mm. E. Thiania bhamoensis Thorell, female, general habitus, dorsal view, scale bar: 0.5 mm. F. Siler semiglaucus (Simon), female, general habitus, dorsal view, scale bar: 0.5 mm. G. Hasarius sp. nr. adansoni (Audouin, 1826), female, general habitus, dorsal view, scale bar: 1 mm. H. Telamonia dimidiata (Simon), female, general habitus, dorsal view, scale bar: 1 mm. I. Telamonia festiva Thorell, female, general habitus, dorsal view, scale bar: 0.5 mm.

Fig. 25. A. Hyllus semicupreus (Simon), female, general habitus, dorsal view, scale bar: 1 mm. B. Plexippus paykullii (Audouin), female, general habitus, dorsal view, scale bar: 0.5 mm. C. Carrhotus viduus (C. L. Koch), female, general habitus, dorsal view, scale bar: 0.5 mm. D. Phintella vittata (C.L. Koch), female, general habitus, dorsal view, scale bar: 0.5 mm. E. Epocilla aurantiaca (Simon), female, general habitus, dorsal view, scale bar: 0.5 mm. F. Cheliceroide brevipalpis sp. nov., male, general habitus, dorsal view, scale bar: 0.5 mm. G. Brettus albomarginatus Simon, female, general habitus, dorsal view, scale bar: 0.5 mm. H. Asemonia tenuipes (O. P.-Cambridge), female, general habitus, dorsal view, scale bar: 0.5 mm. I. Myrmarachne melanopechala MacLeay, female, general habitus, dorsal view, scale bar: 1 mm.

Fig. 26. A. Myrmarachne plataleoides (O. P.-Cambridge), male, general habitus, dorsal view, scale bar: 1 mm. B. Cocalus murinus Simon, female, general habitus, dorsal view, scale bar: 1 mm. C. Phaeacius fimbriatus Simon, female, general habitus, dorsal view, scale bar: 1 mm. D. Rhene decorata Tikader female, internal genitalia, dorsal view. scale bars: 0.25 mm. E, F & G. Left male palp, prolateral view; Left male palp, ventral view & Left male palp, retrolateral view respectively of Rhene danieli Tikader, male, scale bar: 0.5 mm.

Fig. 27. A. Marpissa decorata Tikader, female, internal genitalia, dorsal view, scale bar: 0.25 mm. B. Menemerus brevibulbis (Thorell), female, internal genitalia, dorsal view, scale bar: 0.25 mm. C. Thiania bhamoensis Thorell, female, internal genitalia, dorsal view, scale bar: 0.5 mm. D. Siler semiglaucus (Simon), female, internal genitalia, dorsal view, scale bar: 0.25 mm. E. Hasarius sp. nr. adansoni (Audouin, 1826), female, internal genitalia, dorsal view, scale bar: 0.25 mm. F. Telamonia dimidiata (Simon), female., internal genitalia, dorsal view, scale bar: 0.5 mm. G. Telamonia festiva Thorell, female, internal genitalia, dorsal view, scale bar: 0.25 mm. H. Hyllus semicupreus (Simon), female, internal genitalia, dorsal view, scale bar: 0.5 mm. I. Plexippus paykullii (Audouin), female, internal genitalia, dorsal view, scale bar: 0.5 mm. J. Carrhotus viduus (C. L. Koch), female, internal genitalia, dorsal view, scale bar: 0.25 mm. K. Phintella vittata (C.L. Koch), female, internal genitalia, dorsal view, scale bar: 0.25 mm. L. Epocilla aurantiaca (Simon), female, internal genitalia, dorsal view, scale bar: 0.25 mm. M. N & O. Left male palp, prolateral view; Left male palp, retrolateral view; Left male palp, retrolateral view respectively of Cheliceroide brevipalpis sp. nov., male, scale bar: 0.5 mm. P. Brettus albomarginatus Simon, female, internal genitalia, dorsal view, scale bar: 0.5 mm. Q. Asemonia tenuipes (O. P.-Cambridge), female, internal genitalia, dorsal view, scale bar: 0.25 mm. R. Myrmarachne melanopechala MacLeay, female, internal genitalia, dorsal view, scale bar: 0.25 mm.

Fig. 28. A, B & C. Right male palp, prolateral view; Right male palp, ventral view and Right male palp, retrolateral view respectively of Myrmarachne plataleoides (O. P.-Cambridge), male, scale bar: 0.25 mm D. Cocalus murinus Simon, female, internal genitalia, dorsal view,
scale bar: 0.5 mm. *Phaeacius fimbriatus* Simon, female, internal genitalia, dorsal view, scale bar: 0.5 mm.
Fig. 2
Fig. 3
Fig. 7
Fig. 10
Fig. 11
Fig. 16
Fig. 18
Fig. 23