

RESULTS

4.1 GENERAL MORPHOLOGY (Fig. 1-4)

Head (Fig. 1a) variable in form, usually opisthognathous and more or less triangular, porrect anteriorly and slightly deflected with prominent laterally projected compound eyes and a pair of variable sized, round to oval-shaped ocelli, placed near to posterior-inner sides of the compound eyes, tylus generally longer than jugal lobes except *Eurygaster* spp. **Antennae** (Fig. 2a) placed at the proximal side of the mandibular plates slightly close to compound eyes within antenniferous tubercles. All species bear 5 segmented antennae; colour and length of the antennal segments vary from species to species, but in majority varies from brown to black and its II segment smallest. **Compound eyes** (Fig. 1a) size varies, in some small (*Eurygaster* spp.) while in others large, and protruded laterally (*Chrysocoris* spp.); colour generally red, brown or black. **Ocelli** (Fig. 1a) are sensory organs located behind the compound eyes on the dorsal surface of the head capsule. These are small, round or oval shaped and are placed more distant to each other than to eyes; colour varies from pale to orange or red. **Labium** (Fig. 2b) originates from the under side of the head at apex between the bucculae comprises of four segments of unequal length and generally reaching beyond the posterior coxae extended to different length on to the abdominal segments or in some cases only upto the posterior coxae. The length and proportion of the labial segments are diagnostic characters. The basal segment is enclosed within bucculae, generally I segment smallest, II longest, III and IV subequal but, it is not static, and varies from species to species. A constriction present near the proximal end of the II segment, III segment broadest and the apical one narrowed with fine bristles.

Thorax with **pronotum** (Fig. 1a-b) dorsally shield like, anterior margin generally sinuated, a pair of callosity prominent in some species at antero-lateral position, termed as callus, anterior pronotal angles obtuse (*e.g.*, *Chrysocoris* spp., *Scutellera* spp.) while in *Poecilocoris* spp., slightly spinose, posteriorly convexed, in some species *e.g.*, *Cantao ocellatus* and *Lamprocoris spiniger*; lateral angles produced either in spines or obtuse in majority of the species, and obtuse, lateral

margins normal or slightly sinuated while in some species it is raised *e.g.*, *Poecilocoris* spp., base convex or swollen and generally termed as disc.

Scutellum (Fig. 1a-b) is the largest part of the thorax and covers whole of the abdomen except some species (*e.g.*, *Eurygaster* spp.), decorated with spots of different colour and size. In some species (*e.g.*, *Chrysocoris* spp.) base slightly convexed, while in some (*e.g.*, *Poecilocoris* spp.) convexity at middle, posteriorly ends obtusely but in *Cantao* spp., apically truncate.

Forewings (Fig. 2d) semisclerotized, a transverse semi-circular furrow divides it into two parts, proximal one sclerotized called corium (Co) and the distal part membranous called membrane (Me). This sclerotized portion is further divided into two areas usually referred to as embolium (Emb) and clavus (Clv); embolium occupies the costal margin, and is somewhat elongated, band-like and separated from the rest of the sclerotized portion by means of R+M, corium the largest, median and triangular area, next to embolium, is bound anteriorly by a radiomedian vein (R+M) and posteriorly by a claval furrow (Clf). The semicircular furrow marks off its outer margin from the apical membrane. The clavus inwardly located to the claval furrow, somewhat narrow, elongated and triangular plate and similar to corium and embolium in texture. The distal portion of the membrane contains a variable number of veins, and varies from five to nine in species belonging to different genera.

Hindwings (Fig. 2e) entirely membranous, their apical margin much thicker than the posterior, this gives the shape and also provides protection to the hind wings; anterior margin formed by costo- subcostal vein, next to this is an indistinct radio-median vein (R+M) running in the longitudinal axis. There are two incomplete wing folds and the first runs parallel to the second. Leston (1962) and Hamilton (1971, 1972a, b and c) discussed the terminologies of the wing veins and venational trends and phylogeny.

Legs (Fig. 2c) belong to pro, meso and metathoracic segments in pairs and each leg is composed of coxa, trochanter, femur, tibia and tarsal segments. On the basis of location or position, legs are generally termed as; prothoracic or fore legs, mesothoracic or middle legs and metathoracic or hind legs; tarsi composed of three segments, covered with fine bristles or hairs, first longest and second shortest. The distal tarsal segment is joined with pre-tarsus (Snodgrass, 1935) or post-tarsus (Fox

and Fox, 1964) which is composed of two large hooks like claws and sac like pulvillus in between. The prothoracic femora are dilated medially and shorter than the middle and hind femora while latter are longest amongst all. Tibiae flattened dorsoventrally and more dilated distally.

Metathoracic scent glands (Fig. 3a) occupy a ventral position in the hind part of metathorax (Staddon, 1979); odoriferous structure seen on each side of the metasternum and to the posterior coxa, the gland itself does not usually extend over the edge of the metathorax. It is associated with a cuticle of complicated structure called evaporatorium, usually situated on metapleura but can completely cover ventral parts of thorax. Although some authors suggest that its main function is improving evaporation (Carayon, 1971), it seems that it primarily prevents the secretion from overflowing the rest of the body, especially to the tracheal openings (Remold, 1963). For better effect, evaporatorium is covered by mushroom-shaped sculptures, holding the fluid, these sculptures complicated in structure, often being taxon-specific (Carayon, 1971; Hepburn and Yonke, 1971); their secretion mostly defensive, with sophisticated mechanism of functioning.

Abdomen (Fig. 3b) completely fused with metathorax and cannot be distinguished separately, II tergite also modified and reduced; III tergite is comparatively broader than that of II and anteriorly united with, and posteriorly with the margin of IV segment. Ventrally it is convex, and in many species breadth at base more than length. The I and II sternum fused; each sternal sclerite on its lateral side bear two structures, the one single spiracle and just below it a paired structure called trichobothria.

Male genitalia (Fig. 4a-c) having IX segment modified into a quadrangular structure known as the pygophore (Fig. 4a) and within the pygophore the organs of copulation are located. The pygophore has two openings, the anterior proximal and the dorso-posterior, distal or terminal. The latter larger and external and during copulation the appendages of aedeagus inflated through this opening (Bonhag and Wick, 1953). The X segment in the form of quadrangular structure, termed proctiger while the XI segment located within the proctiger and forms the anal ring which extends during the process of excretion. Pygophore generally broader than long with its dorsomedian

surface medially concave and cup-like. These characters appear to be of taxonomic importance. Aedeagus (Fig. 4b) is the main copulatory organ and consists of a proximal basal plate and a distal phallosoma or theca. The latter encloses the endosoma (Pruthi, 1925) or conjunctiva (Leston, 1955) and bears dorsal membranous conjunctival lobes, ventrolateral lobes and the thecal appendages. On either side of the proximal portion of aedeagus within the pygophore a pair of pointed structures connected with the basal plate occur and these presently called paramere (Fig. 4c), which are well developed and variously termed as claspers, gonostylus or herpagones (Ahmad and Southwood, 1964), and these probably help in grasping and copulation.

Female genitalia (Fig. 4d-e) is from the VIII and IX abdominal segments, these genital plates collectively called as **ovipositor** (4d); VIII paratergites and I pair of gonocoxae are the components of VIII segment, the latter is the only remnant of the VIII venter; generally VIII paratergite paired, but in some it is fused, triangular and some bears a spiracle on the antero-lateral surface, while IX paratergites comparatively small, elongated or lobe like. Spermatheca (Fig. 4e) simple, apically with a bulb, a pump with distal and proximal flanges and distal spermathecal duct. This duct leads to the median dilation which leads through a sclerotized median rod-like and visible duct. The proximal spermathecal duct leads to the female gonopore. The length of distal and proximal spermathecal duct vary between species.

4.2 CHECK LIST OF SPECIES (INDIA AND ADJOINING ORIENTAL REGION)

The scutellerids of India and adjoining countries are presently represented by 62 species belonging to 18 genera viz., *Ahmadocoris*, *Alphocoris*, *Brachyaulax*, *Calliphara*, *Cantao*, *Chrysocoris*, *Eucorysses*, *Eurygaster*, *Hotea*, *Hyperonchus*, *Irochrotus*, *Lamprocoris*, *Melanodema*, *Phimodera*, *Poecilocoris*, *Scutellera*, *Solenosthedium* and *Tetrarthria*. These belong to 6 subfamilies viz., Elvisurinae, Eurygastrinae, Hoteinae, Odontoscelinae, Odontotarsinae and Scutellerinae. The subfamily wise list of species from India and the adjoining oriental region is presented below:

Subfamily: Elvisurinae

I. Genus *Solenosthedium* Spinola, 1837

Solenosthedium Spinola, 1837: 360; Vollenhoven 1863: 4; Kirkaldy, 1909: 311

Type species: by subsequent designation (Reuter, 1888: 414): *Cimex lynceus* Fabricius, 1794

Solenosthedium Amyot and Serville 1843: 26; Schouteden 1903: 8; 1904: 8

1. *Solenosthedium rubropunctatum* (Guerin)

Scutellera rubropunctata Guerin, 1838: 157

Solenosthedium rubropunctatum Vollenhoven, 1863: 4; Kirkaldy, 1909: 311

Solenosthedium rubropunctatum Distant, 1902: 40

Distribution: India, Myanmar

Subfamily: Eurygastrinae

II. Genus *Eurygaster* Laporte, 1832

Eurygaster Laporte, 1832: 67; Stal, 1873: 30; Jakovlev, 1885: 78; Schouteden, 1904: 71

Type species: *Cimex hottentotta* Fabricius, 1775: 699

Bellocoris Hahn, 1834: 42; Spinola, 1837: 365

2. *Eurygaster integriceps* Puton, 1881

Eurygaster integriceps Puton, 1881: 119

Distribution: Pakistan

3. *Eurygaster maura* (Linnaeus, 1758)

Cimex maurus Linnaeus, 1758: 441

Eurygaster maura Saunders, 1892: 16; Distant, 1902: 68

Cimex cinereus Goeze, 1778: 276; Kirkaldy, 1909: 274

Thyreocoris austriacus Schrank, 1801: 68; Distant, 1902: 68

Eurygaster maurus Fieber, 1861: 370; Douglas and Scott, 1865: 65; Jakovlev, 1884: 199; Kirkaldy, 1909: 274

Tetyra picta Fabricius, 1803: 136; Illiger in Rossi, 1807: 363

Distribution: India, Pakistan

Subfamily: Hoteinae

III. Genus *Hotea* Amyot and Serville, 1843

Amyot and Serville 1843, 41; Stal 1873, 24; Schouteden, 1903: 63, 64; Kirkaldy, 1909: 276

Type species: *Hotea gambiae* (Westwood, 1837: 11) by subsequent designation (Schouteden, 1903: 66)

4. *Hotea curculionoides* (Herrich-Schaeffer, 1836)

Pachycoris curculionoides Herrich-Schaeffer, 1836: 106; *Hotea curculionoides* Vollenhoven, 1863: 37; Distant, 1902: 65; Kirkaldy, 1909: 276

Pachycoris punctulatus Germar, 1839: 105; Dallas, 1851: 39; Kirkaldy, 1909: 276

Hotea nasuta Walker, 1867: 58; Kirkaldy, 1909: 276

Distribution: India, Myanmar, Sri Lanka

5. *Hotea nigrorufa* Walker, 1867

Hotea nigrorufa Walker, 1867: 57; Distant, 1902: 66

Distribution: India

Subfamily: Odontoscelinae

IV. Genus *Irochrotus* Amyot and Serville, 1843

Irochrotus Amyot and Serville, 1843: 39.

Type species: *Cimex lanatus* Pallas, 1773: 729.

Arctocoris Stal, 1873: 31; Jakovlev, 1884:162; Kirkaldy, 1909: 263

6. *Irochrotus incisus* (Stal, 1873)

Arctocoris incisus Stal, 1873: 31; Kirkaldy, 1909: 263

Irochrotus incisus Reuter, 1900: 209; Kirkaldy, 1909: 263

Distribution: India

7. *Irochrotus indicus* Schouteden, 1904

Irochrotus indicus Schouteden, 1904: 305

Distribution: India

Subfamily: Odontotarsinae

V. Genus *Ahmadocoris* Carapezza, 2009

Ahmadocoris Carapezza, 2009: 208

Type species: by original designation: *Hotea? diffusa* Walker, 1867

Deroplax Mayr, 1864: 905; Stal, 1873: 25; Schouteden, 1903: 68; 1904: 62, partim.

8. *Ahmadocoris delbergiai* (Ahmad, Moizuddin & Mushtaq, 1988)

Deroplax delbergiai Ahmad, Moizuddin & Mushtaq, 1988: 261; Carapezza, 2009: 208

Distribution: Pakistan

9. *Ahmadocoris diffusa* (Walker, 1867)

Hotea diffusa Walker, 1867: 67

Deroplax diffusa Distant, 1902: 66; Carapezza, 2009: 208

Distribution: India, Pakistan

10. *Ahmadocoris zahidae* (Ahmad, Moizuddin & Mushtaq, 1988)

Deroplax zahidae Ahmad, Moizuddin & Mushtaq, 1988, 261; Carapezza, 2009: 208

Distribution: Bangladesh, Pakistan

VI. Genus *Alphocoris* Germar, 1839

Alphocoris Germar, 1839: 58; Stal, 1873: 26; Schouteden 1903: 80

Type species: *Alphocoris lixoides* Germar 1839: 59

11. *Alphocoris lixoides* Germar, 1839

Alphocoris lixoides Germar, 1839: 59; Distant, 1902: 67; Schouteden, 1903: 81

Distribution: India, Pakistan

VII. Genus *Melanodema* Jakovlev, 1880

Melanodema Jakovlev, 1880: 205; Schouteden, 1904: 80

Type species: *Melanodema carbonarium* Jakovlev, 1880: 206 by monotypy.

12. *Melanodema apicifera* Distant, 1899

Melanodema apicifera Distant, 1899: 46

Distribution: India

VIII. Genus *Phimodera* Germar, 1839

Phimodera Germar, 1839: 60; Jakovlev, 1884: 175; Reuter, 1905: 1

Phymatodera Kolenati, 1846:7

Phymodera Spinola, 1850: 30

Type species by subsequent designation (Schouteden, 1904: 84): *Podops galgulinus* Herrich-Schaeffer, 1837: 29

13. *Phimodera rupshuensis* Hutchinson, 1934

Phimodera rupshuensis Hutchinson, 1934: 119

Distribution: Indian Tibet

Subfamily: Scutellerinae

IX. Genus *Brachyaulax* Stal, 1871

Brachyaulax Stal, 1871: 616; Schouteden, 1904: 23

Type species: *Brachyaulax rufomaculata* Stal, 1871: 616

14. *Brachyaulax cyaneovitta* (Walker, 1867)

Scutellera cyaneovitta Walker, 1867: 16

Tectocoris oblonga (non Westwood, 1837): Distant, 1899: 35, 50; 1902: 52

Distribution: India

X. Genus *Calliphara* Germar, 1839

Calliphara Germar, 1839: 122; Schouteden, 1904: 31

Philia Schiødte, 1843: 281; Kirkaldy, 1909: 295; Kirkaldy, 1909: 297

Lamprophora Stal, 1865: 34; Schouteden, 1904: 30; Kirkaldy, 1909: 297

Chrysophara Stal, 1873: 17

Type species: by subsequent designation (Distant, 1902: 53); *Calliphara nobilis* (non Linnaeus, 1763); Germar, 1839 (= *Tetyra excellens* Burmeister, 1834)

15. *Calliphara excellens* (Burmeister, 1834)

Tetyra excellens Burmeister, 1834: 287

Tectocoris obscura Westwood, 1837: 14; Kirkaldy, 1909: 298

Callidea nobilis Germar, 1839: 117; Kirkaldy, 1909: 298

Calliphara obscura Sharp, 1890: 412; Kirkaldy, 1909: 298

Calliphara excellens Distant, 1902: 53

Distribution: India, Nepal

16. *Calliphara nobilis* (Linnaeus, 1763)

Cimex nobilis Linnaeus, 1763: 400

Cimex pustulatus Panzer, 1798: 111; Kirkaldy, 1909: 298

Scutellera buquetii Guerin, 1838: 159; Kirkaldy, 1909: 298

Calliphara buquetii Stal, 1866: 153; Kirkaldy, 1909: 298

Calliphara nobilis Distant, 1902: 53; Schouteden, 1904: 33; Kirkaldy, 1909: 298

Distribution: India, Myanmar

XI. Genus *Cantao* Amyot and Serville, 1843

Cantao Amyot and Serville, 1843: 29; Dallas, 1851: 3, 17; Stal, 1865: 33; Mayr, 1866: 14; Stal, 1873: 10; Atkinson, 1887: 149; Lethierry and Severin, 1893: 18; Distant, 1902: 42; Schouteden, 1903: 27; 1904: 18 Kirkaldy, 1909: 307

Iostethus Stal, 1873: 10

Type species by subsequent designation (Kirkaldy, 1909: xxxv); *Caliidea parentum* White, 1839

17. *Cantao ocellatus* (Thunberg, 1784)

Cimex ocellatus Thunberg, 1784: 60

Cimex dispar Fabricius, 1794: 81; Dallas, 1851: 17; Kirkaldy, 1909: 308

Callidea dispar Herrich-Schaeffer, 1836: 99; 1836: 99; Westwood, 1837: 16; Kirkaldy, 1909: 308

Callidea ocellata Westwood, 1842: 47; Kirkaldy, 1909: 308

Cantao dispar Amyot and Serville, 1843: 29; Dallas, 1851: 17

Cantao rufipes Dallas, 1851: 17; Walker, 1867: 14; Kirkaldy, 1909: 308

Cantao inscitus Walker, 1868: 506; Lethierry and Severin, 1893: 18

Cantao conscitus Walker, 1868: 507; Lethierry and Severin, 1893: 18

Cantao ocellatus Dallas, 1851: 17; Kirkaldy, 1909: 308

Distribution: India, Bangladesh, Pakistan, Myanmar, Sri Lanka

XII. Genus *Chrysocoris* Hahn, 1834

Chrysocoris Hahn, 1834: 38; Stal, 1865: 34; Schouteden, 1904: 34

Type species: by monotypy *Chrysocoris stollii* (non Wolff, 1801): Hahn, 1834
(= *Scutellera abdominalis* Westwood, 1837)

Galostha Amyot and Serville, 1843: 33; Distant, 1902: 54; Kirkaldy, 1909: 292

18. *Chrysocoris andamanensis* Atkinson, 1887

Chrysocoris andamanensis Atkinson, 1887: 177; Distant, 1902: 60

Distribution: India, Myanmar

19. *Chrysocoris atriventris* Atkinson, 1887

Chrysocoris atriventris Atkinson, 1887: 11; Distant, 1902: 56

Distribution: India

20. *Chrysocoris dilaticollis* (Guerin, 1830)

Scutellera dilaticollis Guerin, 1830:164

Callidea dilaticollis Dallas, 1851:28

Chrysocoris stollii Hahn, 1834:39

Callidea abdominalis Westwood, 1837:15

Galostha stockerus Amyot and Serville, 1843:34

Distribution: India

21. *Chrysocoris eques* (Fabricius, 1794)

Cimex eques Fabricius, 1794: 79; Mayr, 1866: 24; Kirkaldy, 1909: 292

Tetyra eques Fabricius, 1803: 131; Mayr, 1866: 24

Callidea formosa Westwood, 1837: 15; Mayr, 1866: 24

Callidea dorsalis White, 1842: 80.

Galostha eques Amyot and Serville, 1843: 33; Kirkaldy, 1909: 292

Chrysocoris eques Distant, 1902: 61

Distribution: India, Myanmar

22. *Chrysocoris fascialis* White, 1842

Chrysocoris fascialis White, 1842: 86; Distant, 1902: 60

Distribution: India, Myanmar

23. *Chrysocoris marginellus* (Westwood, 1837)

Callidea marginella Westwood, 1837: 15

Callidea caelestis Stal, 1855: 181; Kirkaldy, 1909: 293

Chrysocoris nilgiriensis Atkinson, 1889: 343; Kirkaldy, 1909: 293

Chrysocoris marginellus Stal, 1873: 21; Distant, 1902: 59

Distribution: India

24. *Chrysocoris nicobarensis* Distant, 1892

Chrysocoris nicobarensis Distant, 1892: 96; and 1902: 56

Distribution: India

25. *Chrysocoris ornatus* (Dallas, 1851)

Callidea ornata Dallas, 1851: 27

Chrysocoris ornatus Stal, 1873: 21; Sharp, 1890: 412; Distant, 1902: 59; Kirkaldy, 1909: 293

Distribution: India

26. *Chrysocoris patricius* (Fabricius, 1798)

Cimex patricius Fabricius, 1798: 527

Callidea bengalensis Westwood, 1837: 15

Callidea basilica Germar, 1839: 117; Kirkaldy, 1909: 294

Chrysocoris patricius Stal, 1873: 20; Distant, 1902: 57

Distribution: India, Myanmar

27. *Chrysocoris pulchellus* (Dallas, 1851)

Callidea pulchella Dallas, 1851: 25

Callidea rama Kirby, 1891: 76; Kirkaldy, 1909: 294

Chrysocoris pulchellus Distant, 1902: 59

Distribution: India, Sri Lanka

28. *Chrysocoris purpureus* (Westwood, 1837)

Callidea purpurea Westwood, 1837: 15

Chrysocoris viridis Atkinson, 1887: 175; Kirkaldy, 1909: 294

Chrysocoris purpureus Stal, 1868: 10; Distant, 1902: 58

Distribution: India

29. *Chrysocoris simplex* Atkinson, 1889

Chrysocoris simplex Atkinson, 1889: 343; Distant, 1902: 58

Distribution: India

30. *Chrysocoris spilogaster* (Walker, 1867)

Callidea spilogaster Walker, 1867: 30

Chrysocoris spilogaster Distant, 1902: 56

Distribution: Sri Lanka

31. *Chrysocoris stockerus* (Linnaeus, 1758)

Cimex stockerus Linnaeus, 1758: 441; *Chrysocoris stockerus* Stal, 1873: 20; Distant, 1902: 57

Callidea taprobanensis Westwood, 1837: 15; Kirkaldy, 1909: 294

Callidea erichsoni Germar, 1839: 113

Callidea pupureus Stal, 1868: 10; and 1873: 21; Distant, 1902: 57

Distribution: India, Pakistan

32. *Chrysocoris stollii* (Wolff, 1801)

Cimex stollii Wolff, 1801: 48; *Chrysocoris stollii* Stal, 1873: 21; Distant, 1902: 58

Scutellera stockerus Guerin, 1838: 159, 161; Kirkaldy, 1909: 294

Callidea stockerus Westwood, 1842: 48; Kirkaldy, 1909: 294

Callidea porphyricola Walker, 1867: 29; Kirkaldy, 1909: 294

Distribution: India, Myanmar, Sri Lanka

XIII. Genus *Eucorysses* Amyot & Serville, 1843

Eucorysses Amyot & Serville, 1843: 31. Type species by monotypy: *Eucorysses pallens* Amyot & Serville, 1843 (= *Cimex grandis* Thunberg, 1783: 46)

33. *Eucorysses grandis* (Thunberg, 1758)

Cimex grandis Thunberg, 1783: 31

Cimex baro Fabricius, 1798: 528

Calliphara iris Germar, 1839: 128

Eucorysses superbus Uhler, 1860: 221; Kirkaldy, 1909: 295

Callidea distinguenda Uhler, 1861: 286; Kirkaldy, 1909: 295

Chrysocoris grandis Stal, 1873: 21; Distant, 1902: 54

Distribution: India, Myanmar

34. *Eucorysses superbus* (Dallas, 1851)

Callidea superba Dallas, 1851: 23

Chrysocoris superbus Stal, 1873: 18; Distant, 1902: 55

Distribution: India, Sri Lanka

XIV. Genus *Lamprocoris* Stal, 1865

Lamprocoris Stal, 1865: 34; Schouteden, 1904: 27

Type species by subsequent monotypy (Stal, 1866): *Lamprocoris lateralis* (Guerin-Meneville, 1838: 159)

35. *Lamprocoris lateralis* (Guerin-Meneville, 1838)

Scutellera lateralis Guerin-Meneville, 1838: 159; Kirkaldy, 1909: 301

Callidea lateralis Vollenhoven, 1863: 32; Kirkaldy, 1909: 301

Callidea contraria Walker, 1867: 30; Distant, 1902: 63; Kirkaldy, 1909: 301

Lamprocoris lateralis Distant, 1902: 63

Distribution: India, Myanmar

36. *Lamprocoris roylii* (Westwood, 1837)

Callidea roylii Westwood, 1837: 16; *Lamprocoris roylii* Distant, 1902: 63

Callidea histeroides Walker, 1867: 28

Callidea scripta Walker, 1867: 28

Callidea gibbula Walker, 1867: 28

Distribution: India

37. *Lamprocoris spiniger* (Dallas, 1849)

Callidea spiniger Dallas, 1849: 186; *Lamprocoris spiniger* Distant, 1902: 64

Distribution: India, Myanmar

XV. Genus *Poecilocoris* Dallas

Poecilocoris Dallas, 1848: 100; Stal, 1864: 33; Mayr, 1866: 17; Schouteden, 1904: 20

Poecilochroma White, 1842: 84

Ioglena Stal, 1873: 12; Kirkaldy, 1909: 305

Type species: by monotypy *Cimex drurarei* Linnaeus, 1771: 534

38. *Poecilocoris anisopilus* Walker, 1867

Poecilocoris anisopilus Walker, 1867: 9

Distribution: India

39. *Poecilocoris balteatus* (Distant, 1892)

Poecilochroma balteata Distant, 1892: 96

Distribution: India

40. *Poecilocoris childreni* (White, 1839)

Tectocoris childreni White, 1839: 542; 1842: 84

Poecilocoris childreni Distant, 1902: 46

Distribution: India, Bhutan

41. *Poecilocoris crowleyi* Distant, 1901

Poecilocoris crowleyi Distant, 1901: 61; 1902: 46

Distribution: India

42. *Poecilocoris druræi* (Linnaeus, 1771)

Cimex druræi Linnaeus, 1771: 534; *Poecilocoris druræi* Dallas, 1848: 103; Distant, 1902: 45

Poecilocoris obsoletus Dallas, 1848: 104

Poecilocoris drurayi Lethierry & Severin, 1893: 20

Poecilochroma drurayi Stal, 1873: 12

Poecilocoris heissi Ahmad and Kamaluddin, 1982: 271

Distribution: India, Myanmar

43. *Poecilocoris hardwickii* (Westwood, 1837)

Tectocoris hardwickii Westwood, 1837: 13; Dallas, 1851: 13; Distant, 1902: 45

Pachycoris nepalensis Herrich-Schaeffer, 1839: 339; Dallas, 1851: 13

Scutellera hardwickii Germar, 1839: 135; Dallas, 1851: 13; Distant, 1902: 45

Poecilocoris hardwickii Dallas, 1848: 107; Dallas, 1851: 13

Poecilocoris anisopilus walker, 1867: 9; Distant, 1902: 45

Distribution: India

44. *Poecilocoris interruptus* (Westwood, 1837)

Tectocoris interrupta Westwood, 1837: 14; Dallas, 1851: 12

Scutellera interrupta Herrich-Schaeffer, 1839: 73; Dallas, 1851: 12; Kirkaldy, 1909: 306

Poecilochroma interrupta Stal, 1873: 13; Kirkaldy, 1909: 306

Poecilocoris interruptus Dallas, 1848: 102; Distant, 1902: 48; Kirkaldy, 1909: 306

Distribution: India, Myanmar

45. *Poecilocoris latus* Dallas, 1848

Poecilocoris latus Dallas, 1848: 101

Poecilochroma lata Sharp, 1890: 412; Kirkaldy, 1909: 305

Poecilocoris latus Distant, 1902: 44

Distribution: India, Myanmar

46. *Poecilocoris lewisi* (Distant, 1883)

Poecilochroma lewisi Distant, 1883: 419

Poecilocoris lewisi Yang, 1934: 266

Poecilocoris separabilis Yang 1934: 260

Distribution: India, Pakistan

47. *Poecilocoris nepalensis* Herrich-Schaeffer, 1837

Pachycoris nepalensis Herrich-Schaeffer, 1837: 339

Tectocoris hardwickii Westwood, 1837: 13; Kirkaldy, 1909: 305

Tectocoris affinis Westwood, 1837: 13; Kirkaldy, 1909: 306

Poecilocoris hardwickii Dallas, 1848: 107; Sharp, 1890: 413; Distant, 1902: 45; Kirkaldy, 1909: 305

Poecilochroma hardwicki Stal, 1873: 12; Kirkaldy, 1909: 305

Poecilocoris hardwicki Schouteden, 1904: 21; Kirkaldy, 1909: 305

Distant, 1902: 45

Distribution: India, Myanmar

48. *Poecilocoris obesus* Dallas, 1851

Poecilocoris obesus Dallas, 1851: 13; Distant, 1902: 47

Distribution: India

49. *Poecilocoris ornatus* Dallas, 1851

Poecilocoris ornatus Dallas, 1851: 15; Distant, 1902: 48

Distribution: India

50. *Poecilocoris pulcher* Dallas, 1848

Poecilocoris pulcher Dallas, 1848: 105; Vollenhoven, 1863: 5

Distribution: India

51. *Poecilocoris purpurascens* (Westwood, 1837)

Tectocoris purpurascens Westwood, 1837: 14

Poecilocoris purpurascens Dallas, 1848: 103; Distant, 1902: 47

Distribution: India

52. *Poecilocoris orientalis* Ahmad and Kamaluddin, 1982

Poecilocoris orientalis Ahmad and Kamaluddin, 1982: 278

Distribution: Nepal

53. *Poecilocoris rufigenis* Dallas, 1851

Poecilocoris rufigenis Dallas, 1851: 14; Distant, 1902: 49

Distribution: India, Myanmar

54. *Poecilocoris pseudolatus* Ahmad and Kamaluddin, 1982

Poecilocoris pseudolatus Ahmad and Kamaluddin, 1982: 281

Distribution: India, Bangladesh

XVI. Genus *Scutellera* Lamarck, 1801

Scutellera Lamarck, 1801: 293; Dallas, 1851: 4; Stal, 1864: 33; Schouteden, 1904: 22

Type species: *Cimex nobilis* (non Linnaeus, 1763): Fabricius, 1775 (= *Tectocoris perplexa* Westwood, 1837: 4

55. *Scutellera amethystina* Germar, 1839

Scutellera amethystina Germar, 1839: 124

Cimex fasciatus Panzer, 1797: 108

Calliphara amethystina Germar, 1839: 124

Tectocoris nepalensis Germar, 1839: 125

Scutellera fasciata Distant, 1902: 50

Distribution: India, Myanmar, Pakistan

56. *Scutellera fasciata* (Panzer, 1797)

Cimex fasciata Panzer, 1797: 108; Dallas, 1851: 19

Tectocoris nepalensis Westwood, 1837: 19

Callidea lanius Stal, 1854: 231

Scutellera amethystina Vollenhoven, 1863: 12

Distribution: India, Pakistan

57. *Scutellera perplexa* (Westwood, 1837)

Cimex nobilis Fabricius, 1775: 697

Tectocoris perplexa Westwood, 1837: 4

Scutellera nobilis Distant, 1902: 51

Scutellera brevisrostris Breddin, 1909: 258 synonymized by Distant, 1918:116

Distribution: India, Myanmar, Sri Lanka

XVII. Genus *Tetrarthria* Dallas, 1851

Tetrarthria Dallas, 1851: 20; Vollenhoven, 1863: 13; Schouteden, 1904: 22

Type species: *Tetrarthria variegata* Dallas, 1851: 20

58. *Tetrarthria variegata* Dallas, 1851

Tetrarthria variegata Dallas, 1851: 20; Stal, 1870: 616; Breddin, 1900: 278; Distant 1902: 49

Distribution: India, Myanmar

XVIII. Genus *Hyperoncus* Stal, 1870

Hyperoncus Stal, 1870: 615; Schouteden, 1904: 11 (type *punctellus*)

Type species: *Hyperoncus punctellus* Stal, 1870: 615

59. *Hyperoncus lateritius* (Westwood, 1837)

Sphaerocoris lateritia Westwood, 1837: 13

Hyperoncus lateritius Distant, 1902: 41

Distribution: India

60. *Hyperoncus lineaticornis* Stal, 1873

Hyperoncus lineaticornis Stal, 1873: 7

Distribution: India

61. *Hyperoncus uniformis* Distant, 1901

Hyperoncus uniformis Distant, 1901: 60

Hyperoncus uniformis Distant, 1901: 60

Distribution: Sri Lanka

4.3 TAXONOMIC STUDIES

The species of Scutelleridae range in length from 5-25 mm and often known as shield bugs due to their greatly enlarged convex scutellum that usually entirely covers the abdomen; antennae 3-5 and labium 4 segmented; frena obsolete or lacking; membrane with many veins; tarsi 3 segmented; trichobothria paired and located posterior to spiracle. The present study on the Scutelleridae included 6 subfamilies viz., Elvisurinae, Eurygastrinae, Hoteinae, Odontoascelinae, Odontotarsinae and Scutellerinae. Under these six subfamilies 11 genera have been selected which are mainly reported from India and adjoining countries. A key to the subfamilies, key to the genera and their species studied are provided herein.

Key to the subfamilies (modified after Distant, 1902)

1. Body not remarkably convexed dorsally; second antennal segment curved; scutellum not covering whole of the abdomen, connexivum exposed.....**Eurygastrinae**
- 1'. Body remarkably convexed dorsally; second antennal segment not curved; scutellum covers almost whole of the abdomen, connexivum generally not exposed.....2
2. Body setose or pilose; pronotum anteriorly distinctly broader than head, lateral margins round, metathoracic scent gland with indistinct peritreme; first pair of conjunctival appendages apically membranous and thickly folded; spermatheca with bulb very small and dilation very big, flanges indistinct.....**Odontoscelinae**
- 2'. Body not pilose; pronotum anteriorly almost equal to breadth of head; lateral margins not round; metathoracic scent gland with distinct peritreme; spermatheca with moderate sized bulb, dilation of variable shape and size, flanges distinct.....3
3. Head with tylus remarkably extended beyond jugal lobes; first antennal segment curved; first pair of conjunctival lobe serrate; distal spermathecal flange indistinct**Odontotarsinae**
- 3'. Head with tylus not remarkably extended beyond jugal lobes; first antennal segment not curved; first pair of conjunctival appendages not serrate; distal spermathecal flange distinct.....4
4. Head elongated; preocular distance more than 4x to postocular distance; anterior margin of prosternum covering the base of antenna; ventral abdominal segment with stridulatory patch/ vittae; spermathecal duct very long and tortuous and without any dilation; vesica very long and coiled.....**Hoteinae**
- 4'. Head not elongated; preocular distance less than 2x to postocular distance; anterior margin of prosternum not covering the base of antenna; ventral abdominal segment without stridulatory patch/ vittae; spermathecal duct comparatively very small without any twist; spermathecal dilation present; vesica neither long nor coil.....5
5. Metathoracic scent gland with reduced peritreme; meso and metasterna with a deep medial groove with prominent raised margins; first pair of gonocoxae narrow**Elvisurinae**
- 5'. Metathoracic scent gland with well developed peritreme; meso and metasterna without any medial groove; first pair of gonocoxae large with variable shape.....**Scutellerinae**

Elvisurinae

Diagnosis: Tylus slightly extended beyond jugal lobes; II antennal segment straight and shorter than I; labium with the II segment much shorter than the two apical segments together and a little longer than the apical segments; pronotum and scutellum moderately convexed at base, meso and metasterna with a central broad longitudinal groove, margins prominently raised, metathoracic scent gland with reduced peritreme; abdomen medially grooved on ventral surface; first pair of gonocoxae narrow; spermatheca with elongated bulb; paramere with apex narrow and subtruncate.

Genus *Solenosthedium* Spinola, 1837

Solenosthedium Spinola, 1837: 360; Vollenhoven 1863: 4; Kirkaldy, 1909: 311

Type species by subsequent designation (Reuter, 1888: 414): *Cimex lynceus* Fabricius, 1794

Solenostethium Amyot and Serville 1843: 26; Schouteden 1903: 8; 1904: 8

Diagnosis: Body obovate, antennae five segmented with III segment double or more than 2x of II segment; preocular distance more than twice of its postocular distance, meso and metasterna with a central broad longitudinal groove with margins prominently raised; sternum and abdomen sulcated, abdomen ventrally flat; I and II conjunctival appendages fused basally, distally divided into two branches; spermatheca with well developed distal and proximal pump flanges.

***Solenosthedium rubropunctatum* (Guerin, 1838)**

(Fig. 5; Plate. I, VIII & X)

Scutellera rubropunctata Guerin, 1838: 157

Solenostedium rubropunctatum Vollenhoven, 1863: 4; Kirkaldy, 1909: 311

Solenostethium rubropunctatum Distant, 1902: 40

Body colouration dorsally purplish brown or dark castaneous; I antennal and labial segment, head beneath, sternum, coxae, femora and abdomen ochraceous brown, rest of the antennal and labial segments, tibiae and tarsomeres black, generally with green tinge, dense and fine green punctures on dorsal body surface.

Head (Fig. 5a) triangular, with jugal lobes longer than tylus, lateral margins slightly sinuated; breadth (4.14 ± 0.15) 1.2x to length (3.58 ± 0.13), preocular distance (1.9 ± 0.12) 2.5x as postocular (0.76 ± 0.05), eyes placed near to eyes as compared to each other, interocular distance (2.5 ± 0.2) 1.7x to interocellar (1.5 ± 0.14). **Antennae** five segmented, attached near to eyes on ventral side; I antennal segment 0.82 ± 0.07 long; II smallest (0.62 ± 0.06) and 0.75x to I; III (1.44 ± 0.11) 2.4x to II; IV (1.72 ± 0.13) and V subequal (1.74 ± 0.09) but, generally later one slightly longer, and so it is the longest amongst all and almost 3x as II segment, total length 6.36 ± 0.44 . **Labium** four segmented; I labial segment smallest; II longest and 2.34x as I; III slightly bigger than IV and 2.2x to I; total labial length 9.28 ± 0.74 and extended upto V or VI abdominal segment.

Pronotum (Fig. 5b) slightly convexed; anterior margin sinuate, with angles acute and anteriorly produced, lateral margins straight, distance between lateral angles (10.68 ± 0.63) and almost 2.56x as anterior angles (4.26 ± 0.2), medial length 4.86 ± 0.13 and 0.45x to lateral breadth, lateral angles obtuse, seven round, orange to brown spots on the surface, one near each anterior angle and two on each lateral side more towards margins and one at middle, posterior margin straight.

Scutellum (Fig. 5c-d) slightly convexed, length (10.68 ± 0.35) and breadth (9.86 ± 0.5) subequal, anterior margin straight with lateral angles produced anteriorly, apical end round, they show sexual dimorphism only in case of scutellum, in females (Fig. 5c) number of spots only 8 while in males 10 (Fig. 5d); 6 near basal margin and rest, at middle.

Legs with hind femora longest and 1.26x to fore and 1.1x to middle femora, in case of tibia the hind tibia is longest which is 1.17x to middle and 1.27x to fore tibia.

Exterior of metathoracic scent gland (Fig. 5e) with ostiole broad in triangular or disc shaped; peritreme very short and in flap like structure, restricted to the ostiolar region; evaporatorial surface highly wrinkled and extends upto the half region of mesothorax.

Sternum deeply furrowed, from anterior to posterior and it is strongly keeled, labium rests in furrow at resting phase.

Abdomen (Fig. 5f) with breadth (9.44 ± 0.46) 1.23x to the length (8.02 ± 0.4), sulcated medially upto the VI venter, spiracles located on III to VII segment and also on VIII paratergite, a pair of trichobothria located posterior to spiracles on each lateral side except at VIII paratergite, abdomen possessed a band of thick and small hairs on sub-lateral side.

Male genitalia (Fig. 5g-j) having **pygophore** (5g-h) with ventral surface densely pubescent distally and margin more or less broadly truncated, dorsal border sclerotized and laterally darkened with a small subterminal sclerotized tooth-like projections (Fig. 5g), beyond which it is densely pilose. **Aedeagus** (Fig. 5i) with phallosome short, with a constriction about a third from base. First and second conjunctival appendages fused basally for about two third their length, common base stout, sclerotized, first appendage distally divided into two branches, dorsal branch long with sclerotized, sharp apex, ventral branch short, third conjunctival appendages heavily sclerotized, pointed and recurved into a small hook. Vesica fairly long, apical portion leading to gonopore, laterally flattened and basally bears a circular ejaculatory reservoir. **Paramere** (Fig. 5j) with a basal stem and apical hook, stem swollen towards apex, hook considerably flattened, apex narrowed and subtruncate.

Female genitalia (Fig. 5k-l) having **ovipositor** (Fig. 5k) with VIII paratergite bigger than IX, a spiracle present, near to lateral margin and near to anterior angle, IX leaf shaped, anterior margin swollen, first pair of gonocoxae narrow, small hairs present on the ovipositor. **Spermatheca** (Fig. 5l) with bulb elongated and medially depressed slightly, distal and proximal flanges separate and disc shaped, distal duct constricted at middle and only 0.2x to proximal, dilation spherical and translucent through which sclerotized rod can be seen, proximal duct long and membranous.

Body size: Female 19.75 and male 18.9 ± 0.55 long.

Material examined (NPC): 1♀ and 4♂♂, INDIA: ASSAM, Goalpara, 1♀, 1♂, v.1906, collector and host unknown; SIKKIM, 2500 ft, 1♂, 9.iv.1957, coll. Baldev P.S, orange; UTTARAKHAND: Dehradun, 1♂, 8.iii.1918, coll. F.Z., host unknown; TAMIL NADU: Kalakad, 1♂, coll. Dr. Sahayaraj, host unknown.

Eurygastrinae

Diagnosis: Tylus and jugal almost of the same length, remarkably broad head, II antennal segment somewhat curved and longer than I segment, pronotum and scutellum remarkably not convexed; meso and metasterna without any median groove; metathoracic ostiole distinct and peritreme with anterior and posterior margins crenulate; abdomen without any groove on ventral surface; first pair of gonocoxae large and subquadrate; spermatheca with bulb rounded; parameres T-shaped, vesica simple, membranous, without and supporting appendages; females with spermatheca having elongated sclerotized dilation.

Genus *Eurygaster* Laporte, 1832

Eurygaster Laporte, 1832: 67; Stal, 1873: 30; Jakovlev, 1885: 78; Schouteden, 1904: 71

Type species: *Cimex hottentotta* Fabricius, 1775: 699 by subsequent designation (Anonymous, 1838: 295).

Bellocoris Hahn, 1834: 42; Spinola, 1837: 365

Diagnosis: Body oval or ovate, broad, colouration varies from yellow- brown to dark brown, red or black with dark markings on the lighter shades. Head flat, jugal lobes equal or slightly extends to tylus, II antennal segments somewhat curved; scutellum U-shaped and much narrower than abdomen so that connexivum exposed, tibiae sulcated above; males always with T-shaped paramere and spermatheca of females with elongated and sclerotized dilation.

***Eurygaster maura* (Linnaeus, 1758)**

(Fig. 6; Plate. I, VIII & X)

Cimex maurus Linnaeus, 1758: 441

Eurygaster maura Saunders, 1892: 16; Distant, 1902: 68

Cimex cinereus Goeze, 1778: 276; Kirkaldy, 1909: 274

Thyreocoris austriacus Schrank, 1801: 68; Distant, 1902: 68

Eurygaster maurus Fieber, 1861: 370; Douglas and Scott, 1865: 65; Jakovlev, 1884: 199; Kirkaldy, 1909: 274

Tetyra picta Fabricius, 1803: 136 synonymized by Illiger, 1807: 363

Body colouration variegated, colour from fulvous brown without markings to luteous with stripes and shades of brown, suffused with dark or purple brown and

thickly and darkly punctuate; antennae yellowish-red, IV antennal segment piceous towards the apex, V segment piceous or black, both these segments covered with very short hairs, labium yellow to brown excepts IV segment black luteous, smooth, slightly shining.

Head (Fig. 6a) apex broad, with breadth (3.3 ± 0.17) 1.4x to length (2.28 ± 0.08), tylus and jugal lobes subequal, tylus not elevated, lateral margins slightly sinuated near to eyes, preocular distance (1.22 ± 0.12) 2.55x to postocular (0.75 ± 0.09), interocular distance (2.5 ± 0.11) 1.9x to interocellar, ocellus placed a little to eyes, eyes small and projected laterally; head thickly and densely punctured above and beneath. **Antenna** (Fig. 6b) with five segments, inserted near the eyes, I stout and cylindrical and 0.75 ± 0.09 long; II curved medially and 1.12x to I; III smallest (0.56 ± 0.08) and only 0.67x to II; IV 1.3x to III; V longest (1.2 ± 0.05) and 1.6x to IV and tapered distally; total antennal length 4.1 ± 0.42 . **Labium** four segmented; I 0.94 ± 0.1 long; II longest (1.95 ± 0.13) and 2x to I; distal end dilated; III smallest (0.65 ± 0.07) or subequal to IV and 0.33x to II; total labial length 4.3 ± 0.4 , extended upto posterior coxae.

Pronotum (Fig. 6c) anteriorly narrow, with anterior margin concave, anterior pronotal angles acute, lateral margins nearly obliquely straight or rounded, delicately reflexed; distance between lateral angles (7.35 ± 0.3) 2.1x to the distance between anterior angles (3.5 ± 0.11), medial length (3.33 ± 0.14) subequal to later one, lateral angles round, posterior margin straight, densely punctured.

Scutellum (Fig. 6d) convex, with the base more raised, U-shaped, length (7.3 ± 0.23) 1.35x to breadth (5.4 ± 0.37) and as long as the abdomen, but not so wide as abdomen, leaving a broad portion of the hemielytra and abdomen uncovered (Fig. 6e); lateral margins almost straight, apex broadly rounded.

Prosternum grooved medially and edges raised while meso and metasterna flattened and forming a medially longitudinal groove in which labium lodged at rest.

Exterior of metathoracic scent gland (Fig. 6f) with ostiole elongated and transverse crenulated and extended $\frac{3}{4}$ length of evaporatorium, peritreme transverse with distally terminate in round shape, anterior and posterior margins crenulated, medially grooved to hold the secretion of glands, evaporatorium brown and extended upto mesothoracic region, surface wrinkled.

Legs (Fig. 6g) short and strong; femora flattened; tibiae angulated, the margins raised and set with very short spines or teeth (more prominent in fore tibiae). Hind femur (3.14 ± 0.1) slightly longer than tibia (3.03 ± 0.07), middle and hind femora (2.7 ± 0.12) 1.2x to its corresponding tibiae (2.3 ± 0.13), while fore femur (2.34 ± 0.07) slightly longer than tibia (2.2 ± 0.09).

Abdomen (Fig. 6h) ovate, rather convex beneath ; breadth (6.8 ± 0.2) almost equal to length (6.1 ± 0.23); the segments narrow towards centre than at the sides, their posterior margins concave, connexivum horizontal, much rounded and widened posteriorly, and not covered by the hemielytra or scutellum, last segment of female abdomen trapezoid. Spiracles present ventrally on the segment III to VII and also on VIII paratergite and a pair of trichobothria below each spiracle except VIII paratergites.

Male genitalia (Fig. 6i-l) with **pygophore** (Fig. 6i-j) having breadth and length subequal or breadth slightly more than length; ventro-posterior pygophoral margin sinuated and an oval disc present near ventro lateral pygophoral margin with sparsely arranged thick punctuations; postero- lateral angles obtuse (Fig. 6j). **Aedeagus** (Fig. 6k) with phallosome laterally notched near the middle, bearing a phallosomal process, first pair of conjunctival appendages flattened basally, tapering apically, second pair strongly sclerotized and pointed, vesica apically broad, dentate, bearing two small sclerotized vesical process, basally narrow **Paramere** (Fig. 6l) T-shaped with stem broad near junction to blade, base of blade protruded obtusely towards inner side, apically blade flat, and laterally obtusely produced, inner surface curved slightly and 8-9 setae at base of blade.

Female genitalia (Fig. 6m-n) having **ovipositor** (Fig. 6m) with VIII paratergite triangular, meet in middle, each with a present, IX paratergite lobe shaped, comparatively small; first pair of gonocoxae subquadrate, lateral margins round, posterior margin straight. **Spermatheca** (Fig. 6n) simple with bulb almost spherical, pump region absent, spermathecal dilation very small and spherical; proximal spermathecal duct much longer than distal spermathecal duct.

Body size: Female and male 13.13 ± 0.42 and 12.72 ± 0.3 long, respectively.

Material examined (NPC): 22♀♀ and 8♂♂, INDIA: JAMMU & KASHMIR: Kulu (Bargaon), 1♀, 2.vi.1939, coll. Sardar Singh, wheat; Punj: Kulu, 3♀♀, 12.vi.1939, U. Bahadur, wheat; HIMACHAL PRADESH: Bilaspur, 9♀♀, 7♂♂, 3.ii.1966, coll. A. Pawar, wheat. PAKISTAN: BALUCHISTAN: Karradah farm, 1♀, 23.v.1920, coll. Y.R. Rao, wheat; Zhob valley, 2♀♀, 17.vi.1940, coll. and host unknown; 4♀♀, v.1941, coll. Fort Sendamen, wheat; Kohlu, 2♀♀, 1♂, 3-8.v.1943, coll. C. K. Samuel, wheat.

Hoteinae

Diagnosis: Tylus extended beyond jugal lobes; light to dark brown and blackish colouration, base of abdomen concealed by anterior margin of prosternum; meso and metasterna without any median groove; abdomen in both sexes provided with stridulatory vittae on abdominal sterna V-VI (Fig. 7f); metathoracic scent gland with well developed ostiole and peritreme; first pair of gonocoxae large and generally triangular; spermatheca with bulb round in shape, spermathecal pump flanges variable, spermathecal duct elongated and thin, generally tortuous and in convoluted form, without dilation; paramere widening apically in an almost triangular crown, texture of preapical region of crown scaled; vesica prolonged as penisfilum and coiled several times.

Genus *Hotea* Amyot and Serville, 1843

Amyot and Serville 1843, 41; Stal 1873, 24; Schouteden, 1903: 63, 64; Kirkaldy, 1909: 276

Type species: *Hotea gambiae* (Westwood, 1837: 11) by subsequent designation (Schouteden, 1903: 66)

Diagnosis: Body convex dorsally as well as ventrally; head with tylus remarkably longer than jugal lobes, lateral pronotal angles produced laterally, prosternum rounded anteriorly and covered the base of each antenna; metathoracic scent gland ostiole very narrow, shaped like an elongate chink placed at base of evaporative area; vesica extremely long, slender and flexible, more than 10x longer than the phallosome, in rest it is kept coiled like a woolball; parameres widen apically in an almost triangular crown. Female with spermatheca has a very long spermathecal duct,

like a tortuous tubule with many convolutions, but without spermathecal dilation, and a simple terminal globular bulb.

Key to species

1. Body ochraceous; apex of tylus subquadrate; lateral margins of head and pronotum not remarkably ochraceous but toothed/serrate; pump with distinct proximal and distal flanges, apical end of spermathecal bulb globular, distal and proximal flanges of spermathecal pump distinct.....*curculionoides*
- 1'. Body castaneous, apex of tylus tapered; lateral margins of head and pronotum remarkably ochraceous and smooth; apical end of spermathecal bulb pear shaped, proximal flange of spermathecal pump indistinct.....*nigrorufa*

Hotea curculionoides (Herrich-Schaeffer, 1836)

(Fig. 7; Plate. I, VIII & X)

Pachycoris curculionoides Herrich-Schaeffer, 1836: 106

Hotea curculionoides Vollenhoven, 1863: 37; Distant, 1902: 65; Kirkaldy, 1909: 276

Pachycoris punctulatus Germar, 1839: 105; Dallas, 1851: 39; Kirkaldy, 1909: 276

Hotea nasuta Walker, 1867: 58; Kirkaldy, 1909: 276

Body colouration ochraceous, light to dark brown, coarsely and thickly punctuate, head and lateral pronotal angles beneath piceous, head beneath, lateral side of jugal lobes and apical part of tylus black, antennae ochraceous, fourth segment (except apices) and the whole of the apical segments piceous.

Head (Fig. 7a) with (2.8 ± 0.2) slightly longer than breadth (2.6 ± 0.1) , lateral margins crenulate, tylus distinctly longer than jugal lobes, apically round, preocular distance (2.01 ± 0.2) 4.9x to postocular (0.41 ± 0.14) , interocular (1.87 ± 0.06) 1.4x to interocellar (1.37 ± 0.6) , eyes small enclosed within anterior pronotal angles at rest. **Antennae** five segmented; base of antennae concealed by anterior edges of prosternum, I segment cylindrical and 0.7 ± 0.04 long; II (0.55 ± 0.04) 0.8x to I; III smallest (0.4 ± 0.05) and 0.7x to II; IV (0.8 ± 0.04) 2x to III; V longest among all and 1.4x to IV; total antennal length 3.6 ± 0.2 . **Labium** (Fig. 7b) with four segmented; I, 0.78 ± 0.04 long; II longest (1.7 ± 0.11) and 2.1x to I, distally broaden, III broadest and shortest amongst all, 0.4x to II; IV (0.9 ± 0.08) 1.4x to III; total labial length 4.04 ± 0.22 and extended upto posterior coxae.

Pronotum (Fig. 7c) with anterior margin almost straight, antero-lateral margins crenulated, lateral angles produced obtusely, distance between lateral angles (6.6 ± 0.7)

2.4x to anterior angles (2.7 ± 0.3) and 2.3x to medial length (2.95 ± 0.25), postero-lateral margins straight, posterior margin round, surface thickly punctate.

Scutellum (Fig. 7d) oval, covers whole of the abdomen, medially swollen, lateral margins almost rounded, apex broad and rounded; length (5.5 ± 0.44) and breadth (5.43 ± 0.5) subequal, two oval spots near to anterior margin.

Exterior of metathoracic scent gland (Fig. 7e) with ostiole elongated or slit like and opens into peritreme; latter not in proper plate like elevated structure, evaporatorial surface highly wrinkled and extended upto meso thoracic segment.

Abdomen (Fig. 7f) oval and convexed medially, breadth (5.5 ± 0.5) 1.3x to length (4.25 ± 0.3), a single spiracle located on each lateral side from III-VII abdominal segment and a pair of trichobothria posterior to each spiracle, the intersegmental sutures subquadrate medially; V-VI segment possessed stridulatory patch on ventral surface.

Male genitalia (Fig. 7g-j) having **pygophore** (Fig. 7g-h) with breadth more than its length, lateral and posterior margin round, ventral side with thick punctures, inner surface invaginated medially, proctiger V-shaped. **Aedeagus** (Fig. 7i) with phallosome elongated; vesica is extremely long, slender and flexible; more than 10x longer than the phallosome. **Paramere** (Fig. 7j) broad apically, in triangular shape, preapically scales present.

Female genitalia (Fig. 7k-l) with **ovipositor** (Fig. 7k) having VIII paratergites triangular, posterior margin straight, IX paratergites comparatively bigger, postero-middle margin rounded; first pair of gonocoxae triangular, lateral margins round, posterior margins straight. **Spermatheca** (Fig. 7l) with bulb oval with apical end globular and tilted towards posterior end of the body, slightly curved and distal and proximal flanges of spermathecal pump narrow and sclerotized; spermathecal duct very long with many convolutions and without spermathecal dilation.

Body size: Female 11.71 ± 0.98 and male 10.64 ± 0.55 long.

Material examined (NPC): 7♀♀ and 2♂♂, INDIA: BIHAR: Chapra, 1♀, coll. Mackenzie, date and host unknown; Pusa, 1♂, 4.xi.1925, coll. Rahman, host

unknown; 1♀, 5.xii.1929, coll. B.D. Gupta, host unknown; DELHI: IARI, 1♂, 10.x.2007, coll. Nitisha, citrus; IARI, 2♀♀, 1♂, 16.xi.2010, coll. Shama Parveen, cotton; MEGHALAYA: Nangpoh, Khasi hills, 1♀, vii.1907, coll. D.Nowrojee; host unknown; Lakhimpur, 1♀, 16.v.1938, coll. N.C. Chatterjee, host unknown; Shillong, 2♂♂, 7.ix.1983, coll. Mayaram and V.V. Ramamurthy, grass; UTTAR PRADESH: Baghat, 1♀, v-x.1997, coll. A. Choudhury, mustard.

***Hotea nigrorufa* Walker, 1867**

(Fig. 8; Plate. I)

Hotea nigrorufa Walker 1867, 57; Distant 1902, 66

Body colouration dorsally castaneous red, lateral margins of pronotum and abdomen pale yellow or ochraceous, dorsally body impregnated with black punctations. First antennal segment, first and second labial segment red, V and V antennal segment partial red and apically brown; tibiae and tarsal segments reddish brown, base of femora yellow, ventrally head black; body finely punctured.

Head (Fig. 8a) elongated, anteriorly pointed, lateral margins almost straight or depressed, tylus much longer than jugal lobes, breadth (2.5 ± 0.12) subequal to length (2.44 ± 0.17), preocular distance (1.8 ± 0.06) 4.4 x to postocular (0.41 ± 0.05), interocular distance 1.5x to interocellar, eyes small and touched anterior margin of pronotum, ocelli placed nearer to eyes than to each other, head possessed thick punctations over the surface but more adjacent to lateral margins. **Antennae** five segmented; attached on ventral side of head, base of each antenna covered with the anterior prosternal margin, I (0.78 ± 0.11) 1.5x to II (0.58 ± 0.08); III smallest (0.44 ± 0.07) and 0.7x to II; IV (0.82 ± 0.06) 1.9x to III; IV (1.15 ± 0.1) longest and 1.4x to IV; I, II and III antennal segment cylindrical with sparse hairs while IV and V comparatively robust and apically bulbous, possessed numerous hairs, total antennal length 3.76 ± 0.41 . **Labium** four segmented; I segment 0.85 ± 0.07 long; II longest (1.5 ± 0.12) and 1.8x to I; III smallest (0.52 ± 0.06) while IV slightly longer (0.57 ± 0.05) than III and 0.34x to II; III and IV segment broad and dorso-ventrally flattened; extended upto posterior coxae and total antennal length 3.45 ± 0.25 .

Pronotum (Fig. 8b) convex towards base, anterior and posterior pronotal margins almost straight, anterior angles normal, antero-lateral margins smooth, lateral angles obtuse and large, projected laterally; distance across lateral angles (5.3 ± 0.13) 1.9x to anterior angles (2.74 ± 0.11), later subequal to medial pronotal length (2.7 ± 0.08).

Scutellum (Fig. 8c) round and covers almost whole of the abdomen or except posterior end of abdomen, length (4.82 ± 0.1) slightly more than its width (4.5 ± 0.13).

Exterior of metathoracic scent gland (Fig. 8d) ostiole elongated but very small and continued in a small peritreme, evaporatorium extended slightly to the mesothoracic segment.

Legs sparsely covered with yellow hairs, hind femora (2.51 ± 0.06) slightly longer than hind tibiae (2.41 ± 0.12), mid femora and tibiae measured 2.18 ± 0.07 and 1.72 ± 0.07 respectively while fore femora (1.72 ± 0.08) shorter than fore tibiae (1.9 ± 0.06).

Abdomen (Fig. 8e) broad and convexed ventrally, width (4.7 ± 0.22) more than its length (4.3 ± 0.07), finely punctured; spiracles present on III to VII abdominal segments and also on each VIII paratergite; a pair of trichobothria present just posterior to abdominal spiracles, V-VII intersegmental abdominal sutures subquadrate.

Male genitalia (Fig. 8f-i) having **pygophore** (Fig. 8f) ventral border circular, bearing scattered short setae, a semi sclerotized black area present laterally at the junction of dorsal and ventral borders, dorsal border medially narrow, laterally broad, projecting as a lobe, proctiger globular, bearing scattered setae. **Aedeagus** (Fig. 8h) with phallosome longer than broad, proximally narrow, only one pair of membranous conjunctival appendages present, each tapering apically into a sclerotized spine. Vesica thin, narrow and coiled distally, leading to gonopore, basally stout and somewhat flattened. **Paramere** (Fig. 8i) medially flattened over a fairly long stretch, highly sclerotized, pointedly projecting on both sides of the sub truncated apex, a number of setae located on median flattened part of each paramere.

Female genitalia (Fig. 8j-k) having **ovipositor** (Fig. 8j) with VIII paratergites small and medially fused, IX paratergite comparatively large and finger shaped; first pair of gonocoxae large and triangular, posterior margin somewhat curved. **Spermatheca** (Fig. 8k) with bulb pear shaped; distal flanges of spermathecal pump sclerotized

while proximal flange not conspicuous, spermathecal duct very long with many coils and without dilation.

Body size: Female 9.71 ± 0.2 and male 9.21 ± 0.16 long.

Material examined (FRI): 3♀♀ and 2♂♂, INDIA: TAMIL NADU: North Salem: 2♂♂, 1930, coll. N.C. Chatterjee, *Dodonea viscosa*; Nognoor, North Salem, 1♀, 23.v.1930, coll. N.C. Chaterjee, *Dodonea viscosa*; Jawalagiri, North Salem, 2♀♀, 5.x.1930, coll. N.C. Chaterjee, sandal.

Odontoscelinae

Diagnosis: Members generally dull coloured, body setose to pilose; pronotum anteriorly broader than the head and posterior apical margin; anterior lateral margins round, metathoracic scent gland possessed distinct ostiole and indistinct peritreme, males with first pair of conjunctival appendages deeply folded; spermathecal duct with very large dilation.

Genus *Irochrotus* Amyot and Serville, 1843

Irochrotus Amyot and Serville, 1843: 39.

Type species: *Cimex lanatus* Pallas, 1773: 729.

Arctocoris Stal, 1873: 31; Jakovlev, 1884:162; Kirkaldy, 1909: 263

Diagnosis: Body setose or pilose, head sub-semiorbicular; pronotum with a deep transverse incision near to lateral pronotal angles; body beneath and legs piceous, body less pilose than above; metathoracic scent gland with distinct ostiole and indistinct peritreme; VIII paratergites of ovipositor with spiracle towards lateral margin; first pair of conjunctival lobe membranous and with many folds.

***Irochrotus incisus* (Stal, 1873)**

(Fig. 9; Plate. II & X)

Arctocoris incisus Stal, 1873: 31; Kirkaldy, 1909: 263

Irochrotus incisus Reuter, 1900: 209; Kirkaldy, 1909: 263

Body colouration brown ochraceous, antennae, labium, eyes, scutellum and legs brownish ochraceous, abdomen beneath black; body covered with thick and long pale or greyish black coloured hairs; punctuation more along margins of head, pronotum, scutellum and abdomen.

Head (Fig. 9a) breadth (1.97 ± 0.11) $1.36x$ to length (1.44 ± 0.09); preocular distance (0.71 ± 0.04) $2.15x$ to postocular (0.33 ± 0.07); interocular distance (1.55 ± 0.12) $1.72x$ to interocellar (0.9 ± 0.04). **Antennae** five segmented; II segment cylindrical, V broad and apically tapered, I antennal segment ($.52 \pm 0.03$); II (0.27 ± 0.03) $1.92x$ to I; III smallest (0.16 ± 0.01) and $0.59x$ to II; IV (0.26 ± 0.01) $1.62x$ to III while V longest (0.39 ± 0.02) and $1.5x$ to IV; total antennal length 1.62 ± 0.11 . **Labium** four segmented; I labial segment 0.42 ± 0.03 long; II longest (0.82 ± 0.06) and $1.95x$ to I; III smallest (0.23 ± 0.03) and $0.28x$ to II; it is also broadest and almost $2x$ to II segment; IV (0.29 ± 0.03) $1.26x$ to III; total labial length 1.77 ± 0.1 and extended upto posterior coxae.

Pronotum (Fig. 9b) anteriorly broader than the head; antero-lateral margins distinctly rounded, lateral margins of the pronotum deeply sinuated near middle, and profoundly transversely impressed across disk, lateral pronotal angles rounded, distance between lateral angles (3.69 ± 0.10) $1.74x$ to anterior (2.11 ± 0.07) and $1.87x$ to medial length (1.97 ± 0.1) of pronotum.

Scutellum (Fig. 9c) covered almost whole of the abdomen, apically rounded, length (3.72 ± 0.22) $1.05x$ to breadth (3.53 ± 0.2); scutellar surface covered with long setae, more towards margins, dorsally thickly and densely punctate.

Exterior of metathoracic scent gland (Fig. 9d) with ostiole small, peritreme indistinct, evaporatorium also restricted to ostiolar region of metathoracic segment.

Legs with length of fore, middle and hind femora recorded as 1.07 ± 0.06 , 1.31 ± 0.05 and 1.53 ± 0.06 , respectively while lengths of their consecutive tibiae as 0.98 ± 0.07 , 1.02 ± 0.04 and 1.5 ± 0.21 , respectively.

Abdomen (Fig. 9e) ovate, convexed medio- ventrally, breadth (3.6 ± 0.83) $1.12x$ to length (3.19 ± 0.13); intersegmental sutures convexed anteriorly and lateral margins of

each intersegmental suture round; covered with long and dense hairs, finely and densely punctured.

Male genitalia (Fig. 9f-i) having **pygophore** (Fig. 9f-g) with dorso-lateral margins toothed on its posterior end, posterior margin not straight, proctiger ovate. **Aedeagus** (Fig. 9h) tubular with proximal part broader compared to distal, I pair of appendages apically membranous and thickly folded, II and III pair completely sclerotized, elongated and spine like, apically thin, vesica elongated and curved subapically. **Paramere** (Fig. 9i) apically curved, stem delicate with 2-4 setae located on the base of blade.

Female genitalia (Fig. 9j-k) having **ovipositor** (Fig. 9j) with its VIII and IX paratergites almost equal, each VIII paratergite with spiracle on its lateral side, First pair of gonocoxae subquadrate with posterior and inner margin straight. **Spermatheca** (Fig. 9i) with bulb very small and oval; proximal and distal flanges as well as pump region indistinct; spermathecal dilation membranous, large and oval in shape.

Body size: Female 6.51 ± 0.08 and male 6.21 ± 0.29 long.

Material examined (NPC): 3 ♀♀ and 2 ♂♂, NDIA: BIHAR: Pusa, 1 ♀, 25.xii.1906, coll. P.G.P, host unknown; 1 ♂, 24.vi.1908, coll. unknown, on earth under ber tree; KARNATAKA: Mysore: Okhibali apur, 2 ♀♀, 19.i.1914, coll. C.N. host unknown; Shanmigapuram, 1 ♂, 1-10.iii.1915, coll. C.K.B., host unknown.

Odontotarsinae

Diagnosis: Tylus distinctly surpasses the jugal lobes, metathoracic scent gland with indistinct ostiole and peritreme; I antennal segment somewhat curved, II segment smallest; ovipositor of females generally with IX paratergites equal or larger to VIII, spermatheca with indistinct distal spermathecal dilation.

Genus *Alphocoris* Germar, 1839

Alphocoris Germar, 1839: 58; Stal, 1873: 26; Schouteden 1903: 80
Type species: *Alphocoris lixoides* Germar 1839: 59

Diagnosis: Lateral margins of head and apex of tylus rounded; tylus distinctly surpasses the jugal lobes, apical end of scutellu notched on lateral side; metathoracic scent gland ostiole very small, peritreme indistinct; IX paratergites of ovipositor comparatively larger than VIII not distinct.

***Alphocoris lixoides* Germar, 1839**

(Fig. 10; Plate. II & X)

Alphocoris lixoides Germar 1839: 59; Distant, 1902: 67; Schouteden, 1903: 81

Body colouration pale brown on dorsal surface, lateral margins of jugum, anterior part of tylus, femora and tibiae black; labium, trochanters, tarsomeres, lateral margins of thoracic sterna and abdomen brown while rest of the body beneath black and fine white to cream hairs distributed on ventral surface of body.

Head (Fig. 10a) elongated, declivent, tylus extended beyond jugal lobes, apically rounded, breadth 1.2x to length, preocular distance 2.4x to postocular, lateral margins of head straight eyes placed near to basal margin and touched anterior angles of pronotum; interocular distance 1.5x to interocellar. **Antennae** (Fig. 10b) five segmented; located ventrally far from eyes; I antennal segment curved, basal half thin as compared to apical half; II slender and 0.6x to I; III apically broader, 0.7x to II; IV 1.8x to III; V longest and 1.2x to IV and tapered apically; small hairs present all antennal segments except I segment. **Labium** mutilated.

Pronotum (Fig. 10c) with anterior margin almost straight or slightly concave; anterior and posterior pronotal angles simple, lateral margins obliquely straight; lateral angles rounded, posterior margin almost straight; distance between lateral angles 1.65x to anterior and 1.7x to medial pronotal length.

Scutellum (Fig. 10d) elongated, covered whole of the abdomen; with anterior margin concave; anterior pronotal angles prominent and produced anteriorly; apex subquadrate and toothed at its lateral angles, length 1.55x to breadth; medially swollen throughout the length except apical end; dense punctation but more towards anterior, lateral and submedial length. Thoracic sterna grooved medially to hold the labium in resting condition; anterior margin of prosternum curved.

Abdomen (Fig. 10e) oval, not convexed, intersegmental sutures convexed medio-anteriorly; length 1.3x to breadth, spiracles present laterally from III-VII segments while a pair of trichobothria from III to VII abdominal segment, just posterior to each spiracle, segments medially depressed on its lateral side.

Male genitalia (Fig. 10f-i) with **pygophore** (Fig. 10f-g) longer than broad, lateral margins straight, dorsally lateral margins rounded on its posterior end, ventrally almost straight (Fig. 10g), inner margin curved, proctiger quadrate, posterior margin and basal half surface on ventral side possessed fine setae. **Aedeagus** (Fig. 10h) robust and sclerotized, proximally broader, I pair of conjunctival appendage serrate, II semisclerotized; vesica elongated. **Paramere** (Fig. 10i) with stem broad apically, curved in almost C-shaped, apical end sclerotized and setae present on the curved surface.

Female genitalia (Fig. 10j-k) having **ovipositor** (Fig. 10j) each with VIII paratergite subquadrate, distinct and with spiracle more towards lateral margin; IX paratergites somewhat rounded and bigger than VIII paratergite; First pair of gonocoxae large and triangular with round apices; thick setae on the surface. **Spermatheca** (Fig. 10k) very small, with bulb round; distal flange indistinct but proximal flange prominent, spermathecal pump small but distinct; spermathecal dilation indistinct.

Material examined (NPC): 1♀ and 1♂, INDIA: KARNATAKA: Bannerghatta Park, 1♂, 1♀, 12.ix.1976, Coll. C.A. Viraktamath, host unknown.

Scutellerinae

Diagnosis: Members of this subfamily are generally bright coloured, body ventrally convexed, labium generally extends beyond posterior coxae, abdomen generally sulcated, thorax and scutellum with their bases more or less convexed, pronotum distinctly truncated posteriorly, second antennal segment shortest, metathoracic scent gland with well developed ostiole and peritreme; phallotheca longer than broad, conjunctiva with three pair of appendages, sometimes first and second conjunctival process fused at the base and situated dorso-laterally, parameres C or sickle shaped apically, and bear setae; VIII paratergite generally with spiracle, spermatheca with an

apical bulb and duct with well developed distal and proximal flanges, duct dilated medially, shape of dilation vary species to species.

Key to the genera (modified after Distant, 1902)

1. Jugal lobes straight, scutellum with apical end always truncated, wings always projecting beyond the apex of mesoscutellum when at rest; pronotum with lateral angles may or may not produced anteriorly in strong spine.....*Cantao*
- 1'. Jugal lobes not straight; scutellum with apical end not truncated, wings generally not projecting beyond the apex of mesoscutellum when at rest; pronotum with lateral angles not produced anteriorly in strong spine.....2

2. Body pilose; metathoracic scent gland with peritreme in sickle shaped; abdomen sulcated longitudinally beyond middle on ventral surface.....*Scutellera*
- 2'. Body not pilose; metathoracic scent gland with peritreme not in sickle shaped; abdomen not sulcated longitudinally beyond middle on ventral surface.....3

3. Body always broad or ovate; metathoracic scent gland with peritreme transverse and cylindrical in shape; spermathecal bulb always elongated with apex bent at different length and angle, spermathecal dilation always double walled; paramere with apex bifurcated.....*Poecilocoris*
- 3'. Body ovate to elongated; metathoracic scent gland with peritreme transverse but generally depressed medially or tilted towards posterior end; spermathecal bulb of variable shape, spermathecal dilation devoid of double wall; paramere with apex without any and cylindrical in shape; paramere without bifurcated apex.....4

4. Pygophore with strigil.....5
- 4'. Pygophore without strigil.....6

5. Body pale yellow orange to brown; tibiae sulcated throughout the length*Eucorysses*
- 5'. Body greenish to blue, sometime with golden tinge; tibiae not sulcated throughout length.....*Chrysocoris*

6. Pronotum constricted before middle, lateral pronotal angles always obtuse; abdomen sulcated medially but only at base.....*Brachyaulax*
- 6'. Pronotum not constricted before middle, lateral pronotal angles generally obtuse; abdomen not sulcated medially at base.....*Lamprocoris*

Genus *Brachyaulax* Stal, 1871

Brachyaulax Stal, 1871: 616; Schouteden, 1904: 23

Type species: *Brachyaulax rufomaculata* Stal, 1871: 616

Diagnosis: Body blue to purplish black with variable shapes of spots on dorsal as well as on ventral surface; head short and strongly declivous; lateral margins of pronotum with broad orange to red band and lateral margins also depressed

transversely before its centre, abdomen sulcated at base, odoriferous apertures spherical and small, evaporatorial surface extended upto mesothoracic segment.

***Brachyaylax cyaneovitta* (Walker, 1867)**

(Fig. 11; Plate. II)

Scutellera cyaneovitta Walker, 1867: 16; Distant 1899:35

Tectocoris oblonga Westwood, 1837: Distant 1902: 52

Scutellera amethystine Germar, 1839: Ho, 2003: 195

Body colouration dorsally greenish or violaceous blue with black spots; antennae, thoracic sternum except lateral margins, femora, tibiae and all tarsal segments black; labium, coxae and trochanters brown; lateral margins of the pronotum and thoracic sterna, a greenish or bluish-black sub quadrate spot present in each segment more towards lateral area; lateral margins of abdominal sternite with 3 small and one basal discal patch to abdomen irregularly ochraceous or reddish ochraceous.

Head (Fig. 11a) with length (3.5) and breadth (3.7) subequal; apex broad; lateral margins slightly sinuated; tylus longer than jugal lobes, preocular distance 2.2x than to post ocular; interocellar distance 2.1x to interocular while distance between eye to each ocellus is 0.8. A black broad longitudinal spot extended from apex of tylus to base of head and a small, elongated spot present in between each eye; eyes protruded laterally. **Antennae** (Fig. 11b) five segmented; located ventrally, near to eyes; I antennal segment (1.0) never extended beyond apex of head and subequal to III (1.05); II segment smallest amongst all and also less than 0.5x of I segment; IV 1.2x to III while V longest and almost 3.5x to smallest segment; total antennal length 5.3.

Labium four segmented, extended upto II abdominal segment, I labial segment smallest (0.9); II largest (1.95) and almost 2.2x to I; III and IV measured 1.05 and 1.25, respectively; total antennal length, 5.15.

Pronotum (Fig. 11c) with breadth across anterior angles subequal to the central pronotal length while that of in between lateral angles to 1.53x previous one; anterior pronotal margin straight, anterior angles subquadrate while lateral angles obtuse. Six black spots arranged in two transverse series, posterior spots larger than anterior spots; pronotal dorsal surface depressed before discal area, thick and dense punctures at anterior margin and in depressed area; small hairs near to lateral margins.

Scutellum (Fig. 11d) covered whole of abdomen, length 1.55x to width (at base), ten spots located on surface, three basal, middle one linear and elongated, two before middle, sometimes attached to the lateral margins and sometimes connected, two small and lateral, sometimes connected with the preceding, two spots a little before apex, sometimes connected and one apical, apex round.

Exterior of metathoracic scent gland (Fig. 11e) with ostiole spherical and small, peritreme transverse, slightly curved medially, grooved throughout the length, evaporatorial surface sulcated or wrinkled and extended upto the mesothoracic segment.

Anterior margin of pro sternum concave, sternum medially deeply grooved to hold labium at rest.

Legs with of fore, middle and hind femora 2.1, 2.8 and 3.2 long respectively while that of fore, middle and hind tibiae 2.5, 2.8 and 3.6, respectively, tarsi three segmented, II smallest; I and III subequal and almost 2x to II tarsal segment..

Abdomen (Fig. 11f) U-shaped; with anterior margin almost straight; length 1.25x to breadth; a small central furrow upto III segment to hold the labium when not in use; basally broader than apical end.

Female genitalia (Fig. 11g-h) with **ovipositor** (Fig. 11g) having VIII paratergite triangular and of moderate sized, postero- lateral angle projected posteriorly, IX small and lobe like, I gonocoxa large, posterior margin medially sinuated, bear small hairs on posterior margin. **Spermatheca** (Fig. 11h) with bulb elongated and apically round, proximal and distal flanges of pump funnel shaped; pump region short, distal spermathecal duct narrower than proximal duct; spermathecal dilation big and balloon shaped.

Body size: Female measured 20.15 long and 8.05 broad.

Material examined (NPC): 1♀, INDIA: South India, Valparai, 1♀, 5.vi.1998, coll. G. Ravindra, host unknown.

Genus *Cantao* Amyot et Serville, 1843

Cantao Amyot and Serville, 1843: 29; Dallas, 1851: 3, 17; Stal, 1865: 33; Mayr, 1866: 14; Stal, 1873: 10; Atkinson, 1887: 149; Lethierry and Severin, 1893: 18; Distant, 1902: 42; Schouteden, 1903: 27; 1904: 18 Kirkaldy, 1909: 307
Iostethus Stal, 1873: 10

Type species by subsequent designation (Kirkaldy, 1909: xxxv): *Calidea parentum* White, 1839

Diagnosis: Body elongated, obovate, brightly coloured, generally of yellow, orange or reddish brown often spotted with black; head elongated, jugal lobes almost straight and tylus slightly extended beyond jugal lobes or both subequal, lateral margins of head slightly sinuated; labium extended beyond posterior coxae, anterior pronotal margin deeply sinuated; anterior pronotal angles prominent, lateral pronotal margins slightly depressed; scutellum extending beyond apex of abdomen and apex subquadrate; abdomen with a small central basal sulcation; genitalic plates possessed dense hairs.

Cantao ocellatus (Thunberg, 1784)

(Fig. 12; Plate. II, VIII & X)

Cimex ocellatus Thunberg, 1784: 60

Cimex dispar Fabricius, 1794: 81; Dallas, 1851: 17; Kirkaldy, 1909: 308

Callidea dispar Herrich-Schaeffer, 1836: 99; Westwood, 1837: 16; Kirkaldy, 1909: 308

Callidea ocellata Westwood, 1842: 47; Kirkaldy, 1909: 308

Cantao dispar Amyot and Serville, 1843: 29; Dallas, 1851: 17

Cantao rufipes Dallas, 1851: 17; Walker, 1867: 14; Kirkaldy, 1909: 308

Cantao inscitus Walker, 1868: 506; Lethierry and Severin, 1893: 18

Cantao conscitus Walker, 1868: 507; Lethierry and Severin, 1893: 18

Cantao ocellatus Dallas, 1851: 17; Kirkaldy, 1909: 308

Body colouration dorsally orange with brown to black spots on surface, dorsal surface of head, base of head and half way down tylus black with metallic blue green tints, antennae and labium dark brown to black, scutellum orange red, femora orange or bright red while tibiae and tarsomeres black with green or blue tinge, meso and meta pleura with posterior margin outlined in orange, remainder of these segments dark brown with metallic green overlay.

Head (Fig. 12a) elongated and anteriorly produced, length (3.9±0.12) and breadth (3.7±0.11) subequal, lateral margins almost straight or slightly sinuated, tylus longer

than jugal lobes, basal area of head and two central fasciae extended from base to before apex black. Preocular distance (2.18 ± 0.15) 2.75x to postocular (0.79 ± 0.06), interocular distance (2.3 ± 0.13) 1.9x to interocellar distance (1.17 ± 0.1). **Antennae** five segmented; I (1.25 ± 0.05) and II (1.2 ± 0.06) antennal segments subequal; III (2.5 ± 0.09) longest and 1.4x to II; IV (2.4 ± 0.09) and V (2.45 ± 0.14) subequal; total antennal length 9.76 ± 0.26 . **Labium** four segmented; I labial segment (1.6 ± 0.26) smallest; II longest (2.9 ± 0.16) and 1.75x to I segment; III (2 ± 0.08) and IV (1.9 ± 0.15) labial segment subequal; total labial length 8.4 ± 0.51 and extended beyond posterior coxae.

Pronotum (Fig. 12b) with anterior margin sinuated deeply; anterior pronotal angles produced anteriorly, antero-lateral margins reflexed, usually straight or curved; two black spots near anterior pronotal angles; in some specimens lateral pronotal angles produced laterally in black curved pointed spine, or in some it is obsolete; distance between anterior angles (3.86 ± 0.21) only 0.3x to posterior (12.8 ± 0.54), later 2.7x to medial pronotal length (4.7 ± 0.26); posterior pronotal margin straight with angles produced posteriorly.

Scutellum (Fig. 12c) with anterior and lateral margins straight; apex broad and straight; length (14.6 ± 0.5) 1.9x to breadth (7.8 ± 0.4); sometimes two basal spots surrounded by pale to ochraceous margin located at antero-lateral angles or sometimes it has six to eight spots, variable in size, located at lateral and apical area; apical part of wings not covered by it.

Exterior of metathoracic scent gland (Fig. 12d) with ostiole elongated, opened in a well developed peritreme which is more or less in sickle shaped and raised from the general evaporatorial surface, gooved through out transverse length; evaporatorial surface slightly wrinkled and usually extended upto metathoracic segment.

Legs with tibiae slightly dilated at apical end; femur of each hind leg (7 ± 0.3) generally longer to corresponding tibia (6.4 ± 0.3); in case of middle leg, femur (5 ± 0.2) and tibia (4.8 ± 0.08) subequal or femur slightly bigger than tibia but in case of fore leg, tibia (4.6 ± 0.05) slightly longer than its femur (4.2 ± 0.09); legs possessed creamish white hairs, more dense on tibiae and tarsomeres.

Abdomen (Fig. 12e -f) posteriorly broad; length (11.9 ± 0.63) only 1.2x to the breadth (9.95 ± 0.24), ventrally covered with white or creamish white hairs. Female's abdomen (Fig. 12e) with a single spiracle present on each lateral side from III to VII segments and also on each VIII paratergite; paired trichobothria located just below each spiracle only on III to VII segment, generally paired black spots near medio-ventral line on III to VI segment and a black on each lateral side from III to VI segment; in case of males the intersegmental sutures are more curved anteriorly and number and arrangement of spots vary (Fig. 12f) while other structural characters similar to females.

Male genitalia (Fig. 12g-k) having **pygophore** (Fig. 12g) with ventral surface pilose; posterior margin medially produced and emarginated (Fig. 12h), on each side of emargination produced into a triangular flap, ventrally postero-lateral angles rounded (Fig. 12i). **Aedeagus** (Fig. 12j) with phallosome funnel shaped, sclerotized, three pairs of conjunctival lobes appendages present, first two having common stem, first distally long, membranous, apically blunt while second heavily sclerotized, stout and hook like and third sclerotized and shortest, apically tapering into a small blunt hook; vesica completely sclerotized, long, apex trilobed, dorsal lobe long, curved, narrowed, apically pointed bearing the gonopore at apex, basally curved to bear a sac like ejaculatory reservoir. **Paramere** (Fig. 12k) with oval basal plate, stem long and almost straight, blade slightly curved on its inner side and hairy, apical end narrow.

Female genitalia (Fig. 12l-m) having **ovipositor** (Fig. 12l) with each VIII paratergite large, triangular, having spiracle towards lateral margin, IX paratergite indistinct; First pair of gonocoxae subquadrate, apical margin sinuous. **Spermatheca** (Fig. 12m) with elongated bulb, curved medially, apically spherical, distal and proximal flanges of pump, broad and well developed and disc shaped distal spermathecal duct narrow compared to proximal duct; spermathecal dilation big and rounded.

Body size: female measured 20.52 ± 1.2 and males 20.45 ± 0.66 long.

Material examined (NPC): 7♀♀ and 5♂♂, INDIA: BIHAR: Pusa, 1♀, 13.xi.1905, coll. A.H., sesame; Pusa, 1♂, vii.1911, coll. Dr. R. Keelan, host unknown; DELHI: IARI, 1♂, 3.xi.2008, coll. Shama Parveen, *Acacia sp.*; JHARKHAND: Hazaribagh, 1♀, 2♂♂, 16-25.iii.1928, coll. P.V. Issac, host unknown; TAMIL NADU:

Naduvatum: Nilgiris (7000 ft.), 2♀♀, 5♂♂, v.1904, coll. W. Rowson, host unknown;
 WEST BENGAL: Lebong: Phoobsering (5000 ft.), 3♀♀, ix.1910, coll. H.M.L, host
 unknown. BANGLADESH: Rangpur, 23.xii.1905, coll. P.G.P, host unknown.

Genus *Chrysocoris* Hahn, 1834

Chrysocoris Hahn, 1834: 38; Stal, 1865: 34; Schouteden, 1904: 34

Type species by monotypy: *Chrysocoris stollii* (non Wolff, 1801): Hahn, 1834 (= *Scutellera abdominalis* Westwood, 1837)

Galostha Amyot and Serville, 1843: 33; Distant, 1902: 54; Kirkaldy, 1909: 292

Diagnosis: Body metallic or brassy green (except *C. fascialis*) with black patches, body size varies from 10.00 to 20.00. Head short and declivent, lateral margins deeply sinuated; eyes generally protruded laterally; basal antennal segment never extended beyond apex of head, II segment shortest amongst all; labium always extended beyond posterior coxae and not beyond III abdominal segment, scutellum slightly convexed at base; metathoracic scent gland ostiole as well as peritreme well developed; spermathecal bulb elongated, generally with apical end round; spermathecal dilation present in variable shape and size, pygophore always with strigil, conjunctiva with 3 pairs of appendages.

Key to species

1. Abdomen with venro-lateral margins with purplish pink band.....2
- 1'. Abdomen with venro-lateral margins without purplish pink ban.....3
2. Body yellow to brown coloured; scutellum with a black transverse spot, extended between lateral margins; pump region of spermatheca indistinct but flanges not in proper sclerotized plate form.....*fascialis*
- 2'. Body metallic colour to blue, sometime with golden tinge; scutellum possessed seven spots but no one transverse between lateral margins; well developed proximal and distal flanges enclosed the spermathecal pump region.....*stollii*
3. First pair of conjunctival appendages apically curved while second pair of conjunctival appendages with a subapical sclerotized spine.....4
- 3'. First pair of conjunctival appendages apically not curved and second pair of conjunctival appendages without any subapical sclerotized spine.....7
4. Lateral margins of head deeply sinuated before eyes.....5
- 4'. Lateral margins of head not deeply sinuated before eyes.....6
5. Spermathecal pump with indistinct distal flange.....*marginellus*
- 5'. Spermathecal pump with distinct distal as well as proximal flanges.....*pulchellus*

6. Pronotum with lateral angles broadly obtuse; ten round to oval black spots over the dorsal surface; ventro-posterior margin of pygophore deeply sinuated.....*patricius*
7. Second pair of conjunctival appendages baloon shaped, with sclerotized pointed apical tip.....*dilaticollis*
- 7'. Second pair of conjunctival appendages neither baloon shaped nor with sclerotized pointed apical tip.....8
8. Pronotum with five spots on dorsal surface; apex of first pair of conjunctival appendages medially cleft or bifurcated; spermathecal dilation smoothly membranous.....*purpureus*
- 8'. Pronotum with more than five spots on dorsal surface; apex of first pair of conjunctival appendages medially not cleft or bifurcated; spermathecal dilation membranous with longitudinal thread like pattern9
9. Abdomen possessed small, variable shaped of stigmatal spots from III-VII segment on ventral surface, towards lateral margins.....*andamanensis*
- 9'. Abdomen possessed moderate sized, subquadrate stigmatal spots from III-VI segment on ventral surface, towards lateral margins.....*marginellus*

***Chrysocoris andamanensis* Atkinson, 1887**

(Fig. 13; Plate. XI)

Chrysocoris andamanensis Atkinson, 1887: 177; Distant, 1902: 60

Body colouration metallic green or violaceous blue with black spots over pronotum and scutellum. First antennal segment, I and II labial segment ochraceous, II to IV antennal segment; III and IV labial segments brown to black, coxae, femora and tibiae black with violaceous tinge, tarsal segments black, body with fine and thick punctations except head.

Head (Fig. 13a) slightly produced anteriorly, breadth 1.2x to length, lateral margins of head deeply sinuated before eyes, eyes protruded laterally and almost touched anterior pronotal angles, preocular distance 2x to postocular while interocular 2.12x to interocellar distance, ocelli placed more near to eyes than to each other. **Antennae** five segmented; located ventrally on head near to eyes; I antennal segment never extended beyond apex of the head; II smallest; III antennal segment 8.75x to II segment; IV longest and 1.1x to III segment; V subequal to IV segment, small black hairs over III and onward antennal segment. **Labium** four segmented, I labial segment smallest; II 2x to I; III segment 0.8x to II and IV segment 0.8x to III; total labial length 7.55 and extended upto II abdominal segment.

Pronotum (Fig. 13b) convexed at base, anterior margin deeply sinuated, anterior pronotal angles obtuse and slightly produced anteriorly, lateral pronotal margins sinuated deeply just before lateral angles, distance between lateral angles 2.2x to anterior angles; 8 black pronotal spots, 3 variable sized small spots near anterior pronotal margin while 5 variable sized spots located in posterior row, 3 out of these large, elongated on disc towards posterior margin, 1 small spot at each lateral pronotal angles.

Scutellum (Fig. 13c) with base convexed, oval in shape, anterior scutellar margin straight or slightly convexed; covered whole of the abdomen; length 1.5x to breadth, apex rounded, possessed 7 scutellar spots present, 6 in pair situated laterally and 1 elongate spot at middle more towards base.

Legs with fore, middle and hind femora measured 3.9, 4.5 and 6.1, respectively, while fore, middle and hind tibiae measured 4.2, 4.6 and 5.9, respectively, tibiae and tarsal segments possessed small and black hairs and very few on femora.

Exterior of metathoracic scent gland (Fig. 13d) with ostiole moderate sized, oval in shape, peritreme small and black, not grooved medially; evaporatorial surface extended upto mesothoracic segment.

Abdomen (Fig. 13e) ventrally convexed throughout the length, a submarginal series of black spots present on all abdominal sternites except fused I and II segments; punctuations very sparse and located only toward lateral sides; number and position of spiracles and trichobothria same as other species of this genus.

Male genitalia (Fig. 13f-i) with **pygophore** (Fig. 13f) having posterior margin convex, lateral margins round, strigil present in patch form, inner margin invaginated on to lateral sides, proctiger elongated. **Aedeagus** (Fig. 13h) with vesica sclerotized and anteriorly sharp, I conjunctival appendages broad at base, medially bent while apically round; completely sclerotized; II pair longest, sclerotized at tip and at basal portion, medially membranous and wrinkled, III pair completely sclerotized, elongated apically spined; vesica hooked or notched apically, duct clear. **Paramere** (Fig. 13i) with robust stem, basal part broader to apical, not strongly sclerotized, blade curved upwardly and a tufts of hairs at the junction of base and stem.

Female genitalia (Fig. 13j-k) with **ovipositor** (Fig. 13j) having VIII paratergites fused distally, each eighth paratergite triangular, posterior margin almost straight; IX paratergites comparatively small and elongated, round toward inner side, first pair of gonocoxae with posterior margin straight, inner angle round. **Spermatheca** (Fig. 13k) with bulb somewhat elongated with apical end round, distal and proximal flanges of pump distinct; distal funnel shaped, broader than proximal; basal part of pump region membranous, distal spermathecal duct almost 0.5x to proximal, median spermathecal duct sclerotized and broad, more than 2x to proximal part, spermathecal dilation membranous, large and spherical in shape.

Body size: Female 20.5 and male 19.5 long

Material examined (NPC): 1♀ and 1♂, INDIA: ANDAMAN ISLAND, 1♂, (without any data); UTTARAKHAND: Masoori, 1♀, ix-x.1920, coll. Mackenzie, host unknown.

Chrysocoris dilaticollis (Guerin, 1830)

(Fig. 14; Plate. III & XI)

Scutellera dilaticollis Guerin, 1830:160

Callidea dilaticollis Dallas, 1851:28

Chrysocoris stollii Hahn, 1834:39

Callidea abdominalis Westwood, 1837:15

Galostha stockerus Amyot and Serville, 1843:34

Body colouration dorsally metallic green, where generally the lateral margins of pronotum and base of scutellum with golden tinge, antennae, labium and tarsal segments black, femora, base of tibiae and abdomen ventrally ochraceous, while rest of tibial portion green.

Head (Fig. 14a) declivent, lateral margins deeply sinuated before eyes, tylus extended beyond the jugal lobes; breadth 1.5x to length, central fascia present within anterior to posterior end; eyes much protruded laterally, preocular distance 2.2x to postocular, interocular distance 2.2x to interocellar, ocelli located more closer to eyes than to each other. **Antennae** (Fig. 14b) five segmented; I antennal segment never extended upto apex of head; II segment smallest and only 0.3x to I; III longer than I and 2.4x to I; IV slender and broader amongst all and 1.3x to III segment while V longest

amongst all and 1.4x to III; total antennal length 9.3. **Labium** four segmented; I labial segment smallest; II longest and 1.3x to I; III and IV subequal and extended beyond the posterior coxae.

Pronotum (Fig. 14c) with anterior margin straight, anterior angles broad, anterior portion of lateral margins reflexed, lateral angle obtuse, breadth between anterior angles almost equal to medial pronotal length and 0.55x to lateral pronotal angles; ten black spots present on surface, three at anterior margin, one at each lateral angle, two at base, three at disc.

Scutellum (Fig. 14d) convexed and covers whole of the abdomen, anterior margin straight, apical end round, length 1.5x to breadth, eight spots, six in pairs, more towards lateral side, one at sub apical, one Y-shaped before middle.

Exterior of metathoracic scent gland (Fig. 14e) with ostiole oval, open into transverse peritreme, anterior and posterior margins smooth, without any crenulations, exterior end round, grooved medially beyond half of the length; exterior end slightly curved towards anterior end; evaporatorial surface rugulose and extended to mesothoracic segment.

Abdomen (Fig. 14f) convexed on ventral side; abdominal length and breadth subequal; III to VII segment possessed a spiracle and a pair of trichobothria on each lateral side, a black round spot also present on the same segment, intersegmental suture between VI and VII convexed.

Male genitalia (Fig. 14g-j) with **pygophore** (Fig. 14g) dorso-lateral margin bulged in middle, dorso-lateral surface concave through inside, having ventro-posterior margin curved (Fig. 14h), whole surface covered with scattered strigil; proctiger oval.

Aedeagus (Fig. 14i) not heavily sclerotized with tubular phallotheca, conjunctiva represented by three pair of appendages, I pair strongly sclerotized, except basal part, more or less on S-shaped; II pair completely membranous except tip, it is broader and longest, apically pointed, III pair also sclerotized and apically curved. **Paramere** (Fig. 14j) with strong stem, outer margin of stem curved, blade attached with stem by a membranous part, blade deeply curved and possess long and sparse setae at the base.

Material examined (FRI): 1♂; MYANMAR: Insein, 1♂, 3.i. 1927, coll. D.J. Atkinson, host unknown.

***Chrysocoris fascialis* White, 1842**

(Fig. 15; Plate. III)

Chrysocoris fascialis White, 1842: 86; Distant, 1902: 60

Body colouration yellow to ochraceous with black spots over pronotum and scutellum; base of head metallic green; coxae, trochanters and femora (except apices) yellow/ ochraceous; first labial segment, apices of femora, tibiae and tarsal segments brown to black while rest of the labial segments and antennae brown; abdomen ventrally ochraceous with brown stigmatal spots, laterally purplish pink band throughout the margins; body sparsely punctured.

Head (Fig. 15a) small, lateral margins deeply sinuated near eyes before apex, tylus longer than jugal lobes and latter subquadrate; head breadth (2.8) 1.4x to length (2.0); preocular distance 1.2x to postocular, interocular 2x to interocellar distance and ocelli located nearer to eyes than to each other. **Antennae** (Fig. 15b) five segmented; I antennal segment never extended beyond apex of the head; II smallest and only 0.4x to I; III 4.7x to II while IV longest and broader among all; 1.2x to III; V subequal to III segment and apically tapered, total antennal length 4.4. **Labium** four segmented; I and IV subequal; II longest and 1.6x to I; III 0.7x to II; total labial length 4.35 and extended upto the II abdominal segment.

Pronotum (Fig. 15c) with anterior margin deeply sinuated, lateral margins slightly convexed before lateral angles, anterior pronotal angles anteriorly projected; distance between lateral angles 1.9x to anterior pronotal distance and 2.1x to medial pronotal length; seven spots over surface which covered almost whole pronotal surface, two at anterior angles, connected through a transverse band, two at lateral angles and three at disc, the middle one almost quadrate in shape while adjacent one oblong.

Scutellum (Fig. 15d) not convexed at base, covered almost whole of abdomen, scutellar length 1.4x to breadth, anterior pronota margin almost straight while apex

broad and round; four black spots on dorsum, a transverse, thick band like extended between lateral margins, two oval posterior to middle, more towards lateral side and one disc shaped located subapically.

Legs with hind pair composed of subequal femora and tibiae, middle femora slightly bigger to corresponding tibiae while in tibiae of fore legs slightly bigger to its corresponding femora.

Exterior of metathoracic scent gland (Fig. 15e) with elongated ostiole, peritreme transversely elongated and slightly elevated upward, not grooved medially; evaporatorial surface moderately rugulose.

Abdomen (Fig. 15f) U shaped; anterior margin almost straight, a round to disc shaped black spot on each lateral side of abdomen from III-VII, on VI segment one more spot present adjacent to previous; five pairs of spiracles from III to VII segment and a pair of trichobothria posterior to each spiracle.

Female genitalia (Fig. 15g-h) having **ovipositor** (Fig. 15g) with VIII paratergites triangular and fused medially, IX paratergites small and bulbous, first pair of gonocoxae subquadrate with posterior posterior middle angle round. **Spermatheca** (Fig. 15h) with bulb elongated, distal end rounded, both flanges present but, not in sclerotized plate like and encloses short pump region; proximal spermathecal duct almost 1.6x to distal duct; spermathecal dilation slender, small and transparent, medial spermathecal duct sclerotized and can be seen easily through spermathecal dilation.

Body size: Female 11.2 long and 5.8 broad.

Material examined (NPC): 1♀; MYANMAR: Maymyo, 1♀, 20.viii.1914, coll. Com. Ins. Ento, beans.

Chrysocoris marginellus (Westwood, 1837)

(Fig. 16; Plate. III & XI)

Callidea marginella Westwood, 1837: 15

Callidea caelestis Stal, 1855: 181; Kirkaldy, 1909: 293

Chrysocoris nilgiriensis Atkinson, 1889: 343; Kirkaldy, 1909: 293

Chrysocoris marginellus Stal, 1873: 21; Distant, 1902: 59

Body colouration dorsally metallic green or indigo blue with black spots over dorsum, ventrally thorax metallic green while abdomen ochraceous or reddish ochraceous with lateral margin violaceous or black, submarginal abdominal series of broad, transverse spots, green or bluish green. I segment ochraceous, while rest black.

Head (Fig. 16a) declivent, lateral margins deeply sinuated, tylus longer than jugal lobes, breadth 1.4x to length; preocular distance, 1.5x to postocular, two median fasciae present between apex to base of head; eyes protruded laterally, touched anterior pronotal angles; interocular distance 2x to interocellar and ocelli placed more closer to eyes than each other. **Antennae** five segmented; I antennal segment never extended beyond apex of head; II segment smallest and only 0.6x to I; III segment 4.3x to II; IV 1.6x to III while V longest amongst all and 1.2x to IV; total antennal length 10.9 ± 0.51 . **Labium** four segmented; I labial segment smallest; II longest and 1.9x to I; III and IV subequal and only 0.6x to the II; total labial length 6.1 ± 0.2 and extended upto or beyond posterior coxae.

Pronotum (Fig. 16b) with anterior margin deeply sinuated and anterior pronotal angles produced anteriorly; lateral pronotal margins obliquely straight, not sinuated with lateral angles obtuse; breadth between anterior pronotal angles subequal to medial pronotal length while distance between lateral pronotal angles 4.2x to anterior; eleven spots on the dorsum, three at anterior margin, one at each lateral angles and remaining spots on disc.

Scutellum (Fig. 16c) having base convexed with anterior scutellar margin convexed, covered whole of abdomen; scutellar length 1.4x to breadth, basal angle and scutellar apex rounded; seven spots present, six in pairs, more towards lateral sides and one elongated, broad and roughly T-shaped situated medially.

Exterior of metathoracic scent gland (Fig. 16d) with ostiole round to oval in shape, peritreme transverse with exterior end curved, sickle shaped, medially grooved to hold the secretion through ostiole, evaporatorial surface rugulose and extended upto mesothoracic segment.

Legs with hind leg having femur 1.1x to corresponding tibia while in case of middle and hind legs, femora and tibiae subequal.

Abdomen (Fig. 16e) with breadth subequal to length or slightly broader; segment III to VII bear subquadrate spots on each lateral side and a black medial spot on the III segment; spiracle on III to VII segments and a pair of trichobothria just below each spiracle; VII intersegmental suture broadly V-shaped.

Male genitalia (Fig. 16f-h) with **pygophore** (Fig. 16f) having posterior margin sinuated, strigils present in two patches on dorso-posterior region and also scattered on the dorsal surface; lateral margins also sinuated slightly; proctiger ovate, setae on ventral and lateral sides. **Aedeagus** (Fig. 16g) not highly sclerotized, having tubular phallosome; three pairs of conjunctival appendages present, I pair sclerotized and apically curved, II pair basally broad and membranous, apically thin and sclerotized and terminated in spine, and bear small spine before apical end, III pair comparatively short and stout with almost uniform thickness, apically tapering; vesica broad having apex notched. **Paramere** (Fig. 16h) robust, sickle shaped, blade curved, at the junction of stem and blade a tuft of long setae present; stem broad and at middle margin bulged out laterally.

Female genitalia (Fig. 16i-j) having VIII paratergites triangular with posterior margin convex, IX paratergites comparatively small (Fig. 16i), First pair of gonocoxae large and subquadrate with lateral margins convex and posterior margin sinuated slightly. **Spermatheca** (Fig. 16j) with bulb elongated and distally bulbous with round apex; proximal flange disc shaped while distal flange of pump indistinct; pump conspicuous; spermathecal dilation elongated, membranous and cylindrical.

Body size: Female 19.15 and male 18.8 long.

Material examined (NPC): 2♀♀ and 2♂♂; INDIA: KARNATAKA: Bangalore, 1♂, 1903, coll. and host unknown; MAHARASHTRA: Matheran (2500 ft), 1♂, iv.1903, coll. D. N., host unknown. MYANMAR: Myitkyina, 1♀, 30.viii.-1.ix.1914, coll. T. B. Fletcher, host unknown. SRI LANKA: Hambantota, 1♀, 15.ii.1908, coll. T. B. Fletcher, host unknown.

***Chrysocoris patricius* (Fabricius, 1798)**

(Fig. 17; Plate. III, VIII & XI)

Cimex patricius Fabricius, 1798: 527

Callidea bengalensis Westwood, 1837

Callidea basilica Germar 1839, 117

Chrysocoris patricius Stal 1873, 20; Distant 1902, 57

Body colouration dorsally metallic green or blue with golden reflection, central lobe to head and spots over pronotum and scutellum black. Base of I antennal segment, I and base of II labial segment, coxae, femora (except apices) and lateral margins of prosternum orange or reddish, remaining antennal and labial segments and tarsal segments dark brown to black, apices of femora, tibiae, stigmatal plates and sternum metallic green or blue, lateral margins of ventro-lateral abdomen purplish pink.

Head (Fig. 17a) declivent, lateral margins sinuated deeply, tylus longer than jugal lobes; head breadth (2.54 ± 0.097) 1.4x to length (1.79 ± 0.11); eyes protruded laterally; preocular distance (0.81 ± 0.08) 1.7x to postocular (0.46 ± 0.05); ocelli placed nearer to eyes than to each other; interocular distance (1.03 ± 0.37) 1.3x to interocellar (0.8 ± 0.05) distance and ocelli placed more nearer towards eyes than to each other.

Antennae (Fig. 17b and c) five segmented; attached ventrally on head, nearer to eyes, I antennal segment (0.64 ± 0.07) never extended beyond the apex of head; II (0.31 ± 0.09) smallest and only 0.5x to I; III (1.17 ± 0.07) 3.8x to II; IV and V segment flat while IV broadest of all segments, slightly grooved in middle and 1.4x to III; V (1.8 ± 0.1) longest and 1.1x to IV; small hairs on III and onward segment, in males the II segment very small almost half to the females, total antennal length 5.48 ± 0.31 .

Labium four segmented; I labial segment smallest (0.67 ± 0.07); II longest (1.1 ± 0.15) and 1.6x to I; III (0.76 ± 0.07) and IV (0.78 ± 0.05) subequal and only 0.7x to II segment; total labial length 3.32 ± 0.25 and extended upto posterior coxae.

Pronotum (Fig. 17d) convexed, anterior pronotal margin slightly sinuated, lateral margins straight, lateral pronotal angles broad and obtuse; breadth between anterior pronotal angles (2.65 ± 0.16) subequal to medial pronotal length (2.62 ± 0.12) and only 0.5x to the breadth between lateral angles (5.32 ± 0.25); 10 black spots distributed over the surface, 3 at anterior margin, 5 at disc, in which 4 round in pairs and middle one oblong, one at each lateral angles.

Scutellum (Fig. 17e) with base convex, covers whole of the abdomen, scutellar length (5.75 ± 0.29) 1.2x to breadth (4.62 ± 0.29), basal margin almost straight or convex and apical margin round, eight black spots over the surface, 6 round and in pairs located more towards lateral side, one spot circular located at base and one

oblong almost at middle; punctures thick and, dense towards lateral sides while medially it is small and arranged sparsely.

Legs with fore, middle and hind femora 1.84 ± 0.12 , 2.1 ± 0.11 and 2.59 ± 0.11 , respectively while fore, middle and hind tibiae 2.07 ± 0.09 , 2.22 ± 0.11 and 2.82 ± 0.17 long, respectively.

Exterior of metathoracic scent gland (Fig. 17f) with ostiole large, round to oval in shape, peritreme transverse and grooved medially upto half of the length, anterior margin concave (Fig. 30o); evaporatorial surface black and extended upto mesothoracic segment.

Abdomen (Fig. 17g) ventrally subquadrate; breadth $1.04x$ (4.66 ± 0.31) slightly more than abdominal length (4.49 ± 0.16), ventrally it possessed black spots at base and on each abdominal segment. A spiracle on each lateral side from III to VII abdominal segments and also on VIII paratergites, a pair of trichobothria posterior to each spiracle except VIII paratergites.

Male genitalia (Fig. 17h-k) having **pygophore** (Fig. 17g) with ventral margin broad (Fig. 13h), bearing a large strigil of irregular rows of stout setae forming a central arc, dorsal border narrow and bearing two long narrow strigils on each side of a small membranous area composed of irregular rows of stout setae (Fig. 17i). **Aedeagus** (Fig. 17j) with phallosome cylindrical, basally narrow, three pairs of conjunctival appendages present, first pair flattened proximally, bent distally to sclerotized apices, second pair longest, membranous produced into sclerotized double spines at apices, third pair slender, with distal halves sclerotized and pointed, vesica swollen and basally attained hook shape. **Paramere** (Fig. 17k) stout with a long stem and a long hook pointed at tip, base of hook at its junction with the stem flattened, bearing a number of fairly stout setae.

Female genitalia (Fig. 17l-m) having **ovipositor** (Fig. 17l) with VIII paratergite triangular with a spiracle each near to lateral margin and more towards dorsal side, posterior margin straight, medially fused, IX paratergites small and lobe like, first pair of gonocoxae large and subquadrate, moderate setae on genitalic plate.

Spermatheca (Fig. 17m) with bulb elongated and apex round; distal and proximal flanges of pump distinct and broad, proximal bulbous while distal flange disc shaped,

proximal spermathecal duct longer and narrower than distal; spermathecal dilation transparent, small and cylindrical.

Body size: Female 10.42±0.17 and male 10.13±0.38 long.

Material examined (NPC): 19♀♀ and 20♂♂; INDIA: DELHI: IARI, 1♀, 15.x.1936, coll. Shaffi, host unknown; 1♂, 19.viii.1939, jwar, 1♂, 26.viii.1939, Lucern; 1♂, 18.viii.1939, coll. P. Mukerjee, *Sesamum indicum*; 1♀, 6.viii.1940, coll. H.U. Khan, jwar; 1♂, 6.iv.1940, coll. R. Saran, gram; 1♂, 12.x.1940, coll. Mohan Singh, soybean; 1♂, 19.viii.1941, coll. P. Mukherjee, methi; 1♂, 7.vi.1941, coll. P. Mukerjee, cowpea; 1♂, 4.iii.1944, coll. Jagram, hollyhock; 1♀, 9.xii.1946, coll. Sadiq, potato leaves; IARI, 1♀, 29.viii.1946, coll. K.P.Sharma, host unknown; IARI, 1♀, xi.1949, coll. unknown, cucurbits; 1♂, 4.ii.1952, coll. S.C. Kumar; host unknown; 1♂, 22.v.1955, coll. S. Singh, in light trap; Farm area, 1♂, 15.ii.1955, coll. N.N. Batra, mint; C.C.A. farm, 1♂, 8.ix.1956, coll. D.N.S., maize; 1♂, 20.v.2007, coll. Shama Parveen, mango; 1♀, 6.v.2007, coll. Shama Parveen, vegetables; 1♂, 15.v.2009, coll. Shama Parveen, weeds; 1♀, 15.v.2009, coll. Shama Parveen, rice; 1♀, 7.x.1950, coll. Bhim Singh, jwar; UTTAR PRADESH: Aligarh, 1♀, 1♂, 28.viii.2007, coll. Shama Parveen, in light trap; Banaras, 1♀, 17-18.ix.1919, coll. S. Misra & G.D. Austin; Kanpur, 1♀, 23.x.1914, coll. Fletcher, host unknown; Mathura, 1♀, 29.viii.2007, coll. Shama Parveen, light trap; Mainpuri, 2♀♀, 5♂♂, 5.ix.2007, coll. Shama Parveen, light trap; Tundla, 4♀♀, 2♂♂, 1.ix.2007, coll. Shama Parveen, light trap. SRI LANKA: Tenasserim, 1♀, 10-12.i.1922, coll. Sharma, host unknown.

Chrysocoris pulchellus (Dallas, 1851)

(Fig. 18; Plate. IV & XI)

Callidea pulchella Dallas, 1851: 25

Callidea rama Kirby, 1891: 76; Kirkaldy, 1909: 294

Chrysocoris pulchellus Distant, 1902: 59

Body colouration bright bluish or brassy green, antennae, rostrum and sternum black, margins of sternum brassy green, base of head beneath and abdomen ochraceous, femora (except apices) reddish ochraceous, their apices, tibiae and all tarsal segments black.

Head (Fig. 18a) with lateral margins deeply sinuated; tylus surpasses the jugal lobes; a central fascia present within anterior to posterior margin, a black oval spot near to eye present; breadth (3.6 ± 0.16) 1.5x to length (2.4 ± 0.23), preocular distance (1.1 ± 0.07) 1.8x to postocular (0.61 ± 0.01), eyes produced laterally, interocular distance (2.2 ± 0.11) 2x to interocellar (1.1 ± 0.07); ocellus placed more closer to eyes than to each other. **Antennae** five segmented; attached ventrally nearer to eyes; I antennal segment (0.9 ± 0.08) never extended beyond apex of head; II smallest (0.37 ± 0.1); III (2.25 ± 0.22) almost 6x to II while IV (2.76 ± 0.3) and V subequal (2.65 ± 0.36); total antennal length 8.9 ± 0.85 . **Labium** four segmented; I labial segment smallest (1.03 ± 0.06); II (2 ± 1.32) longest and 1.9x to I; III (1.3 ± 0.07) and IV (1.23 ± 0.07) subequal; total labial length 5.56 ± 0.25 and extended upto II-III abdominal segment.

Pronotum (Fig. 18b) with anterior margin depressed slightly, anterior angles produced forward; lateral angles margins convexed before obtused posterior angles; distance between posterior angles (7.97 ± 0.58), 2x to distance between anterior angles (3.86 ± 0.23) while medial pronotal length (4.06 ± 0.27) almost same as that of latter; surface possessed ten black spots of variable size, 3 at anterior margin, one at each posterior angles, 2 at base, 2 on disc and one largest subquadrate placed centrally.

Scutellum (Fig. 18c) oval, having anterior margin slightly convexed, anterior angles notched, apical end round; length (9.75 ± 0.82) 1.4x to breadth (6.86 ± 0.72); possessed eight variable sized black spots, 6 in pairs more towards lateral sides, one round to oval located towards scutellar apex and one Y-shaped or elongated placed medially.

Exterior of metathoracic scent gland (Fig. 18d) having oval or round ostiole which releases its secretion in transverse peritreme, its exterior end raised laterally from evaporatorial surface, grooved medially throughout the length, evaporatorial surface rugulose and extended upto mesothoracic segment.

Legs with fore, middle and hind femora 3.5 ± 0.1 , 4.1 ± 0.21 and 4.48 ± 0.44 long, respectively while fore, middle and hind tibiae 3.87 ± 0.08 , 4.11 ± 0.13 and 5.01 ± 0.49 , respectively.

Abdomen (Fig. 18e) convexed ventrally, length (7.6 ± 0.75) 1.1x to breadth (6.9 ± 0.77), a black shaded with brassy green stigmata spot on each lateral side from

III to VII segment and one medial on III segment present, arrangement of spiracles and trichobothria same as other species of this genus.

Male genitalia (Fig. 18f-i) having **pygophore** with dorso-posterior margin concave, postero-lateral angles round, dorso-medial surface concave; strigils scattered in irregular plates on whole surface; proctiger elongate, ventro-posterior margin deeply sinuated (Fig. 18g). **Aedeagus** (Fig. 18h) with phallosome slender; not strongly sclerotized, three pairs of conjunctival appendages present, I pair strongly sclerotized, basally broad while apically tapered and curved before apex; II pair long, basal portion sclerotized, rest membranous excepts apical end which is spinose, it bears a short sclerotized spine before end; III pair sclerotized, apical end spinose and curved; vesica strong, elongate and notched where gonopore exit. **Paramere** (Fig. 18i) with stem comparatively short to blade, basal part broader, stem and blade joined with membranous part, blade curved and a tuft of setae present on inner margin.

Female genital (Fig. 18j-k) with **ovipositor** (Fig. 18j) having VIII paratergites subquadrate with inner margin concave, dorsally fused, IX paratergite comparatively small and thumb shaped; first pair of gonocoxae large and subquadrate with posterior margin almost straight; small setae present on ovipositor. **Spermatheca** (Fig. 18k) with bulb elongated, apical end round, flanges of spermathecal pump present, pump region nearer to distal flange broader than to proximal, distal flange of pump comparatively broader and in disc shape, a sclerotized band present in between two flanges; distal and proximal spermathecal ducts almost same in their length and breadth; spermathecal dilation elongated, medially somewhat broader, membrane translucent.

Body size: Female 15.06 ± 0.47 and male 13 ± 0.8 long.

Material examined (FRI): 5♀♀ and 3♂♂; INDIA: TAMIL NADU: Jawalagiri, North Salem, 2♀♀, 18.v.1930, coll. unknown, sandal, [1♂, 10.vii.1930, 1♂, 18.vi.1930, 1♀, 12.vii.1930, 1♀, 29.vi.1930]. Jawalagiri; North Salem: 1♂, 12.vii.1930, coll. unknown, sandal; Jawalagiri; North Salem: 1♀, 18.vi.1930, coll. unknown, sandal.

***Chrysocoris purpureus* (Westwood, 1837)**

(Fig. 19; Plate. IV & XI)

Callidea purpurea Westwood, 1837: 15

Chrysocoris viridis Atkinson, 1887: 175; Kirkaldy, 1909: 294

Chrysocoris purpureus Stal, 1868: 10; Distant, 1902: 58

Body colouration dorsally metallic green with black spots over pronotum and scutellum; head, pronotum, scutellum, and sternum metallic green; first antennal segment, labium, coxae, trochanters, femora (except apices) tibiae and abdomen ochraceous, rest of antennal segments, apices of femora and tibiae metallic green or violaceous blue; small black punctures over pronotum and scutellum

Head (Fig. 19a) declivent, lateral margins deeply sinuated before eyes; tylus surpasses jugal lobes, breadth (4.05 ± 0.13) 1.2x to length (3.31 ± 0.21), preocular distance (1.51 ± 0.07) 2x to postocular (0.74 ± 0.09); eyes protruded laterally, ocelli located near to eyes than to each other; interocular distance (2.53 ± 0.13) 2x to interocellar (1.25 ± 0.1). **Antennae** five segmented; I antennal segment (1.18 ± 0.91) never extended beyond apex of head; II (0.44 ± 0.05) and only 0.4x to I; III 5.8x to II; IV longest amongst all and 1.4x to III; V (2.86 ± 0.27) 0.9x to IV; total antennal length 10.13 ± 1.27 . **Labium** four segmented; I labial segment smallest (1.09 ± 0.06); II longest (2.26 ± 0.11) and almost 2x to I while III (1.92 ± 0.14) and IV (1.7 ± 0.13) 1.7x and 1.6x, respectively to I segment; total labial length 6.97 ± 0.45 and extended upto II abdominal segment.

Pronotum (Fig. 19b) convexed, more towards base, anterior margin slightly sinuated, lateral margins straight, breadth at lateral angles (9.82 ± 0.33) 2.36x to anterior pronotal angles (4.15 ± 0.24), and length at middle 4.16 ± 0.24 , lateral pronotal angles obtuse; five black spots over surface, two at antero-lateral portion, and two at the posterior end while one at middle but more towards the posterior margin.

Scutellum (Fig. 19c) slightly convexed at base, anterior margin convex while apical end truncated, covers whole of the abdomen, length (10.6 ± 0.5) 1.2x to breadth (8.95 ± 0.6), seven black spots, six round located towards lateral side in pair while oblong spot and placed at middle near to base.

Legs with fore, middle and hind femora 3.62 ± 0.24 , 4.02 ± 0.31 and 5.53 ± 0.35 , respectively while fore, middle and hind tibiae 3.96 ± 0.25 , 4.01 ± 0.21 and 5.42 ± 0.35 , respectively; small hairs distributed all over the legs.

Exterior of metathoracic scent gland (Fig. 19d) with ostiole small, sunken, peritreme transverse, elevated upward, slightly grooved throughout the length; evaporatorium extended to mesothoracic region, surface is divided into two colour zone i.e., black and yellow, black surface sulcated with fine punctations while yellow surface is smooth.

Abdomen (Fig. 19e) ventrally convexed; breadth (8.09 ± 0.9) 1.1x to length slightly (7.34 ± 0.45), a black round spot on each ventro-lateral sides, small punctures towards lateral margins but medially it is smooth, arrangement of spiracles and trichobothria same as other species of this genus.

Male genitalia (Fig. 19f-h) having **pygophore** with dorso-posterior angle round, inner margin invaginated on its lateral and posterior side (Fig. 19f), strigils present in patches on dorsal surface. **Aedeagus** (Fig. 19g) with theca distally broad, I pair of conjunctival appendage sclerotized and apically cleft or bifurcated, II pair semisclerotized, anteriorly sclerotized and spinose; 3rd sclerotized and apically tapered, vesica completely sclerotized, apically notched before gonopore. Paramere (Fig. 19h) sickle shaped, stem broad, blade curved and strongly sclerotized, small setae at the base of blade.

Female genitalia (Fig. 19i-j) having **ovipositor** (Fig. 19i) with VIII paratergites triangular, fused dorsally, IX paratergites small, anterior margin convexed, elongated; first pair of gonocoxa subquadrate, lateral margins round, posterior margins sinuate, postero-interior angles round. **Spermatheca** (Fig. 19j) with bulb apically round, distal and proximal pump flanges in disc shaped, pump region small, distal and proximal spermathecal ducts almost subequal or previous slightly shorter than proximal, spermathecal dilation spherical and big, texture of dilation not transparent.

Body size: Female 18.28 ± 0.51 and male 17.84 ± 0.97 long.

Material examined (NPC): 10♀♀ and 8♂♂; INDIA: ANDHRA PRADESH: Guntur, 3♀♀ 1♂, 10.ii.1960, coll. Baldev, mango; Nandyal, 1♀, 27.ix.1912, coll. T.V.R., host unknown; KARNATAKA: Beeravalli, 1♀, 10.viii.1909, coll. C.N., host

unknown; 3♂♂, coll. Pooniah, xii.1913, host unknown; MADHYA PRADESH: Chindrawara, 1♂, 21.iv.1908, coll. C.W.M., host unknown; MAHARASHTRA: Nagpur: Maharaj bagh, 6.ii.1914, coll. C.S.M., cotton; 1♀, 6.ii.1914, cotton; Nagpur, 1♀, 10.i.1919, coll. A.G.R., cotton; Nagpur, 1♀, 1♂, 2.v.1920, coll. Ghosh, orange; Puna, 1♀, 15.xi.1907, cotton; TAMIL NADU: Palnis, Rodai Kanal (7000 ft), 24.viii.1921, coll. Fletcher, host unknown; Malabar: Tellicherry, 1♂, 3.viii.1907, coll. T.V.R., wild castor. MYANMAR: Mandalay, 1♀, 4.ix.1914, coll. Fletcher, host unknown; Mandalay division: Maymyo (3300 ft), 1♂, 19.viii.1914, coll. Fletcher, host unknown.

Chrysocoris stockerus (Linnaeus, 1758)

(Fig. 20; Plate. IV, VIII & XI)

Cimex stockerus Linnaeus, 1758: 441

Chrysocoris stockerus Stal, 1873: 20; Distant, 1902: 57

Callidea taprobanensis Westwood, 1837: 15; Kirkaldy, 1909: 294

Callidea erichsoni Germar, 1839: 113

Body colouration dorsally metallic green or indigo blue, with black spots over pronotum and scutellum. Head beneath, sternum, apices of femora, tibiae and round spots on ventro-lateral margins of abdomen shining brassy green. Basal margin of head beneath, I antennal segment, base of I labial segment, coxae, trochanters, femora (except apices), posterior margin of meso and metasterna, and abdomen ochraceous; rest of the antennal and labial segments and all tarsal segments brown to black, a large quadrate spot at base, stigmatal spots, inner lateral spots and apex of abdomen black.

Head (Fig. 20a) declivent, with breadth (3.39 ± 0.25) more than length (2.65 ± 0.35 mm), lateral margins before eyes deeply sinuated, tylus longer than jugal lobes, preocular distance (1.23 ± 0.06) almost 1.8x to postocular distance (0.67 ± 0.12). Eyes projected laterally, ocelli located below eyes, nearer to eyes than to each other (1.13 ± 0.07), eyes 2.15 ± 0.08 apart. **Antennae** five segmented, attached beneath head, near to eyes; I antennal segment (1 ± 0.11) longer than II (0.74 ± 0.97); later smallest amongst all; III (1.85 ± 0.1) 2.2x to II; IV (2.32 ± 0.28) 1.2x to III and V (2.48 ± 0.24) longest and almost 3.35x to II; the latter two segments flat and slightly grooved

medially; total antennal length 8.4 ± 0.9 and covered with small bristles. **Labium** four segmented; I labial segment smallest; II longest and 1.7x to I; III slightly longer than IV; total labial length 5.8 ± 0.33 and extends upto II or III abdominal segment.

Pronotum (Fig. 20b) convexed at base, anterior margin slightly sinuated, anterior angles acute while lateral obtuse, distance between lateral pronotal angles (8.11 ± 0.9) 2.27x to that of anterior (3.56 ± 0.25), while central pronotal length (3.55 ± 0.36) subequal to the later; eight spots on surface, 3 somewhat transverse spots near anterior margin, 3 large irregular sized discal spots near base and a single on each lateral pronotal angle.

Scutellum (Fig. 20c) with anterior margin almost straight, basally convexed, projecting posteriorly, covered almost whole of the abdomen, apically round, length (9 ± 0.78) 1.3x to breadth (6.91 ± 0.52). Seven spots present on dorsal surface; 6 round spot arranged in pairs located more towards lateral scutellar margins and one elongated present centrally.

Legs with fore, middle and hind femora 3.31 ± 0.18 , 3.42 ± 0.23 and 4.24 ± 0.24 , respectively while fore, middle and hind tibiae 3.35 ± 0.17 , 3.34 ± 0.22 and 4.2 ± 0.22 , respectively.

Exterior of metathoracic scent gland (Fig. 20d) with ostiole oval, peritreme transverse and elevated, grooved medially upto exterior end, evaporatorial surface rugulose and surface seemed distinct from sternum.

Abdomen (Fig. 20e) with ventral surface convex medially, breadth (7.13 ± 0.4), almost 1.1x to length (6.42 ± 0.46), spiracles located on lateral sides, and below a pair of trichobothria from III to VII abdominal segments, small hairs distributed all over the surface and more at genital plates.

Male genitalia (Fig. 20f-i) having **pygophore** (Fig. 20f) with posterior margin possessed small setae, proctiger oval to quadrangular, patches of strigils at anterior and latero-posterior margins, ventrally cup shaped (Fig. 20g), ventro-lateral pygophoral angles round. **Aedeagus** (Fig. 20h) with phallosome cup shaped and distally broad, 3 pairs of conjunctival appendages present, I pair completely sclerotized, medially broader with distal end round, II pair semisclerotized, apically membranous, III pair sclerotized and distally tapered; vesica completely sclerotized

and curved dorsally and bears the gonopore. **Paramere** (Fig. 20i) consists of a long broad stem and a curved blade at distal end, the proximal inner edge of the blade beset with dense setae.

Female genitalia having **ovipositor** (Fig. 20j) with VIII paratergites small, triangular, fused dorsally; IX paratergites small, inner margin round, unlike VIII paratergites not fused; first pair of gonocoxae large and somewhat quadrangular, small setae on plates. **Spermatheca** (Fig. 20k) with bulb elongated but distally round; distal and proximal pump flanges separated by a distinct pump region; spermathecal dilation large and spherical; within dilation present sclerotized rod through which passed spermathecal duct; proximal spermathecal duct small and narrow.

Body size: Female 16.4 ± 0.9 and male 14.01 ± 0.6 long.

Material examined (NPC): 7♀♀ and 12♂♂; INDIA: MAHARASHTRA: Pune, 1♂, 14.xii.1918, coll. Fletcher, host unknown. SRI LANKA: Arawa (Madulsima), 900ft, 1♀, 9.xii.1908 (1♂, 11.xii.1908; 1♀, 10.xii.1908; 1♀, 13.i.1909), coll. T.B. Fletcher, host unknown; Hambantota, 1♀, 4♂♂ (1♂, 16.xi.1907; 1♂, 9.i.1909; 3♂♂, 1♀, 6.ii.1909; 1♀, 7.ii.1909; 1♂, 30.xii.1908), coll. T.B. Fletcher, host unknown; Welibama, 1♂, 21.i.1908, coll. T.B. Fletcher, host unknown.

Chrysocoris stollii (Wolff, 1801)

(Fig. 21; Plate. IV, IX & XI)

Cimex stollii Wolff, 1801: 48

Scutellera stockerus Guerin, 1838: 159, 161

Callidea stockerus Westwood, 1842: 48

Callidea porphyricola Walker, 1867: 29

Chrysocoris stollii Stal, 1873: 21; Distant, 1902: 58

Body colouration generally metallic green or dark purplish blue, bear black spots over pronotum and scutellum, ventral surface purplish blue or black with green spots on sternum while abdomen brown to ochraceous, lateral margin pink or purple and black stigmata spots; antenna, III and IV labial segments brown; coxae, trochanters, femora (except apices) I and II labial segment ochraceous, apices of femora, tibia and tarsal segments black, ventrally; minute punctures on body except head, dense towards lateral sides of different body parts.

Head (Fig. 21a) declivent, with breadth (3.6 ± 0.2) 1.4x to length (2.65 ± 0.25), lateral margins near eyes deeply sinuated, tylus extended beyond jugal lobes; preocular distance (1.15 ± 0.1) 1.5x to postocular (0.75 ± 0.8); interocular distance (2.21 ± 0.16) almost 2x to inero-cellular (1.13 ± 0.1); and ocelli placed closer to eyes than to each other; two fascias from anterior to middle, another from base to middle of the head and one oval spots located near to each eye, lateral surface wrinkled. **Antennae** five segmented, ventrally located on head, near to eyes; I antennal segment (0.88 ± 0.05) never extended beyond apex of head; II (0.37 ± 0.05) smallest amongst all and only 0.4x to I; III (1.77 ± 0.1) 4.8x to II; IV (2.31 ± 0.11) 1.4x to III; V (2.49 ± 0.1) slightly longer than IV; total antennal length 7.84 ± 0.41 ; small hairs present (except I and II segment). **Labium** four segmented; I segment smallest (0.89 ± 0.1); II longest (1.89 ± 0.2) and 2.1x to I; III (1.45 ± 0.08) and IV (1.31 ± 0.09) subequal and almost 0.7x to II labial segment; total labial length 7.83 ± 0.32 and extended upto II abdominal segment.

Pronotum (Fig. 21b) with base convexed, distance within anterior pronotal angles (3.56 ± 0.41) subequal to breadth of head (3.6 ± 0.2), and 0.47x to lateral angles (7.57 ± 0.74), latter obtuse, possessed eight black spots on the surface, 3 small spots near anterior pronotal margin while 3 large, subquadrate or irregular sized spots at disc, extended to posterior pronotal margin and one round shaped at each lateral pronotal angle.

Scutellum (Fig. 21c) slightly convexed at base; covered almost whole of the abdomen, length (8.25 ± 0.78) 1.22x to breadth (6.76 ± 0.33), seven spots present on the surface, 6 in pairs, round to oval shaped, placed more towards lateral margin, one oblong V-shaped at middle, dense punctuation toward lateral sides.

Legs with fore, middle and hind femora 3.08 ± 0.21 , 3.27 ± 0.11 and 4.22 ± 0.24 , respectively while fore, middle and hind tibiae measured 3.27 ± 0.19 , 3.15 ± 0.15 and 4.48 ± 0.26 , respectively.

Exterior of metathoracic scent gland (Fig. 21d) with ostiole large oval, peritreme transverse with distal end curved and extended upto lateral margin of evaporatoria, grooved medially through out the length; evaporatoria extended upto half of the mesothoracic segment, surface rugulose with minute and dense punctations.

Abdomen (Fig. 21e) with almost equal in its length (6.71 ± 0.41) and breadth 6.58 ± 0.53 , ventrally convexed; round to subquadrate stigmal plate from II to VI segment at each lateral side; a pair of spiracles present from III to VII segments at each lateral side and just posterior to it a pair of trichobothria present. In case of female abdomen III to VII segment toothed or spined posteriorly on lateral side.

Male genitalia (Fig. 21f-h) having **pygophore** (Fig. 21f) with dorsal border semicircular; bearing patch of strigil, laterally on each side and another such patch extended along lower side of dorsal border; ventral margin flattened, bearing scattered setae; proctiger ovate with scattered setae. **Aedeagus** (Fig. 21h) with phallosome not heavily sclerotized, 3 pairs of conjunctival appendages present, first pair flattened and apically spinose, second pair membranous but apices sclerotized, third pair long, proximal half not sclerotized but, distal half strongly sclerotized; vesica curved apically, basally attached to ejaculatory reservoir. **Paramere** (Fig. 21i) highly sclerotized, dorsally hook shaped and bear a tuft of setae at the base of hook and stem stout.

Female genitalia (Fig. 21j-k) having **ovipositor** (Fig. 21j) with VIII paratergites triangular, posterior margin almost straight; IX paratergites comparatively small and in lobe shaped; medial end round; first pair of gonocoxae sub quadrate, posterior margin slightly sinuated. **Spermatheca** (Fig. 21k) with bulb apically round, distal and proximal pump flanges disc shaped, distal comparatively bigger than proximal; pump not sclerotized; distal spermathecal duct smaller than proximal duct; spermathecal dilation oblong and membranous; sclerotized rod distinct.

Body size: Female 15.6 ± 0.32 and male 13.6 ± 0.32 long.

Material examined (NPC): 35♀♀ and 48♂♂; INDIA: ANDHRA PRADESH: Hyderabad, 1♂, 5.vi.1941, coll. A.S.R., cotton; BIHAR: Pusa, 1♂, 2.viii.1915, (1♀, 20.viii.1915), coll. T. Ram; Pusa, 1♀, 28. viii.1915, coll. U. Bahadur, weeds; Pusa, 1♀, 10.i.1916, coll. Boy, (1♀, 27.ix.1915), host unknown; Pusa, 1♀, 12.iii.1915, coll. Md. S., *Justicia* hedge; (1♂, 25.vi.1916, coll. D. Nandan, host unknown; Pusa, 1♂, 8.iv.1918 (1♂, 11.iv.1918), coll. Fletcher, host unknown; DELHI, 1♂, 1♀, 29.iii.1938, coll. A. Singh, hollyhock; 1♂, 20.viii.1940, coll. M.G.R. Menon; host unknown; 1♂, viii.1945, coll. Jag Ram, grass; IARI, 1♂, 15.x.1953, coll. G.C.

Sharma, host unknown, IARI, 1♀, 20.x.1960, coll. M. Ram, kitchen garden; IARI, 19♀♀, 35♂♂, coll. Shama Parveen, jatropha; MAHARASHTRA: Nagpur, 1♂, 15.i.1919, coll. A.G.R., cotton; WEST BENGAL: Maldah, 9♀♀, 3♂♂, 5.xi.2008, coll. Samim Akhtar, weeds.

Genus *Eucorysses* Amyot and Serville, 1843

Eucorysses Amyot & Serville, 1843: 31

Type species by monotypy: *Eucorysses pallens* Amyot & Serville, 1843 (= *Cimex grandis* Thunberg, 1783)

Diagnosis: Generally pale yellow to brown coloured; large sized, more than 18mm, lateral margin of head moderately sinuated, lateral pronotal margins almost straight; scutellum and abdomen oval shaped; metathoracic scent gland with well developed ostiole and peritreme; tibiae entirely sulcated, strigil present on genital capsule; spermatheca with apical end globular, spermathecal dilation present.

***Eucorysses grandis* (Thunberg, 1783)**

(Fig. 22; Plate. V, IX & XII)

Cimex grandis Thunberg, 1783: 43

Cimex baro Fabricius, 1798: 528

Calliphara iris Germar, 1839: 128

Eucorysses superbus Uhler, 1860: 221; Kirkaldy, 1909: 295

Callidea distinguenda Uhler, 1861: 286; Kirkaldy, 1909: 295

Chrysocoris grandis Stal, 1873: 21; Distant, 1902: 54

Body colouration yellow to dark orange or brown with very fine punctures over pronotum and scutellum; antennae and labium black while coxae, trochanters, femora, tibiae and all tarsal segments are also black but with violaceous tinge, basal area of head to eyes and medially extended broadly beyond half length of head, then narrowed down before apex and head; punctations fine and sparse but dense on pronotum and scutellum.

Head (Fig. 22a) porrect, lateral margins slightly sinuated; tylus surpasses the jugal lobes; breadth (4.68 ± 0.22) 1.15x to length (4.07 ± 0.17), preocular distance (2.01 ± 0.4) 2.6x to postocular; eyes small not protruded laterally, interocular distance (2.74 ± 0.6) 1.65x to interocellar (1.66 ± 0.33) and placed more closer to eyes than towards each

other **Antennae** five segmented, ventrally located, near to eyes, I antennal segment (1.35 ± 0.15) never extended beyond apex of head; II smallest (0.51 ± 0.11) and $0.38x$ to I segment; III (3.78 ± 0.23) $7.4x$ to II while IV (4.46 ± 0.23) and V (4.4 ± 0.15) subequal; total antennal length 14.5 ± 0.65 . **Labium** four segmented, I labial segment smallest (1.68 ± 0.15); II longest (3.74 ± 0.15) and $2.23x$ to I; III slightly smaller than II while IV $1.7x$ to I segment; total labial length 11.74 ± 0.53 and extended upto III abdominal segment.

Pronotum (Fig. 22b) convexed at base, anterior margin straight or slightly sinuated, lateral margins straight, breadth within anterior (4.6 ± 0.46), almost $0.37x$ to posterior breadth (12.32 ± 1.15), and latter $2.2x$ to medial length (5.66 ± 0.62); a black spot from base of half of the length present but, in some individual it is obsoleted.

Scutellum (Fig. 22c) medially convexed, covered whole of the abdomen, breadth (10.28 ± 1.59) $1.5x$ to length (15.82 ± 1.47), basal margin convex while apical round, 3 discal spots, 1 oval at centre of the base and one subquadrate spot located before middle, adjacent to lateral margin and extended towards centre; some specimen possessed small spot near antero-lateral angles.

Legs with fore, middle and hind femora 4.84 ± 0.4 , 5.5 ± 0.3 and 7.02 ± 0.24 , long respectively while respective tibiae 5.18 ± 0.25 , 5.2 ± 0.35 and 6.76 ± 0.23 long; small and dense hairs distributed over tibial and tarsal segments.

Exterior of metathoracic scent gland (Fig. 22d) with ostiole oval, peritreme transverse, exterior end of peritreme raised from evaporatorial surface, grooved near to ostiolar region, evaporatorial surface black and rugulose, extended upto mesothoracic segment.

Abdomen (Fig. 22e) elongated, oval shaped and medially convexed; length (12.76 ± 1.31) $1.13x$ to breadth (11.26 ± 1.47), a spiracle located on each lateral side from III-VII segments and also on VIII paratergites; a pair of trichobothria located posterior to each spiracle except, VIII paratergites; ventral surface of abdomen devoid of any punctations; very small and sparse pale coloured hairs present.

Male genitalia (Fig. 22f-i) with **pygophore** (Fig. 22f) bearing strigil on dorso-posterior surface, ventral and ventro-lateral margins slightly sinuated, proctiger oval; dorso-lateral margins convexed. **Aedeagus** (Fig. 22h) with phallosome highly

sclerotized, first pair of conjunctival appendages slender, sclerotized, second pair long, divided into two parts; first part membranous, flattened, second part sclerotized proximally, pouched-shaped distally, third pair slender, bilobed, heavily sclerotized; vesica broad before gonopore and apically toothed. **Paramere** (Fig. 22i) apically hook-shaped, stem much elongated, cylindrical and stouter than blade, connected with a membranous part; bearing a tuft of setae at the base of hook.

Female genitalia (Fig. 22j-i) with **ovipositor** (Fig. 22j) having VIII paratergites triangular, separated medially, each paratergite with a spiracle, located at basal inner angle; IX paratergite small, triangular and narrow; first pair of gonocoxae broad, subquadrate with inner margin slightly curved, apices round. **Spermatheca** (Fig. 22i) with bulb large, apex round constricted near middle; distal flange of pump flattened while proximal notched, distal and proximal spermathecal ducts almost equal; spermathecal dilation elongated or spindle shaped with many longitudinal folds.

Body size: Female 27.85 ± 1.2 and male 24.02 ± 0.34 long.

Material examined (NPC): 3♀♀ and 3♂♂; INDIA: ASSAM: Guwahati, 1♂, 18.vi.1921, coll. Fletcher, host unknown; MEGHALAYA: Barapani, 1♀, 22.viii.2009, coll. B.S. Wungmareo, ground nut; Barapani, 1♂, 12.v.2010. coll. Shama Parveen, ornamental plant; WEST BENGAL: 2♀♀, Indian Museum Collection, No- 1205 and 1206, collector and host unknown. MYANMAR: Lashio, 1♂, 6.iv.1918, coll. A.G.R., host unknown.

Genus *Lamprocoris* Stal, 1865

Lamprocoris Stal, 1865: 34; Schouteden, 1904: 27

Type species by subsequent monotypy (Stal, 1866): *Lamprocoris lateralis* (Guerin-Meneville, 1838: 159)

Diagnosis: Body colour variable, with blue green to brown-orange; lateral margins of head sinuated before eyes, the second antennal segment slightly smaller than third, but third segment not double or more than double to II segment, some individual with their lateral pronotal angle produced laterally in spine; metathoracic scent gland with well developed ostiole and peritreme; thoracic sternum and abdomen ventrally

without any sulcation, scutellum U-shaped; lateral margin of abdomen not completely covered by scutellum, spermathecal dilation present.

Key to species

1. Body indigo blue or metallic green, lateral margins of head slightly sinuated; lateral pronotal angles obtuse; lateral margins of each abdominal segment normal; spermathecal bulb elongated with apex quadrate, spermathecal dilation globular with anterior and posterior surface suppressed; phallosome small and quadrate, paramere with apex end blunt.....*roylii*
- 1'. Body reddish ochraceous or violaceous, lateral margins of head deeply sinuated; lateral pronotal angles spinose, lateral margins of each abdominal segment medially constricted and appear as bilobed; spermathecal bulb elongated with apex round; spermathecal dilation oval; phallosome comparatively large and broad; paramere with apex spinose.....*spiniger*

Lamprocoris roylii (Westwood, 1837)

(Fig. 23; Plate. V, IX & XII)

Callidea roylii Westwood, 1837: 16

Callidea histeroides Walker, 1867: 28

Callidea scripta Walker, 1867: 28

Callidea gibbula Walker, 1867: 28

Lamprocoris roylii Distant, 1902: 63

Body colouration metallic green or indigo blue; antennae and labium brown to black; lateral margins of abdomen and pronotum red, abdomen beneath green or bluish black, legs black with metallic green tinge; blue or black spots over pronotum and scutellum, fine and dense punctations on dorsal as well ventral surface; **Head** (Fig. 23a) small, lateral margins sinuated before eyes, tylus generally longer to jugal lobes or sometime equal, breadth (2.5 ± 0.09) $1.3x$ to length (1.9 ± 0.11), preocular distance (0.9 ± 0.14) $1.6x$ to postocular (0.5 ± 0.08); interocular distance (1.6 ± 0.1) $1.8x$ interocellar (0.9 ± 0.06); eyes protruded laterally and touched anterior pronotal angles.

Antennae five segmented, ventrally located on head, near to eyes; I antennal segment (0.61 ± 0.06) longer than II; II segment smallest (0.49 ± 0.02) and $0.8x$ to I; III (0.86 ± 0.07) $1.76x$ to II; IV (1.2 ± 0.12) $1.4x$ to III; V segment longest (1.7 ± 0.1) and $1.4x$ to IV; total antennal length 4.85 ± 0.4 ; hairs present sparsely on first two segments and densely on III-V segment. **Labium** four segmented; I labial segment smallest (0.68 ± 0.048); II (1.4 ± 0.1) almost $2.13x$ to I; while III (0.9 ± 0.07) $0.6x$ to II; IV (1 ± 0.05) $1.1x$ to III; total labial length (4 ± 0.27) and extended beyond posterior coxae.

Pronotum (Fig. 23b) convexed at base, anterior margin slightly sinuated with prominent antero-lateral angles, pronotal lateral margins straight; lateral pronotal angles big and obtuse, distance between lateral angles (6.9 ± 0.3) 2.5x than anterior pronotal angles (2.7 ± 0.09) and almost 2x to medial length (3.5 ± 0.11); seven bluish black spots with different shapes located on dorsum of pronotum, 3 spots of variable sized on each lateral side and one long medial spot extended within base to subapical part of pronotum.

Scutellum (Fig. 23c) more or less round shaped, covers almost entire abdomen except lateral sides of abdomen, slightly convexed at base; breadth (6.6 ± 0.31) 1.3x to length (5 ± 0.5); ten spots on the surface, 2 adjacent to anterior margin more towards antero-lateral angle, 1 medial, towards basal part, 1 pair of broad band like transverse located centrally on disc, 1 just below it and adjacent to lateral margins, 2 round spots in pair and 1 oval spot subapically, punctures dense and regular.

Exterior of metathoracic scent gland (Fig. 23d) with ostiole elongated and opened into transverse peritreme which is medially grooved through out length, exterior end elevated, surface is black, evaporatorium grayish black, wrinkled and extended to mesothoracic segment.

Legs with fore 2.6 ± 0.17 and middle 2.9 ± 0.11 femora longer to its corresponding tibiae (3.3 ± 0.16 and 2.4 ± 0.14 , respectively); while in case of hind leg, tibia (3 ± 0.16) longer than femur (2.4 ± 0.11); small hairs present, more densely on tibiae and tarsomeres.

Abdomen (Fig. 23e) convexed ventrally, breadth (5 ± 0.52) 1.36x to its length (6.7 ± 0.21), I-IV intersegmental suture of abdomen almost straight while V-VI strongly convexed anteriorly; small and sparse punctures on ventral surface, a spiracle located from III to VII abdominal segment on each lateral sides and a pair of trichobothria located posterior to each spiracle.

Male genitalia (Fig. 23f-i) having **pygophore** somewhat rectangular in outline, dorso-posterior pygophoral margin (Fig. 23f) slightly concave, latero-posterior margins toothed, inner surface possess setae, ventral margin (Fig. 23g) semicircular, setae present on margins as well as surface; proctiger oval and bilobed. **Aedeagus** (Fig. 23h) with phallosome cup shaped, distally more flattened and somewhat pointed

on dorsal side, a pair of strongly sclerotized process present which is produced laterally, I and II pair of conjunctival appendages fused basally, basally membranous and broad, apically tapered into strongly sclerotized curved or hooked shape spine, and dorso-posterior end sclerotized, one pair of conjunctival lobes, apically sclerotized and produced in spine; its margins toothed; II pair sclerotized and rod like, III pair of conjunctival appendages absent; vesica curved and pointed distally.

Paramere (Fig. 23i) semisclerotized, stem elongated, cylindrical, not strongly sclerotized, blade curved on inner side, apically blunt and strongly sclerotized, setae present at the base of blade, stem elongated and cylindrical.

Female genitalia (Fig. 23j-k) having **ovipositor** (Fig. 23j) with VIII paratergites triangular, posterior margin straight widely separated towards centre; IX paratergites thumb like, end towards middle round; first pair of gonocoxae large and triangular with lateral margins round, posterior margin almost straight, surface depressed medially; small setae distributed on the plates. **Spermatheca** (Fig. 23k) with bulb elongated, apically round; distal pump flange small and disc shaped, proximal flange indistinct; distal spermathecal duct globular at base of pump region; distal and proximal spermathecal duct subequal, proximal almost 2 times broader than distal, spermathecal dilation spherical but depressed at both surfaces; sclerotized rod absent.

Body size: Female 12.36 ± 0.67 and male 11.30 ± 0.19 long.

Material examined (NPC): 4♀♀ and 13♂♂; INDIA: DELHI: IARI: 1♂, 28.viii.2007, coll. Shama Parveen, sorghum; HIMACHAL PRADESH: Simla, 1♀, viii.1904, coll. C.M.C., host unknown; UTTARAKHAND: Bhowali (5700 ft), 1♂, 29.vi.1939, coll. H.S. Pruthi, host unknown; Kumaon, 1♀, 18.vi.1912, coll. Dr. Cameroon, host unknown; Musoorie (6500 ft.), 1♀, 2♂♂, vi.1912, coll. Harcourt, host unknown; Musoorie hills (5-7000 ft.), 1♀, 4.x.1937 (29.ix.1934, 1♂, 24.vi.1940, 1♂), coll. Dr. H.S. Pruthi, host unknown; Nainital (6-7000 ft.), 1♂, 1-4.vii.1937, coll. T. Ahmad, host unknown; Nainital (6300 ft), 2♂♂, 14.x.1959, coll. Baldev Pd., wild herbs; UTTAR PRADESH: Hathras, 1♂, 29.vii.2007, coll. Shama Parveen, grass; Mathura, 1♂, 27.vii.2007, coll. Shama Parveen, maize. MYANMAR: Lashio (3000 ft), 2♂♂, 23-24.viii.1914, coll. Fletcher, host unknown.

***Lamprocoris spiniger* Dallas, 1849**

(Fig. 24; Plate. V & XII)

Callidea spiniger Dallas, 1849: 186

Lamprocoris spiniger Distant, 1902: 64

Body colouration ochraceous or reddish ochraceous, head dorsal and ventral, lateral pronotal margins of pronotum, ventral surface of pronotum, base of scutellum and sometime apices of femora as well as tibiae brassy green with, I and II antennal segment brown with reflection of green while rest of the antennal segment and labium brown; lateral abdominal margins reddish, body regularly punctated.

Head (Fig. 24a) with breadth (3.57 ± 0.13) 1.25x to length (2.9 ± 0.18), lateral margins deeply sinuated before eyes; tylus extended beyond jugal lobes, latter apically subquadrate; preocular distance (1.37 ± 0.09) 1.6x than postocular (0.85 ± 0.06); interocular distance (2.37 ± 0.12) 1.7x to interocellar (1.4 ± 0.08) and closely situated to eyes than to each other. **Antennae** (Fig. 21b) five segmented, located ventrally on head, near to eyes; I antennal segment (0.95 ± 0.05) never extended beyond apex of head, II smallest (0.8 ± 0.81) and only 0.8x to I, III (1.53 ± 0.3), 1.9x to II, IV (2.3 ± 0.27), 1.5x to III, and V (2.45 ± 0.13) generally longest or subequal to IV segment, total antennal length 8.02 ± 0.6 ; small hairs distributed on all antennomeres.

Labium four segmented; I labial segment smallest (1.2 ± 0.08); II longest (1.97 ± 0.09) and 1.6x to I; III (1.55 ± 0.06) and IV (1.47 ± 0.09) long; total labial length 6.2 ± 0.2 and extended beyond posterior coxae.

Pronotum (Fig. 24c) convexed, anterior pronotal margin deeply sinuated, angles pointed anteriorly; antero-lateral margins reflexed, straight or slightly curved, anterior part possessed prominent green or violaceous callus marking; lateral pronotal angles spined and produced transversely, distance between lateral angles (11.2 ± 0.43) almost 3x to the anterior angle (3.95 ± 0.13), and 2x to medial pronotal length (5.42 ± 0.17); thick punctation on the surface except anterior region.

Scutellum (Fig. 24d) convexed, oval in shape, lateral margins round, with apex round and broad, basal angles in fold, scutellar length (10.47 ± 0.22) slightly more than its breadth (9.22 ± 0.17), covered whole of the abdomen except lateral sides.

Legs normal, length of tibiae more than their corresponding femora except in case of fore legs; length of fore, middle and hind femora 3.95 ± 0.13 , 4.37 ± 0.09 and 5.3 ± 0.08 , respectively while fore, middle and hind tibiae measured 4.12 ± 0.15 , 4.07 ± 0.09 and 5.05 ± 0.06 , respectively.

Exterior of metathoracic scent gland (Fig. 24e) with ostiole elongated and narrow, peritreme transverse and curved towards exterior end, grooved through out the length, evaporatorium black, extended to the basal region of mesopleuron, surface wrinkled.

Abdomen (Fig. 24f) ventrally convexed; breadth (8.87 ± 0.33) subequal or slightly more than length (8.2 ± 0.32); each segment slightly or deeply convexed and every sternum sinuated or depressed on lateral side; a single spiracle located laterally on III to VII segments and a pair of trichobothria just below each spiracle.

Male genitalia (Fig. 24g-j) with **pygophore** (Fig. 24g) having dorso -posterior margin notched medially, lateral pygophoral margins almost straight, ventro-posterior margin arcuate medially (Fig. 24h); proctiger globular; dorsal as well as ventral pygophoral surfaces covered with small hairs. **Aedeagus** (Fig. 24i) long, phallosome bowl shaped, distally more broad, strongly sclerotized; I and II pairs of conjunctival appendages form a single structure, basally membranous and broad and apically tapered and completely sclerotized, III pair distinct, basally broad and medially toothed, apically sclerotized and pointed; vesica distally much broader, tapering into gonopore. **Parameres** (Fig. 24j) with almost straight, strong and cylindrical stem, blade curved on its inner side, setae present at base of blade.

Female genitalia (Fig. 24k-l) having **ovipositor** (Fig. 24k) with VIII paratergites triangular and comparatively larger than IX paratergites, posterior margin straight; IX paratergites medially separated; first pair of gonocoxae large, lateral margins narrow, posterior margin clefted towards inner side; small and sparse setae present on plates.

Spermatheca (Fig. 24l) with bulb elongated, apically round, subapically somewhat constricted; distal and proximal pump flanges disc shaped, pump sclerotized except basally, distal and proximal spermathecal duct almost of same length but latter more broader, approximately 1.5x to distal, spermathecal dilation big and ovate, membrane with light and dark bands in zigzag pattern.

Body size: Female 19.3 and male 18.1 long.

Material examined (NPC): 1♀ and 3♂♂; INDIA: MANIPUR: Ukhrul, 1♂, 16.iv.2010, coll. B.H.D, mango; MEGHALAYA: Shillong, 1♂, ix.1920, coll. Fletcher, host unknown; Shillong (Khasi Hills, 5000 ft), 1♀, 26.ix.1927, coll. Fletcher, host unknown; Tamin, 1♂, 6.xi. 2007, coll. NPIB, host unknown.

Genus *Poecilocoris* Dallas, 1848

Poecilocoris Dallas, 1848: 100; Stal, 1864: 33; Mayr, 1866: 17; Schouteden, 1904: 20

Poecilochroma White, 1842: 84

Ioglena Stal, 1873: 12; Kirkaldy, 1909: 305

Type species by monotypy *Cimex drurarei* Linnaeus, 1771: 534

Diagnosis: Body pale yellow to orange-red to brown with black spots, dorsally round to ovate with strongly convex pronotum and scutellum; lateral margins of head generally sinuated, tylus longer than jugal lobes; antennae always five segmented, I segment never extended beyond apex of head, labium of variable length and always extended beyond posterior coxae; anterior pronotal margins deeply sinuated, scutellum round to ovate covered whole of abdomen, connexiva slightly exposed at repose; metathoracic scent gland ostiole with well developed ostiole and transverse peritreme; evaporatorium extended upto mesothoracic segment; ventrally abdomen furrowed slightly upto middle of length; females with eighth paratergites always with spiracle, spermatheca bulb elongated and bent at different length and angle, proximal and distal flanges always developed, spermathecal dilation double walled; in case of males, ventro-posterior margin of pygophore always with slight to deep sinuation, phallosome in tubular shape, parameres apically bifurcated.

Key to species

1. Body bluish black with red strips on pronotum, scutellum and ventral surface of abdomen; body moderately convexed; labium extended upto posterior coxae; dorso-ventral margin of pygophore broadly sinuated*interruptus*
- 1'. Body pale yellow to orange brown; body strongly convexed; labium extended beyond posterior coxae; dorso-ventral margin of pygophore moderately sinuated2
2. Phallosome strongly sclerotized, with basal part narrow while apically broadened, assuming cup shape; 2nd pair of conjunctival appendages apically hammer shaped.....*hardwickii*
- 2'. Phallosome not strongly sclerotized; elongated and tubular shaped of the same thickness or broadened medially; 2nd pair of conjunctival appendages not hammer shaped.....3

3. Pronotum always with four spots, 2 at anterior pronotal and 2 adjacent to posterior margin; distal part of abdomen without any remarkable spot; apical part of distal spermathecal duct broader, almost 4x to basal part.....*latus*
- 3'. Pronotum not with four spots; ventral surface of abdomen always with remarkable spots; apical part of distal spermathecal duct almost of the uniform thickness throughout the entire length.....4
4. Pronotum with a transverse black band, extended between anterior pronotal angles; spermathecal bulb elongated*druræi*
- 4'. Pronotum with a transverse black band, extended between lateral pronotal angles through anterior margin spermathecal bulb bent apically.....5
5. Lateral margins of head almost straight*rufigenis*
- 5'. Lateral margins of head deeply sinuated.....6
6. Lateral pronotal angles broadly obtuse; scutellum with 11 spots; 1 spot at middle of the base in roughly w-shaped; spermathecal bulb remarkably bent almost at middle and at an angle of 90° *ornatus*
- 6'. Lateral pronotal angles not broadly obtuse; scutellum with 9 spots; spermathecal dilation oval and bulb slightly curved at middle.....*lewisi*

***Poecilocoris druræi* (Linnaeus, 1771)**

(Fig. 25; Plate. V & XII)

Cimex druræi Linnaeus, 1771: 534

Poecilocoris druræi Dallas, 1848: 103; Distant, 1902: 45

Poecilocoris obsoletus Dallas, 1848: 104

Poecilocoris drurayi Lethierry & Severin, 1893: 20

Poecilochroma drurayi Stal, 1873: 12

Poecilocoris heissi Ahmad and Kamaluddin, 1982: 271

Body colouration orangish red dorsally with black spots, head (dorsal and ventral), antennae, labium, sternum (except lateral margins of pro sternum), legs and abdomen (except middle part) black, rest of parts red; eyes and ocelli pale brown; body possessed small pale hairs.

Head (Fig. 25a) tapered anteriorly, with breadth $(3.9 \pm 0.16)1.2x$ to the length (3.3 ± 0.17) , lateral margins slightly sinuated and reflexed, tylus with apex pointed, longer than jugal lobes, preocular distance $(1.7 \pm 0.8) 2.1x$ to postocular (0.8 ± 0.05) ; interocular $(2.5 \pm 0.11) 2.1x$ to interocellar (1.2 ± 0.05) , surface punctuate but densely towards lateral margins and near to eyes. **Antennae** five segmented, ventrally located on head near to eyes; I antennal segment (1 ± 0.06) extended beyond apex of head; II smallest (0.72 ± 0.08) and $0.7x$ to I; III $(2.1 \pm 0.2) 3x$ to II; IV (2.4 ± 0.25) and V (2.5 ± 0.12) subequal; total antennal length 8.8 ± 0.72 , small pale hairs distributed on

antennomeres. **Labium** four segmented, I labial segment smallest (1.3 ± 0.14); II longest (2.85 ± 0.16) and 2.2x to I; III (2.5 ± 0.11) 0.9x to II; IV (2.2 ± 0.08) 1.1x to III; total labial length 8.9 ± 0.34 and extended upto IV abdominal segment.

Pronotum (Fig. 25b) convexed at base, anterior pronotal margin deeply sinuated, anterior angles toothed; antero-lateral pronotal margins obliquely straight and reflexed; distance within lateral angles (10.4 ± 0.66) 2.5x to anterior (4.1 ± 0.16) and medial length (4.2 ± 0.23); a continuous black band within anterior lateral angles through anterior margin and two big subquadrate spot present, more towards posterior margin.

Scutellum (Fig. 25c) convexed basally, not covering whole of the abdomen, connexivia exposed; length (11.2 ± 0.6) 1.2x to breadth (9.5 ± 0.7) lateral scutellar margins round; apex narrow and round; 11 spots, one broad spot of irregular shape at anterior margin, one at each antero-lateral angles, one at middle on each lateral sides, 6 in pairs on either side of mid-dorsal scutellar line.

Exterior of metathoracic scent gland (Fig. 25d) with ostiole round and sunken open in black transverse peritreme grooved through entire length; evaporatorium grayish black and extended upto mesothorax.

Legs with fore, middle and hind femora 3.8 ± 0.06 , 4.3 ± 0.26 and 5.25 ± 0.35 , respectively and tibiae 4 ± 0.07 , 4 ± 0.17 and 5 ± 0.31 long, respectively.

Abdomen (Fig. 25e) flattened ventrally, breadth (10.25 ± 0.5) 1.2x to length (8.6 ± 0.12); medially anterior margin sulcated; abdomen sulcated medio-longitudinally upto IV or V sternae; inter segmental sutures curved; a spiracle on each lateral side from III to VII segment and also on VIII paratergite, and a pair of trichobothria below each spiracle except VIII paratergite.

Male genitalia (Fig. 25f-i) with **pygophore** as long broad (Fig. 25f), dorso-median surface inpushed, dorso lateral lobes (Fig. 25g) with sub acute apices at inner margins, proctiger oblong and apically rounded. **Aedeagus** (Fig. 25h) with a pair of semi sclerotized conjunctival lobes, apically round, a pair of rod like thecal appendage present; vesica funnel shaped and possessed small lateral projections. **Paramere** (Fig. 25i) robust and strongly sclerotized stem broad medially and grooved on inner side, a tuft of setae at the base of blade, apex of blade bifurcated distinctly.

Female genitalia (Fig. 25f-g) having **ovipositor** (Fig. 25f) with VIII paratergites triangular, not meeting centrally posterior margin straight, a spiracle present on inner basal angle; IX paratergites comparatively small and triangular, medially distinct; first pair of gonocoxae subquadrate, inner margin convexed; small setae present on plates but more on posterior margins. **Spermatheca** (Fig. 25g) with bulb long and simple, apex round; distal pump flange larger than proximal, latter disc shaped; pump region with base bulbous, distal spermathecal duct narrow at base but widened distally; spermathecal dilation round, proximal spermathecal duct uniformly thick and only 0.75 x as long as distal one.

Body size: Female 19.6 ± 1.07 and 18.2 ± 0.15 long.

Material examined (NPC): 5♀♀ and 2♂♂; INDIA: MEGHALAYA: Khasi hills (5000 ft), 1♀, v.1929, coll. D. P. Singh, host unknown; Shillong (5000 ft), 2♀♀, 1♂, vi.vii.1918, coll. Fletcher, host unknown; Shillong (4900 ft), 1♀, 31.v.1918, coll. Y.R. Rao, host unknown; Shillong, 1♀, 10.vi.1920, coll. Fletcher, host unknown. NEPAL: Kathmandu; 1♂, 1967; coll. M.M.S; host unknown.

***Poecilocoris hardwickii* (Westwood, 1837)**

(Fig. 26; Plate. VI, IX & XII)

Tectocoris hardwickii Westwood, 1837: 13; Dallas, 1851: 13; Distant, 1902: 45

Pachycoris nepalensis Herrich and Schaeffer, 1839: 339; Dallas, 1851: 13

Scutellera hardwickii Germar, 1839: 135; Dallas, 1851: 13; Distant, 1902: 45

Poecilocoris hardwickii Dallas, 1848: 107; Dallas, 1851: 13

Poecilocoris anisopilus walker, 1867: 9; Distant, 1902: 45

Body colouration above yellowish-orange or red; head above and beneath shiny black or violaceous blue; antennae, labium and legs dark brown to black, ocelli brown or red, sternum except lateral margins and I to III and medial part of VII abdominal segment black while lateral margins of sternum and rest of abdominal segments red. Body rather thickly and finely punctured.

Head (Fig. 26a) anteriorly produced; breadth (4 ± 0.08) 1.1x to length (3.5 ± 0.19), lateral margins sinuated near eyes; tylus extended beyond jugal lobes, preocular distance (1.9 ± 0.12) 1.9x to postocular (1 ± 0.17); ocelli placed more closer to eyes than to each other; interocular distance (2.6 ± 0.09) 2.3x to interocellar distance

(1.13 ± 0.05). **Antennae** five segmented, I antennal segment 1.33 ± 0.16 long; II smallest (1 ± 0.05) and $0.8x$ to I; III (3.2 ± 0.17) and $3.2x$ to II; IV (3.4 ± 0.14) slightly longer than III while V longest (4 ± 0.17) and $1.2x$ to IV; total antennal length 12.5 ± 0.45 . **Labium** four segmented; I labial segment smallest (1.5 ± 0.14); II longest (2.9 ± 0.09) and $1.5x$ to I; III (2.32 ± 0.17) and IV (2.33 ± 0.1) subequal and $0.8x$ to II, extended upto IV abdominal segment.

Pronotum (Fig. 26b) with anterior margin deeply sinuated, anterior angles distinctly toothed, antero-lateral margins reflexed; postero-lateral margins smooth; lateral angles obtused; distance within lateral pronotal angles (12.7 ± 0.5) $2.35x$ to anterior and $2.2x$ to medial pronotal length (5.4 ± 0.3); two large, oval black spots on disc and one transverse broad black marking along anterior pronotal margin and also anterior angle narrow band extended along lateral margins.

Scutellum (Fig. 26c) convexed through out the length but more towards base, covered whole of abdomen, apex round and broad, length (14.8 ± 0.64) $1.1x$ to breadth (13.8 ± 0.5), majority of specimens possessed eleven irregular shaped black spots, three spots of different shape and size located at the base, of which the central one largest, elongated-triangular, a small round one on each side of the apex of this, a transverse row of four across the disc, behind the middle, two intermediate spots largest, and two smaller towards apex, but in some specimens these spots very small sized and two spots obliterated, these spots generally either more or less confluent.

Exterior of metathoracic scent gland (Fig. 26d) with ostiole round and small, peritreme transverse, almost straight, exterior end elevated upward, grooved throughout entire length; evaporatorial surface black and wrinkled, extended upto basal part of mesothorax.

Legs possessed dense hairs, more on tibiae and tarsomeres, length of fore, middle and hind femora 4.9 ± 0.14 , 5.72 ± 0.2 and 7.45 ± 0.21 , while that of fore, middle and hind tibia 5.57 ± 0.21 , 5.7 ± 0.37 and 7.87 ± 0.35 , respectively.

Abomen (Fig. 26e) strongly convexed; breadth (12.2 ± 0.93) $1.1x$ to length (11 ± 0.93), spiracles located near to the lateral margins from III to VII and on VIII paratergites, and a pair of trichobothria below each spiracle except VIII paratergites,

intersegmental sutures in curved but in case of females VI segment in subquadrate shape while in males V- shaped.

Male genitalia (Fig. 26f-i) with **pygophore** (Fig. 26f) having posterior margin sinuate, postero-lateral angles round (Fig. 26g), lateral and posterior margins possessed numerous setae, dorso-lateral area also covered with dense setae; proctiger oval. **Aedeagus** (Fig. 26h) strongly sclerotized; phallosome cup shaped with basal part narrow and apically broadened; conjunctival lobes strongly sclerotized except apical part of the II pair of conjunctival appendages; II pair of conjunctival appendages apically hammer shaped; vesica completely sclerotized and apically notched, assuming a hook shape. **Paramere** (Fig. 26i) robust and elongated, apically stem curved and hooked with apex highly sclerotized and pointed.

Female genitalia (Fig. 26j-k) with **ovipositor** (Fig. 26j) with VIII paratergites triangular and sulcated medially; spiracle present at inner basal angle of VIII paratergites; IX paratergites comparatively small and lobe like, first pair of gonocoxae subquadrate, lateral margins somewhat round, inner and posterior margins straight. **Spermatheca** (Fig. 26k) with bulb elongated and slightly depressed at subapical region, apex round; distal pump flange shorter than proximal flange; distal spermathecal duct narrow at base compared to apical end; spermathecal dilation round, proximal duct long and of uniform thickness.

Body size: Female 24.35 ± 0.35 and male $23. \pm 25$ long.

Material examined (NPC): 12♀♀ and 3♂♂; INDIA: MEGHALAYA: Khasi Hills (5000 ft.), 2♀♀, v. 1929, coll. D.P. Singh, host unknown; Shillong (5000 ft.), 6♀♀, ix.1917, coll. Fletcher, host unknown; Shillong, Khasi Hills, 2♂♂, viii-x.1919, coll. Fletcher, host unknown; Shillong (5000 ft.), 2♀♀, 1♂, 27.viii.1928, coll. Dutt, host unknown.

***Poecilocoris interruptus* (Westwood, 1837)**

(Fig. 27; Plate. VI, IX & XII)

Tectocoris interrupta Westwood, 1837: 14; Dallas, 1851: 12

Scutellera interrupta Herrich-Schäffer, 1839: 73; Dallas, 1851: 12; Kirkaldy, 1909: 306

Poecilochroma interrupta Stal, 1873: 13; Kirkaldy, 1909: 306

Poecilocoris interruptus Dallas, 1848: 102; Distant, 1902: 48; Kirkaldy, 1909: 306

Body colouration dorsally black with greenish tinge and red patches or spots; ocelli red, legs brown (except all tarsal segments) while antennae, labium, peritreme and tarsal segments brown to black; red marking or strips on pronotum, scutellum and abdomen (ventral); punctures on dorsal and ventral surface.

Head (Fig. 27a) with breadth (2.6 ± 0.16) $1.2x$ to length (2.6 ± 0.22), lateral margins sinuated slightly, tylus projected beyond jugal lobes, later subquadrate apically; preocular distance (1.27 ± 0.09) $1.8x$ than postocular (0.7 ± 0.1); antero-lateral surface wrinkled; interocular space (2.1 ± 0.11) $2x$ than interocellar (1 ± 0.08); ocelli placed closer to eyes than to each other. **Antennae** five segmented; I antennal segment (1.05 ± 0.1) never extended beyond apex of head, II (0.62 ± 0.07) smallest and $0.6x$ to I; III (2.1 ± 0.13) and IV (2 ± 0.08) subequal and $3.3x$ to II while V (2.5 ± 0.12) longest and $1.25x$ to IV; total antennal length 8.3 ± 0.5 . **Labium** four segmented; I labial segment (1.07 ± 0.06) smallest; II longest (1.9 ± 0.07) and $1.8x$ to I; III (1.4 ± 0.1) and IV (1.3 ± 0.1) subequal and almost $1.25x$ to I; total labial length 5.7 ± 0.33 and extended upto posterior coxae.

Pronotum (Fig. 27b) with anterior margin sinuated deeply; antero-lateral angles prominent; antero-lateral margins slightly sinuated and recurved, lateral angles obtuse, postero-lateral margins straight distance within posterior pronotal angles (8.5 ± 0.6) $2.6x$ to anterior angles (3.3 ± 0.15) and $1.7x$ to medial length (3.5 ± 0.3); C-shaped red mark on lateral sides of pronotum more towards base and a small pointed mark at middle of the base available.

Scutellum (Fig. 27c) convexed through out entire length, more towards apex, anterior margin convex, antero-lateral angles produced anteriorly; lateral pronotal margins straight or slightly round towards apex, widely round and broad at apex; covered almost whole of abdomen except sides of corium slightly exposed; length (8.8 ± 0.4) $1.2x$ to breadth (7.2 ± 0.3); a central transverse red mark interrupted in the middle and one mark on the apical margin.

Legs length of fore, middle and hind leg 5.08 ± 0.21 , 3.91 ± 0.15 and 3.43 ± 0.25 , respectively while fore, middle and hind tarsi 5.46 ± 0.24 , 4.1 ± 0.1 and 3.92 ± 0.25 , respectively.

Exterior of metathoracic scent gland (Fig. 27d) with ostiole round and deeply situated, exteriorly open in transverse peritreme, grooved throughout the length, lateral end directed upward; evaporatorial surface smooth and extended upto mesothoracic segment.

Abdomen (Fig. 27e) ventrally convexed; breadth (8.9 ± 0.6) 1.2x to length (7.25 ± 0.5); sanguineous or reddish to ochraceous transverse mark on the bases of III to VI abdominal segments and marginal abdominal spots at the apices of the incisures; a spiracle present on each lateral side from 3rd to VII and VIII paratergite and a pair of trichobothria caudal to spiracles except VIII paratergites, abdomen sulcated ventrally at base, in females intersegmental suture between VI and VII sterna convex anteriorly and lateral margins subacute.

Male genitalia (Fig. 27f-i) having **pygophore** (Fig. 27f) with dorsal surface medially concave, dorso-lateral lobes projecting inward with rounded apices, proctiger ovate,, ventro-posterior margin medially concave. **Aedeagus** (Fig. 27h) with phallosoma tubular, sclerotized, without dorsal thecal appendages; one pair of semisclerotized dorsal conjunctival appendages, apically membranous; one pair of sclerotized spine-like ventral thecal appendages available; vesica elongated, but apically narrow and curved. **Paramere** (Fig. 27i) with short blade having apex acute, curved in hook or sickle shape, stem cylindrical and grooved on inner side, a tuft of setae at the base of blade.

Female genitalia (Fig. 27j-k) with **ovipositor** having VIII paratergites triangular and possessed spiracle at antero-basal angle, IX paratergites comparatively short and lobe like (Fig. 27j), first pair of gonocoxae triangular, posterior margin straight, postero-medial angles round. **Spermatheca** (Fig. 27k) with bulb elongated, apically bulbous and medially curved; proximal and distal pump flanges well developed and enclosed an elongated pump region, distal spermathecal duct narrower and longer than proximal duct; spermathecal dilation large and almost round or globular.

Body size: Female 15.5 ± 0.9 and male 14.4 ± 0.64 long.

Material examined (NPC): 4♀♀ and 5♂♂; INDIA: DELHI: 1♂, 9.viii.1959, coll. C.C.A. host unknown; HIMACHAL PRADESH: Simla, Kandaghat, 2♂♂, 1♀, v.1941, coll. S.R. Varma, stored fruits; Simla, 1♀, 19.vii.1944, coll. Bose, host

unknown; 1♂, 8.iii.1946, coll. R.N. Kalra, sheesham; PUNJAB, 1♂, vii.1909, coll. G.M., host unknown; UTTRAKHAND: Kumaon, Muktesar (7500 ft), 1♀, 15-24.iv.1922, coll. Sen, host unknown; Mussorie, 1♀, 2.vii.1939, coll. J.D., weed.

***Poecilocoris latus* Dallas, 1848**

(Fig. 28; Plate. VI, IX & XII)

Poecilocoris latus Dallas, 1848: 101

Poecilochroma lata Sharp, 1890: 412; Kirkaldy, 1909: 305

Poecilocoris latus Distant, 1902: 44

Body colouration yellow to orange red with dark green or black spots over pronotum and scutellum; head black, ventrally metallic green or blue, antennae, labium, legs (except basal half of femora) and lateral part of black with bluish hue while rest of the body pale to orange red.

Head (Fig. 28a) declivent, tylus extended to jugal lobes, apically head quadrate, lateral margins slightly sinuated, breadth (4.5 ± 0.12) 1.2x to length (3.8 ± 0.15), preocular distance (2 ± 0.11) 2.35x to postocular (0.85 ± 0.1); ocellus red and placed more closer to eyes than to each other, interocular (2.9 ± 0.2) 2.1x to interocellar (1.4 ± 0.14). **Antennae** five segmented; I antennal segment 1.2 ± 0.04 long; II smallest (1.5 ± 0.15) and 0.95x to I; III (2.7 ± 0.08) 2.3x to II, IV (3.45 ± 0.18) 1.3x to III while V longest (3.8 ± 0.26) and 1.1x to IV segment; total antennal length 12.3 ± 0.48 . **Labium** four segmented; I labial segment smallest (1.9 ± 0.22); II longest (3.3 ± 0.08) and 1.7x to I; III (3 ± 0.13) 0.9x to II while IV (2.5 ± 0.17) 0.8x to III; total labial length 10.6 ± 0.3 and extended upto III or IV abdominal segment.

Pronotum (Fig. 28b) with anterior margin sinuated deeply; anterior pronotal angles prominently toothed, antero-lateral margins straight, lateral pronotal angles distinctly large and obtuse; distance within lateral pronotal angles (13.6 ± 0.7) 2.8x to the anterior angles (4.8 ± 0.26) and 2.6x to the medial pronotal length (5.3 ± 0.37); posterior pronotal margin not straight, slightly sinuated at both lateral angles; four green or black irregular shaped spots on the surface, anterior two spots comparatively and located at anterior pronotal angles while two large extended from posterior margin to mid of pronotum.

Scutellum (Fig. 28c) ovate, convexed through out the length; anterior scutellar margin convexed with angles small and round, lateral margins curved with apex broad and U-shaped; covered whole of the abdomen, length (14.4 ± 0.54) and breadth (13.9 ± 1.2) subequal; seven spots of irregular shape and size present, two spots small at antero-lateral angles, one smallest at each lateral sides, two spots before apex and one large bilobed at anterior margin.

Legs with fore, middle and hind femora 6.75 ± 0.23 , 5.6 ± 0.25 and 4.9 ± 0.15 long, respectively while corresponding tibiae 6.9 ± 0.3 , 5.1 ± 0.38 and 5.2 ± 0.1 long.

Exterior of metathoracic scent gland (Fig. 28d) with ostiole, round and small, opened in transverse tube like peritreme, grooved throughout the length; evaporatorial surface wrinkled, minute punctations over surface and extended upto the half of mesothorax.

Abdomen (Fig. 28e) flattened, medio-ventrally sulcated upto VI segment; breadth (13.6 ± 1.3) 1.3x to length (10.5 ± 0.86); a spiracle located on each lateral side from III to VII segment and also VIII paratergites and a pair of trichobothria present, caudal to each spiracle except VIII paratergites.

Male genitalia (Fig. 28f-i) having **pygophore** (Fig. 28f-g) slightly longer than broad, dorso-median surface concave, lateral margins round, postero-lateral angles round, proctiger quadrangular, setae present on the margins and posterior surface. **Aedeagus** (Fig. 28h) tubular, a pair of broad, semisclerotized dorsal conjunctival appendages present, membranous at base and apically sclerotized, a pair of thin spine like sclerotized ventral appendages present, vesica short. **Paramere** (Fig. 28i) with stem broad, blade curved and apically bifurcated, inner surface grooved, tuft of setae present at base.

Female genitalia (Fig. 28j-k) with **ovipositor** (Fig. 28j) having VIII paratergites triangular shaped, widely separated and with single spiracle on inner corner and more towards lateral margin; IX paratergites comparatively small; first pair of gonocoxae subquadrate, posterior margin slightly convexed. **Spermatheca** (Fig. 28k) with bulb curved at sub medially, distal pump flange larger as compared to proximal flange, distal spermathecal duct not of uniform thickness, at base narrow but very thick distally, almost 4x, duct constricted before proximal pump flange; spermathecal

dilation oval shaped, membrane striated; proximal spermathecal duct long and narrow with uniform thickness.

Body size: Female 24.26 ± 0.74 and male 22.63 long.

Material examined (NPC): 6♀♀ and 4♂♂; INDIA: ASSAM: 1♂, 11.ii.1911, coll. unknown, tea; MEGHALAYA: Shillong (5000 ft.), 1♀, 27.viii.-9.ix.1926, coll. Dutt, host unknown; Barapani, 3♀♀, 2♂♂, 10.v.2010, coll. Shama Parveen, tea; TRIPURA: 2♀♀, 1♂, 6.vi.2009, coll. NPIB, tea.

***Poecilocoris lewisi* (Distant, 1883)**

(Fig. 29; Plate. IX)

Poecilochroma lewisi Distant, 1883: 419

Poecilocoris lewisi Yang, 1934:266

Poecilocoris separabilis Yang, 1934: 260

General colouration dorsally ochraceous or brown, with black spots on dorsum, black spots possess metallic green coloured small spots, ocelli red, I antennal segment, labium except apical end of IV segment and peritreme yellow or orange while rest of the antennal and labial segments brown; ventrally body metallic green with lateral margins yellow, coxae and trochanter yellow, femora yellow with green reflection; tibiae green with black tarsal segments, ventrally abdomen yellow with green stigmatal plates on lateral sides.

Head (Fig. 29a) with breadth ($4. \pm 0.16$) $3.1x$ to length (3.5 ± 0.19); lateral margins sinuated before eyes; tylus extended beyond jugal lobes, preocular distance (1.7 ± 0.08) more than $1.5x$ to postocular (1.01 ± 0.14), interocular distance (2.5 ± 0.17) $2.1x$ to interocellar (1.2 ± 0.08), surface with thick and dense punctations and more towards lateral margins. **Antennae** five segmented; I antennal segment ($1. \pm 0.07$) never extended beyond apex of head; II smallest (0.8 ± 0.05) and $0.8x$ to I; III (2.2 ± 0.1) $2.75x$ to II; IV (2.5 ± 0.08) $1.1x$ to III while V longest (2.9 ± 0.1) and $1.2x$ to IV; total antennal length 9.37 ± 0.3 . **Labium** four segmented; I labial segment smallest (1.44 ± 0.1); II longest (2.9 ± 0.22) and $1.4x$ to I; III (2.4 ± 0.11) $0.7x$ to II while IV (2.1 ± 0.08) $0.9x$ to III; total labial length 8.9 ± 0.32 and extended upto IV abdominal segment.

Pronotum (Fig. 29b) with anterior margin sinuated; anterior pronotal angles pointed anteriorly, antero-lateral and postero-lateral margins somewhat straight; lateral pronotal angles round, posterior margin also slightly depressed; distance between posterior pronotal angles (10.5 ± 0.6) 2.5x to anterior angles and 2.6x to medial length (4.04 ± 0.25); a continuous brown or black band within lateral angles through anterior margin and two big subquadrate spots present, more towards posterior margin and occupied more than middle area of pronotum anteriorly.

Scutellum (Fig. 29c) dorsally not convexed as in other members of the genus, covered whole of abdomen, anterior pronotal margin convexed, apically subquadrate, length (10.7 ± 0.48) slightly more than breadth (9.75 ± 0.68); nine spots of different shapes and size present on surface, one oblong at each basal angle, one M-shaped confluent medially, adjacent to anterior margin, one oval medially, near to each lateral side, one large and subquadrate adjacent to lateral, sometime they are medially fused and two at apical portion.

Exterior of metathoracic scent gland (Fig. 29d) with ostiole small and oval, peritreme transverse with exterior end upwardly curved; medially grooved, evaporatorium rugulose and extended upto mesothoracic segment.

Legs with hind (5.35 ± 0.3) and middle femora (4.44 ± 0.17) longer to their corresponding tibiae (5.25 ± 0.21 and 4.1 ± 0.25), respectively, while in case of fore leg femur (3.6 ± 0.1) shorter than tibia (3.9 ± 0.22).

Abdomen (Fig. 29e) flattened, with breadth (9.9 ± 0.35) 1.2x to length (8.3 ± 0.26), spiracles present on III-VII abdominal venter and also on VIII paratergites and a pair of trichobothria caudal to each spiracle except VIII paratergites, intersegmental suture between segment VI and VII curved in U-shape; a black subquadrate spot present on III-VI segments, VII segment almost completely black.

Female genitalia having (Fig. 29f-g) **ovipositor** (Fig. 29f) with VIII paratergites triangular, posterior margin straight, latero-posterior angle pointed, IX paratergites comparatively small and lobe-like; first pair of gonocoxae triangular and large, posterior margin depressed twice. **Spermatheca** (Fig. 29g) with bulb comma shaped; distal and proximal pump flanges well developed but latter larger than former, distal

spermathecal duct of uniform diameter, spermathecal dilation round; proximal spermathecal duct also possessed almost same length and thickness as distal duct.

Body size: Female 18.2 ± 0.91 long.

Material examined (NPC): 6♀♀; INDIA: UTTARAKHAND: Jyolicot, 5♀♀, 6-7.vi.1915, coll. H.H.P, apricot; Ranikhet (8000 ft), 1♀, 20.vi.1939, coll. H.S. Pruthi, host unknown.

Poecilocoris ornatus Dallas, 1851

(Fig. 30; Plate. VI)

Poecilocoris ornatus Dallas, 1851: 15; Distant, 1902: 48

Body colouration: dorsally orange- yellow to ochraceous, head black; ocelli brown to red, sternum and head beneath golden green except lateral margins of prosternum and evaporatorium of metathoracic scent gland; I antennal segment yellow to orange while rest of the segments, labium and all tarsal segment brown; coxa and trochanters ochraceous to brown red, femora and tibia brown with green reflection; abdomen ventrally ochraceous with a large subquadrate golden green spot on lateral sides of each segment.

Head (Fig. 30a) with breadth (4.17 ± 0.15) $1.2x$ to length (3.6 ± 0.2), lateral margins slightly sinuated, tylus distinctly longer than jugal lobes, preocular distance (1.6 ± 0.7) $1.6x$ to postocular (1.05 ± 0.7), interocular distance (2.5 ± 0.11) $2x$ to interocellar distance (1.27 ± 0.06); ocelli placed more closer to lateral margin than to eyes.

Antennae five segmented; I antennal segment (1.07 ± 0.06) never extended beyond apex of head, II smallest (0.85 ± 0.13) and $0.85x$ to I; III (2.2 ± 0.15) $2.6x$ to II; IV (2.7 ± 0.1) $1.4x$ to III while V longest (2.9 ± 0.15) and $1.1x$ to IV; total antennal length 9.72 ± 0.5 . **Labium** four segmented, I labial segment smallest (1.6 ± 0.21); II longest (2.8 ± 0.06) and $1.75x$ to I; III (2.5 ± 0.1) $0.9x$ to II while IV (2.2 ± 0.15) also $0.9x$ to III; total labial length 9.07 ± 0.21 and extended upto V abdominal segment; apical tip of segment possessed conspicuous fine setae.

Pronotum (Fig. 30b) with anterior margin sinuated deeply, anterior pronotal angles prominent; antero-lateral margins obliquely straight; posterior pronotal angles obtuse,

posterior margin slightly curved; distance within posterior pronotal angles (11 ± 0.7) 2.5x to anterior (4.4 ± 0.06) and 2.4x to medial length, brown or black confluent patch within lateral margins through anterior margin, two large sub quadrate black spots located on disc more towards base.

Scutellum (Fig. 30c) oval, convexed towards base and covered almost whole of abdomen, basal margin convexed; antero-lateral angles round, apically ovate and broad, length (11.7 ± 0.3) 1.2x to breadth (9.8 ± 0.2); 11 spots of irregular shape present dorsally, one irregular W-shaped at base, one at each antero-lateral angle, 6 in pairs of variable shapes and size, placed on disc, more towards middle and one small round in middle but near to each lateral margins.

Legs with length of fore, middle and hind femora 3.97 ± 0.05 , 4.5 ± 0.1 and 5.87 ± 0.32 , respectively while length of fore, middle and hind tibiae 4.17 ± 0.05 , 4.3 ± 0.11 and 5.73 ± 0.3 , respectively.

Exterior of metathoracic scent gland (Fig. 30d) with ostiole oval, sunken open in black, transverse peritreme, grooved through out the length, evaporatorial surface orange and red coloured, surface wrinkled, extended upto mesothoracic segment.

Abdomen (Fig. 30e) flattened ventrally, breadth (11.03 ± 0.25) 1.36x to length (8.06 ± 0.25); a green sub quadrate spot present from III to VI segments on each lateral side and also on VII, spot on VII segment extended through out segment and medially attained knob shaped; spiracle located on each latera side from III to VII and also on VIII paratergites and caudal to it a pair of trichobothria except VIII paratergites.

Female genitalia (Fig. 30f-g) with **ovipositor** (Fig. 30f) having VIII paratergites triangular and medially distinctly separated, spiracle present at inner corner, towards lateral margin, posterior margin with small setae, IX paratergites comparatively small and lobe shape (Fig. 30f); first pair of gonocoxae large subquadrate, lateral margins round, posterior margin distinctly sinuated. **Spermatheca** (Fig. 30g) with bulb curved sub medially, but apically narrowed slightly; proximal pump flange larger as compared to distal pump; distal spermathecal duct not uniformly thick throughout length; spermathecal dilation round and double walled; proximal duct almost of same length as distal but with uniform thickness.

Body size: Female 16.7 and male 15.9 long.

Material examined (NPC): 1♀ and 2♂♂; INDIA: MEGHALAYA: Shillong (5000 ft), 1♂, vi-vii.1918, coll. Fletcher, host unknown; Shillong (5000 ft), 1♀, 24.v.1924, coll. Bose, host unknown; Shillong, Khasi Hills (5000 ft), 1♂, v.1929, coll. D.P. Singh, host unknown.

***Poecilocoris rufigenis* Dallas, 1851**

(Fig. 31; Plate. VII)

Poecilocoris rufigenis Dallas 1851, 14; Distant 1902, 49

Poecilocoris capitatus Yang, 1934:264

Body colouration dorsally ochraceous or red with green and purple spots on pronotum and scutellum; head brown to black, base and central lobe of head, basal margin of scutellum, antennal segments except I segment, labium, transverse segmental spots to sternum and abdomen, and legs, black or bluish black.

Head (Fig. 31a) with lateral margins slightly sinuated or almost straight, apex round, tylus longer and projecting beyond jugal lobes, breadth 1.25x to length; preocular distance 2.3x to postocular interocular distance 2x to interocellar; ocelli placed near to eyes than to each other, thickly punctate near to ocelli and lateral margins.

Antennae five segmented; I segment never extended beyond apex of head, II smallest; III almost 3.5x to II segment; IV and V segment mutilated. **Labium** four segmented; I labial segment smallest; II longest and extended upto VI abdominal segment.

Pronotum (Fig. 31b) with anterior margin deeply sinuated, anterior angles pointed, lateral pronotal margins straight, lateral pronotal angles obtuse or round; distance between posterior angles 2.4x to anterior and 2.3x to the medial length, posterior pronotal margin almost straight; anterior and lateral margins black, two large black subquadrate spots on disc, more towards base.

Scutellum (Fig. 31c) with anterior margin convexed; medially convexed through out length; apex broad and round; length 1.3x to breadth, seven spots present on dorsal surface, one at base, 3 large confluent spots on each lateral side and extended upto middle.

Exterior of metathoracic scent gland (Fig. 31d) with ostiole small and round, peritreme transverse, exterior end slightly elevated, evaporatorial surface extended upto mesothoracic segment, surface wrinkled and with fine punctations.

Abdomen (Fig. 31e) grooved medio-ventrally upto V abdominal segment; breadth 1.2x to length, subquadrate spot on III to VII segment on each lateral side, a spiracle on each lateral side from III-VII and VIII paratergites and a pair of trichobothria posterior to spiracle, except VIII paratergites.

Female genitalia having **ovipositor** (Fig. 31f) with sparsely distributed setae, VIII paratergites large and triangular with spiracle near each inner corner; medially widely separated and latero-posterior angle pointed, IX paratergites lobe like and comparatively small; first pair of gonocoxae large and subquadrate, posterior margin sinuated.

Material examined (FRI): 1♀; INDIA: UTTARAKHAND: Musoorie: 1♀, vi.1921, coll. F.Z., host unknown.

Genus *Scutellera* Lamarck, 1801

Scutellera Lamarck, 1801: 293; Dallas, 1851: 4; Stal, 1864: 33; Schouteden, 1904: 22

Type species: *Cimex nobilis* (non Linnaeus, 1763): Fabricius, 1775 (= *Tectocoris perplexa* Westwood, 1837: 4

Diagnosis: body oblong and pilose; colouration vary from metallic green to blue with black spots on dorsal and ventral surface. Head triangular and porrect; lateral margins sinuate. First antennal segment never goes beyond apex of head; second smallest, labium extends upto 3rd or 4th abdominal segment. Anterior pronotal margin depressed slightly; anterior angles obtuse; posterior margin produced posteriorly at both sides. Scutellum long and finely punctured; apex truncate. Mesosternum distinctly sulcated, peritreme sickle shaped. Ventrally abdomen furrowed beyond half of the abdomen.

Key to species

1. Scutellum possessed 9 black spots; posterior margin of VIII paratergites almost straight; first pair of gonocoxae subquadrate.....*fasciata*
- 1'. Scutellum possessed 11 spots; posterior margin of VIII paratergites convexed posteriorly; first pair of gonocoxae triangular shaped*perplexa*

***Scutellera fasciata* (Panzer, 1797)**

(Fig. 32; Plate. VIII)

Cimex fasciata Panzer, 1797: 108; Dallas, 1851: 19

Tectocoris nepalensis Westwood, 1837: 19

Callidea lanius Stal, 1854: 231

Scutellera amethystina Vollenhoven, 1863: 12

Body colouration dorsally metallic bluish- green or purplish, central fascia to head, and spots on pronotum and scutellum black; I antennal, I and II labial segment, coxae, trochanters and femora yellow or ochraceous, rest of the antennal and labial segments, tibia and tarsal segments brown, lateral margins of pronotum bright orange, brown spots on each ventral abdominal segment which extended upto middle; sterna green or blue with lateral margins ochraceous.

Head (Fig. 32a) porrect, lateral margins sinuated before eyes; tylus longer and projected beyond jugal lobe; breadth 1.1x to length; dorsally sulcated; preocular distance 1.7x to postocular; interocular distance 2.1x to interocellar. **Antennae** (Fig. 32b) five segmented; II antennal segment smallest; I and III subequal while IV longest; small and dense hairs distributed over III to V segment, II possessed sparse hairs while I completely devoid of hairs. **Labium** four segmented; I labial segment smallest; II longest; extended upto III abdominal segment.

Pronotum (Fig. 32c) with anterior margin sinuated, anterior pronotal angles pointed anteriorly; antero-lateral margins straight but constricted medially; lateral angles obtuse; distance between lateral angles 1.75x to anterior angles and 1.8x to medial length; 5 black spots, one central elongated, from anterior to posterior margin, one round near to each lateral angle and one quadrate from posterior margin to middle; two transverse series of thick and dense punctations, one near to anterior margin and another before middle.

Scutellum (Fig. 32d) elongated, anterior margin almost straight, covered almost whole of abdomen, apical margin of wings exposed; generally 12 irregular shaped and sized spots present, one elongated, medial, extended from base to half of scutellar length, one oval near to base but more towards lateral angles, two round adjacent to each lateral sides, one comparatively larger extended beyond middle, adjacent to

lateral margins and one apical. In some individuals these spots confluent and counted only 10 in number.

Exterior of metathoracic scent gland (Fig. 32e) with ostiole small and slit like, opened into sickle shaped peritreme, grooved almost entire length, evaporatorial area small and restricted only to metathoracic region, surface smooth.

Legs same as in *Scutellera perplexa*.

Abdomen (Fig. 32f) elongated, centrally grooved from base to beyond middle of the abdomen; spiracles present from III to VII segments on each lateral sides and a pair of trichobothria below each spiracles, a greenish black spot on each lateral side and extends to the middle from III to VII segment.

Female genitalia with ovipositor (Fig. 32g) having dense setae, more on posterior margin; VIII paratergites subquadrate and large and widely separated; latero-posterior angle round; IX paratergites comparatively small, first pair of gonocoxa large and subquadrate; lateral margins somewhat round, inner and posterior margins straight.

Material examined (FRI): 1♀; MYANMAR: Zibingul: Mandalay district, 1♀, ix.1935, coll. D.F.O., host unknown.

Scutellera perplexa (Westwood, 1837)

(Fig. 33; Plate. VIII, IX & XII)

Cimex nobilis (non Linnaeus, 1763): Fabricius, 1775: 697

Tectocoris perplexa Westwood, 1837: 4

Scutellera nobilis Distant, 1902: 51

Scutellera brevisrostris Breddin, 1909: 258. Synonymized by Distant, 1918: 116

Body colouration metallic green or violaceous blue, head, pronotum (except lateral margins), pronotum, head beneath and sternum (except extremity) metallic green or blue, lateral margins of pronotum, peritreme, ventral abdomen (except stigmatal spots) and ocelli red; first antennal segment, coxae, trochanters and femora (except apices) dark orange or red while rest of the antennal segments, apices of femora, tibiae and tarsal segments black with metallic green tinge; labium brown to black.

Head (Fig. 33a) porrect, tylus round distally, projected beyond jugal lobes; lateral margins sinuates near eyes; length (3.74±0.31) 0.95x to breadth (3.93±0.16), preocular distance (1.91±0.08) 1.9x to postocular (1±0.06), interocular distance

(2.69 ± 0.11) 1.9x to interocellar (1.4 ± 0.06), two black elongated spot from anterior to posterior end of head; eyes touches the anterior pronotal angles; ocelli red and located near to eyes than to each other. **Antennae** five segmented; I antennal segment (0.99 ± 0.05) never extended beyond apex of head; II smallest (0.73 ± 0.04) and 0.73x to I; III (1.84 ± 0.18) 2.5x to II; IV (2.44 ± 0.22) longest and 1.32x to III while V (2.3 ± 0.11) 0.94x to IV; total antennal length measured 8.3 ± 0.48 . **Labium** four segmented, I labial segment smallest (1.68 ± 0.22); II longest (3.13 ± 0.13) and 1.68x to I; III (2.56 ± 0.16) 0.81x to II while IV (2.3 ± 0.14) 0.89x to III; total labial length 9.67 ± 0.53 and extended upto IV or V abdominal segment.

Pronotum (Fig. 33b) with anterior margin sinuated, anterior angles acute; antero-lateral margins slightly sinuated; red coloured, lateral pronotal angles big and obtuse, posterior angles produced, distance between lateral angles (8.7 ± 0.65) 2.09x to anterior angles (4.15 ± 0.23) and 1.84x to medial length (4.72 ± 0.33); a row of punctations observed in between anterior pronotal angles and second similar row of punctations observed posteriorly, four black spots in pairs located posterior to second row, of these, former on disc while latter on posterior angles, one elongated median spot extends from anterior to posterior pronotal margin.

Scutellum (Fig. 33c) slightly convexed dorsally, anterior margin almost straight, anterior angles simple rounded; lateral pronotal margins almost straight, apex broad, subquadrate; length (11.9 ± 1.04) 1.65x to breadth (7.18 ± 0.61), covered almost whole of abdomen except lateral and posterior part of abdomen; 9 black spots present on scutellum; one long extended from base to almost middle of scutellum and 8 roughly round spots located much before apex, 6 spots arranged in 3 pairs on either side of central elongated spot.

Legs with length of fore, middle and hind femora 3.36 ± 0.21 , 3.95 ± 0.24 and 5.03 ± 0.36 while fore, middle and hind tibiae 3.92 ± 0.16 , 4.23 ± 0.16 and 5.52 ± 0.35 long, respectively.

Exterior of metathoracic scent gland (Fig. 33d) with ostiole narrow and slit like, peritreme long and sickle shaped, grooved at least half of length; evaporatorium restricted only to metathoracic region, surface moderately wrinkled.

Abdomen (Fig. 33e) elongated, convexed medially; length (10.3 ± 0.68) 1.25x to breadth (8.2 ± 0.76); distinctly furrowed longitudinally and mid-ventrally extended upto fifth segment, where labium retained when not in use; a pair of trichobothria distinct posterior to each spiracle from III to VII segments, a series of green to bluish transverse spots observed on the ventro-lateral aspects.

Male genitalia (Fig. 33f-i) having **pygophore** (Fig. 33f-g) with posterior margin possessed two sclerotized spines, ventro-lateral margin straight; dorsal margin semicircular, proctiger elongated with a tuft of setae, thick and dense setae on dorsal as well as ventral surfaces. **Aedeagus** (Fig. 33h) with phallosome basally narrow, distally broad, bearing a small spinose process, laterally with sclerotized areas; first and second pair of conjunctival appendages fused into a flat structure, divided into two parts, basal part representing first pair of appendages, membranous, pointed into a blunt sclerotized apex, second portion representing the second pair of appendages, which is also membranous, apically tapering to a sclerotized spine, third pair of conjunctival appendages slender and highly sclerotized; vesica narrow, curved distally, tapered to gonopore. **Paramere** (Fig. 33i) with stem long, cylindrical uniformly stout, inner margin more sclerotized, hooked at apex, latter pointed and a tuft of setae at apex of stem.

Female genitalia (Fig. 33j-k) having **ovipositor** (Fig. 33j) with VIII paratergites triangular, narrow, widely separated posteriorly; posterior margin straight, first pair of gonocoxae large, hairy posterior margin somewhat convex, dense setae present on all plates. **Spermatheca** (Fig. 33k) with bulb apically round and constricted, both the pump flanges distinct, pump narrow; spermathecal duct narrow and spermathecal diation globular.

Body size: Female and male 21.4 ± 1.65 and 19.3 ± 0.88 long, respectively.

Material examined (NPC): 87♀♀ and 74♂♂; INDIA: ASSAM, 1♀, v.1913, coll. N.C.D., host unknown; BIHAR: Pusa, 2♂♂, 24.vii.1906, coll. T.R.C., weeds; Pusa, 1♂, 29.iii.1910, coll. H.M.L., host unknown; Pusa, 1♂, 2.viii.1916, coll. H. Singh, weeds; Pusa, 1♀, 16.iv.1913, coll. D.P.S. (1♂, 1♀, 13.vii.1927); Pusa, 1♀, 22.ix.1913, coll. C.B.S., host unknown; Pusa, 1♀, 16.iv.1913, coll. D.P.S., (1♂, 1♀, 13.vii.1927), host unknown; Pusa, 1♀, 22.ix.1913, coll. C.B.S., host unknown; Pusa,

1♂, 2.viii.1916, coll. H. Singh, weeds; Pusa, 1♂, 14.iii.1918, coll. R. Saran, host unknown; Pusa, 1♂, 14.iii.1918, coll. R. Saran, host unknown; Pusa, 1♂, 14.vii.1927, coll. Bose, host unknown; Pusa, 1♂, 14.vii.1927, coll. Bose, host unknown; Chapra, 1♂, 1♀, coll. Mackenzie, host unknown; DELHI: IARI, 35♂♂, 42♀♀, 5-12.ix.2007, coll. Shama Parveen; jatropha; 18♂♂, 24♀♀, 19-25.xii.2009, coll. Shama Parveen, cotton; PUNJAB: Gojra, 2♂♂, 2♀♀, 11.vii.1906, coll. C.S.M., ficus; Gurdaspur, 1♂, 5♀♀, 13.x.1918, coll. A.G.R., ber; Victor point, 1♀, 1.i.1922, coll. Sharma, host unknown; UTTARAKHAND: Garhwal: Landsdown, 1♀, 19.x.1909, host unknown; UTTAR PRADESH: Aligarh, 3♂♂, 2♀♀, vii.2009, coll. Shama Parveen, jatropha. SRI LANKA: Madulsima, 1♂, 23.xii.1908, coll. T.B. Fletcher, host unknown; Uva: Taldana (1000 ft), 1♀, 10. viii.1908, coll. T.B. Fletcher; host unknown; Arawa: Madulsima (900 ft), 1♂, i.1909, (1♂, 1♀, 26.v.1908), coll. T.B. Fletcher, host unknown.

4.4 Biology of *Scutellera perplexa*

Scutellera perplexa was observed as a serious sucking pest of *Jatropha curcas* Linnaeus from Delhi and adjoining areas. This species causes severe damage to foliage and developing fruits. To study the biology, they were observed almost for two consecutive years *i.e.*, between April 2007 and 2009 under laboratory and field conditions. It remained active throughout the year and was observed between July and March. Population density was highest between September and November. The life cycle takes about 63.3 ± 3.07 days; egg period lasted for 6.67 ± 0.87 days with 98.87 ± 2.24 per cent hatchability and nymphal durations of I, II, III, IV and V instar were 5.33 ± 0.82 , 7.95 ± 0.68 , 6.15 ± 0.91 , 7.54 ± 0.76 and 9.69 ± 1.18 days, respectively. A key to the identification of different instars is given. It was observed at Delhi and adjoining areas. Because little was known of its ecology, studies on seasonal activity in the field and bionomics (under field and laboratory conditions) were done between April 2007 and 2009. Results are presented herein.

Seasonal occurrence: Adults appeared starting the last week of June or first week of July, and remained active until the following March with reduced activity during extremely hot and cold months. Egg batches and adults were abundant between September and October, with nymphal instars abundant between second week of July and fourth week of August. The bugs migrated to adjacent plants or weeds as and when the leaves dry and fall.

Mating behaviour (Plate XIIIb): Copulation started within 14.9 ± 0.77 days ($n=11$) after emergence of adults and pairs remained in copulation in end to end position (Plate XIIIa) for 2.05 ± 0.49 hours ($n=10$). Copulation was repeated intermittently for 1.70 ± 0.45 days ($n=10$).

Oviposition: females oviposited 5.95 ± 0.86 days ($n=18$) after mating and eggs were laid in batches of two rows and these are light yellow (Plate XIIIc); number of eggs per batch was 36.47 ± 6.70 ($n=15$) with a total fecundity of 68.17 ± 12.51 ($n=6$). Eggs were laid either on the leaves or muslin cloth (in the laboratory) and under field conditions, egg batches were observed on leaf surfaces (77.5%), petioles (17.5%) and

stems (5.0%). When leaves fall (i.e. December to January), females oviposit in leaf litter (Plate XIIIId) from which neonates emerge (Plate XIIIe-f).

Duration and description of juveniles and adults

Egg (Fig. 34a-c): eggs were firmly glued by a sticky secretion, and these change from light yellow to orange and bright red just before hatching. Eggs were oblong and measured 1.57 ± 0.09 mm \times 1.19 ± 0.07 mm (n=10). A well chitinized, triangular or T-shaped egg burster with 22-26 chorionic processes was present near the top of each egg shell, and arranged adjacent to the micropylar boundary (Fig. 34a-b). At hatching, the chorion opened distally (Fig. 34c) allowing a cap to separate out, which either remained attached or was completely detached. A few hours (7.93 ± 1.56 hrs) (n=10) before hatching, eyes of the first instar were observable through the chorion. The incubation stage lasted 6.67 ± 0.87 days (n=31) with 98.87 ± 2.24 per cent hatchability.

First instar (Fig. 34d): these aggregated without any feeding over or near empty chorion for about 1.65 ± 0.36 days (n=10). Nymphs were rounded, and darkened to light brown before molting (Fig. 34d). They measured 2.21 ± 0.22 mm \times 1.73 ± 0.05 mm (n=10). The head was more or less triangular, transverse, with eyes projecting laterally, ocelli not developed, antennae four segmented and covered with small brown hairs, first antennal segment orange, while remaining segments, coxae and femora brown. Labium four segmented (Fig. 34m), 1.18 ± 0.08 mm long and reaching posterior end of abdomen. Thoracic segments distinct, with prothorax broadest. Legs with tarsi two segmented, legs and lateral margins of the body covered with small, soft hairs. Abdominal tergites and sternites without any characteristic spots. This instar lasted for 5.33 ± 0.82 days (n=52).

Second instar (Fig. 34e): these were uniformly colored, dorsally head, thorax (except lateral margins) and lateral margins of abdomen black and rest of the body orange to red, measuring 2.98 ± 0.25 mm \times 2.21 ± 0.19 mm (n=10). Eyes reached anterior pronotal angles, ocelli not developed, antennae and labium four segmented, hairy and latter reaching beyond the posterior end of abdomen (Fig. 34e). Anterior margin of pronotum almost straight or slightly depressed medially (Fig. 34n). Legs brown with two tarsal segments black. Two black spots present on abdomen in the middle (Fig.

34e), anterior rectangular and larger while posterior oblong. Segmentally arranged dorsal and ventral, small, bluish black small spots were observed laterally on abdomen. This instar lasted 7.95 ± 0.68 days ($n=44$).

Third instar (Fig. 34f): body ovate, measuring $4.82 \pm 0.47 \times 3.48 \pm 0.32$ mm ($n=10$). Head (dorsally), thorax (except lateral margins), lateral margins and middle portions of abdomen shiny black, the remainder orange. Two fasciae observed extending to the midpoint from the anterior. Ocelli not developed (Fig. 34f). Antennae and labium four segmented, latter extending considerably beyond the abdomen (Fig. 34o). Legs brown with tarsi two segmented. Middle portion of abdomen with three black spots dorsally, the anteriormost larger, rectangular and notched laterally while intermediate ones were ovate and posterior narrow, band-like and slightly concave. Laterally abdomen with segmentally arranged bluish black spots; ventrally, four brown spots seen on middle abdomen from fourth to sixth segments. A pair of trichobothria were observed just posterior to spiracles from the second to sixth segments (Fig. 34j). This instar lasted 6.15 ± 0.91 days ($n=37$).

Fourth instar (Fig. 34g): pilose, elongate, measuring 7.68 ± 0.76 mm \times 5.32 ± 0.52 mm ($n=10$). Two color morphs occurred, one a combination of black and red, and the other light yellow and brown. In the first morph, head (dorsal), thorax (except lateral margins), middle and lateral portion of abdomen bluish black, the remainder bright red. In the second morph, head (dorsal), thorax (except lateral margins), middle and lateral portion of abdomen brown, the remainder light yellow. A pair of fascia on the head extended from the anterior to nearly the posterior of the head. Eyes protruded laterally, ocelli not developed (Fig. 34g). Antennae and labium four segmented, and the latter extending to the fourth or fifth abdominal segment (Fig. 34p). Pronotum slightly depressed medially. Small wing pads observed extending to the first abdominal segment. Evaporatoria of metathoracic scent glands appeared in this stage. Legs were brown with two- segmented tarsi. Three medial spots were distinct dorsally with a pair of brown ventral spots medially the fourth to sixth segments (Fig. 34k). In addition, segmentally arranged dorsal and ventral bluish-black spots were present laterally. Position and number of trichobothria were similar to those of the

third instar. External genitalia were evident in both sexes. This instar lasted 7.54 ± 0.76 days (n=24).

Fifth instar (Fig. 34h): elongate, measuring 12.60 ± 0.56 mm \times 8.80 ± 0.44 mm (n=10). Two color morphs were observed similar to the fourth instar and the body coloration for both morphs was similar to that of the fourth instar. A pair of fasciae extended from the anterior to posterior of the head. Eyes more protruding, ocelli not developed, antennae and labium four segmented the latter extending to the third or fourth abdominal segment. Thoracic segments distinct and well developed, anteriorly pronotum more or less straight, wing pads extending beyond the first abdominal segment (Fig. 34h). Evaporatoria of metathoracic scent glands were evident. Legs were brown with two segmented tarsi. Three median spots distinct on the abdomen as in the fourth instar, but slightly larger. Ventrally anterior and intermediate spots much closer, posterior ones fused and ovate (Fig. 34i). Spiracles and trichobothria were the same as in third and fourth instars. External genitalic structure more developed than in the fourth instar. This nymphal stage lasted 9.69 ± 1.18 days (n=38).

Key to nymphal instars

1. Body rounded, uniformly colored; labium extending to posterior end of abdomen; abdominal segmentation indistinct.....I instar
- 1'. Body oval to elongate, not uniformly colored; labium variable i.e. either long, extending well beyond abdomen or short, never extending beyond fifth abdominal segments; abdominal segmentation distinct.2
2. Labium extending well beyond the abdomen; wing pads and external genitalia indistinct3
- 2'. Labium short never extending beyond the fifth abdominal segment, wing pads and external genitalia distinct.....4
3. Trichobothria indistinctII instar
- 3'. Trichobothria distinctIII instar
4. Wing pads small, extending only to first abdominal segment, labium extending to fourth or fifth abdominal segmentIV instar
- 4'. Wing pads large, extending well beyond first abdominal segment, labium extending to third or fourth abdominal segmentV instar

Adult (Fig. 34i): body oblong, obscurely pilose, metallic bluish green females ($19.54 \pm 1.09 \times 9.12 \pm 0.60$, n=10) generally larger than males ($18.06 \pm 1.10 \times 8.28 \pm 0.41$, n=10). Head triangular, convex dorsally and declivent. Tylus longer than jugal lobes.

Ocelli present, placed nearer to eyes than to each other. Antennae five segmented, second segment shortest while fourth longest (1: 3.44). Labium four- segmented, extending to third or fourth abdominal segment. Pronotum metallic green or blue, except lateral margins red. A row of punctations between pronotal angles anteriorly and second similar row of punctations posteriorly, four black spots in pairs located posterior to second row, of these, former on disc while latter on the posterior angles, one elongate median spot extends from anterior to posterior (Fig.7i). Scutellum slightly convexed dorsally, 12.42 ± 1.17 mm (♀) and 11.36 ± 0.61 mm (♂) long, covering abdomen completely, six rounded discal black spots and one median spot present; median spot elongate, extending from base to middle, discal spots in pairs on either side. Ostiole of metathoracic scent glands elongate, near to posterior coxa, evaporatorium red with black outer margin. Coxae, trochanters and femora (except apices) red, apices of femora and tibiae metallic green. Tarsi black and three segmented. Abdomen distinctly furrowed longitudinally on the ventral aspect in middle extending to the fifth segment, where labium rests when not in use, a pair of trichobothria located posterior to each spiracle from the second to sixth segments, a series of green to bluish transverse spots on the ventrolateral aspect. Females and males survived 31.36 ± 4.63 (n=13) and 27.60 ± 7.23 days (n=11), respectively.