

**AQUATIC HEMIPTERA (INSECTA) OF KASARAGOD DISTRICT,  
KERALA STATE**

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**INTRODUCTION**

The study of Aquatic Hemiptera is important because many aquatic bugs are good bioindicators of water quality (Jansson, 1977). Some of the water bugs are key stone predators, their abundance is essential to the existence of animal communities in an aquatic habitat (Murdoch et al., 1984). Besides, they are valuable for the study of zoogeographic relationships as water bugs are less likely to be transported by agencies of man (Hungerford, 1958).

The available information relating to the aquatic and semi-aquatic Hemiptera of India is based on taxonomic recording of species from different parts of the country. Annandale (1919), Distant (1903, 1906, 1909, 1910a, 1910b), Dover (1928), Horvath (1915) and Pavia (1919a, 1919b) were a few of the earliest workers to contribute to our knowledge of these aquatic and semi-aquatic bugs of the country. Later Chen (1960), Hafiz & Mathai (1938), Hafiz & Ribeiro (1939), Hafiz & Pradhan (1947), Hutchinson (1933), Pradhan (1950a & b) Thirumalai (1983, 1986, 1989, 1992, 1994a & b, 1996, 1997), Thirumalai & Dam (1996), Thirumalai & Sharma (press), Ravishankar & Venkatesan (1988), Venkatesan & Rao (1981), Zettel (1977), Ghosh *et al* (1989) and Bal & Basu (1994) rendered additional information on the Indian aquatic bugs. The revisionary work of Andersen (1975, 1980, 1990, 1993), Andersen & Foster (1992), Andersen & Chen (1993), Chen & Nieser (1993), Den Boer (1965), Hungerford & Matsuda (1958), Polhemus (1994), Polhemus & Andersen (1984), Polhemus & Polhemus (1994, 1995) on a few genera of Gerridae; Brooks (1951), Hungerford (1933), Lansbury (1968) on Notonectidae; Chen (1960), Hutchinson (1940), Wroblewski (1960, 1962) on Corixidae; Lansbury (1972) on the genus *Ranatra* (Fab.) of Nepidae; Andersen (1983, 1989), Lundblad (1936), Polhemus (1990a) on a few genera of Veliidae; Andersen & Polhemus (1980) on Mesoveliidae; Hungerford & Evans (1934), Polhemus & Polhemus (1995) on Hydrometridae; Kormilev (1971) on Ochteridae; Polhemus (1990b) on Helotrephidae of the world are also noteworthy to understand the Indian aquatic bugs.

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A perusal of the above cited literature on the Indian aquatic bugs reveals that 58 species are known from various localities in Kerala (Appendix I). These studies are mostly from the southern part of Kerala and the only information available on the aquatic Hemiptera of Kerala, north of Palghat gap is from Silent Valley (Thirumalai, 1986).

Little is known about the fauna of Kasaragod, the northern most district of Kerala. The forest areas of the district being in a highly fragmented state, the faunal information collected from this area may serve as base line data for comparison with other biologically rich habitats.

The present study is based on the water bugs collected from various aquatic habitats of Kasaragod district. Under each species, the citation for the original description and other accompanying work necessary to understand the taxon or its occurrence in India are given. Besides, a key to the species known to be distributed in Kasaragod district is also provided.

*Key to the species of Aquatic and Semi-Aquatic Hemiptera of Kasaragod District, Kerala*

1. Antenna visible, not concealed, as long as or longer than head; hind femora long surpassing end of abdomen; winged and wingless forms (Family : Gerridae).....2  
     Antenna not visible, concealed below and shorter than head; hind femora short, not surpassing end of abdomen; winged forms .....6
2. Body long and thin; metasternum well developed .....3  
     Body elongate or oval; metasternum reduced to a very short subtriangular plate (Subfamily : Halobatinae) .....5
3. Fore tarsus long, atleast half the length of tibia; hind tarsi fused; distal half of middle femur bears a dense brush of long hairs in males (Subfamily : Ptilomerinae).....  
     .....*Ptilomera (Ptilomera) agroides* Schmidt  
     Foretarsus short; hind tarsal segments distinct, not fused; middle femur lacks brush of long hairs in males .....4
4. Fourth antennal segment long and straight; rostrum surpassing prosternum; pronotum with dark line along its entire length; second front tarsal segment equal to or longer than the first (Subfamily : Gerrinae) .....*Limnometra anadyomene* (Kirkaldy)  
     Fourth antennal segment short and curved; rostrum not surpassing prosternum (Subfamily : Cylindrostethinae) .....*Cylindrostethus productus* (Spinola)
5. Length more than 4.5 mm; eyes not covering anteriolateral angles of mesonotum; third antennal segment longer than fourth.....*Metrocoris malabaricus* Thirumalai  
     Length less than 4.5 mm; eyes fully covering anteriorlateral angles of mesonotum; third and fourth antennal segments subequal .....*Ventidius (Ventidius) aquarius* Distant

- 6. Elongate forms; hind legs oar-like; abdominal appendages absent; hind tibia and tarsi ciliated; swims upside down (Family : Notonectidae) ..... 7
- Flattened forms; hind legs not oar-like; short abdominal appendages present; hind tibia and tarsi compressed; swims normally (Family ; Belostomatidae) .....  
.....*Lethocerus indicus* Lepeletier & Serville
- 7. Length more than 13.00 mm; metaxyphus long .....*Enithares hungerfordi* Brooks
- Length less than 10.00 mm; metaxyphus short .....*Enithares fusca* Brooks

A SYSTEMATIC LIST OF AQUATIC HEMIPTERA OF KASARAGOD DISTRICT,  
KERALA STATE

- Order : Hemiptera
- Suborder : Heteroptera
- Family : NOTONECTIDAE
- Subfamily : NOTONECTINAE
- Genus : *Enithares* Spinola
  - 1. *Enithares fusca* Brooks
  - 2. *Enithares hungerfordi* Brooks
- Family : BELOSTOMATIDAE
- Subfamily : LETHOCERINAE
- Genus : *Lethocerus* Mayr
  - 3. *Lethocerus indicus* (Lepeletier & Serville)
- Family : GERRIDAE
- Subfamily : GERRINAE
- Genus : *Limnometra* Mayr
  - 4. *Limnometra anadyomene* (Kirkaldy)
- Subfamily : CYLINDROSTETHINAE
- Genus : *Cylindrostethus* Fieber
  - 5. *Cylindrostethus productus* (Spinola)
- Subfamily : PTILOMERINAE
- Genus : *Ptilomera* Amyot & Serville

6. *Ptilomera (Ptilomera) agroides* Schmidt  
 Subfamily : HALOBATINAE  
 Genus : *Metrocoris* Mayr
7. *Metrocoris malabaricus* Thirumalai  
 Genus : *Ventidius* Distant
8. *Ventidius (Ventidius) aquarius* Distant

#### SYSTEMATIC ACCOUNT

- Family NOTONECTIDAE  
 Subfamily NOTONECTINAE

##### 1. *Enithares fusca* Brooks

*Enithares fusca* Brooks, 1948, *J. Kans. Ent. soc.*, **21** : 46; Lansbury, 1968, *Pacific. Insects*, **10** : 412; Thirumalai, 1986, *Rec. Indian Mus.*, **84** : 30; Thirumalai, 1994a, *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 12.

*Diagnosis* : Medium sized (9.1 to 9.45 mm) oblong bugs with short metaxyphus (fig. 2) and absence of black spicules on the mesotrochanter (fig. 3).

*Material examined* : 2 Females from Chempilankai, Muliya R. F., 14.x.1993, *Coll* : K. C. Gopi.

*Distribution* : India : Kerala, Tamilnadu.

*Remarks* : This species is very similar to *E. ciliata* (Fabricius) in general size and coloration and has so far been reported only from Kerala and Tamilnadu states.

##### 2. *Enithares hungerfordi* Brooks

*Enithares hungerfordi* Brooks, 1948, *J. Kans. Soc.*, **21** : 41; Lansbury, 1968, *Pacif. Insects*, **10** : 372; Thirumalai, 1986, *Rec. zool. Surv. India*, **84** : 30; Thirumalai, 1989, *Misc. Occ. Pap. Rec. zool. Surv. India*, **118** : 22, Thirumalai, 1994a *Misc. Occ. pap. Rec. zool. Surv. India*, **165** : 13.

*Diagnosis* : Size more than 13.0 mm; head and thorax as in fig. 4; embolium greatly expanded ventrally towards head (Fig. 5.); metaxyphus very long with acuminate apex (Fig. 6). The basal width of the metaxyphus equals the median length.

*Material examined* : 5 females from Pullody, 27.x.1993; 2 males, 3 females and 5 immature stages from Ranipuram, 25.i.1994, *Coll* : K. C. Gopi.

*Distribution* : India : Kerala, Tamilnadu.

*Remarks* : Out of the six species so far known from India, *E. fusca* and *E. hungerfordi* are restricted to southern part of India. This species has also been reported from Eastern Ghats (Thirumalai, 1989).

Family BELOSTOMATIDAE

Subfamily LETHOCERINAE

3. *Lethocerus indicus* (Lepeletier & Serville)

*Belostoma indica* Lep. & Serv., 1825, *Encycl. Meth.*, X : 272 : *B. indicum* Lep. & Serv. : Mayr, 1871, *Vehr. Zool.*, 21 : 426 : Distant, 1906, *Fauna British India*, 3 : 38; *L. indicus* (Lep. & Serv.) : Bueno, 1927, *Bull. Brooklyn Ent. Soc.*, 22 : 30; Lundblad, 1934, *Arch. Hydrobiol. Suppl.*, 12 : 52.

**Diagnosis :** A very long elongate bug ranging from 60 to 85 mm in length; antenna concealed, irregular with lateral prolongations (Fig. 7). Fore femur dilated, bearing grooves. Corium with strong anastomosing longitudinal veins; ventral laterotergite pubescent; abdominal sternite covered with short spinules.

**Material examined :** 1 male from Payaradukka, 19.iii.1994, *Coll* : K. C. Gopi.

**Distribution :** India (widely distributed); Indonesia; Malaysia; Philippines; Srilanka.

**Remarks :** This 'giant water bug' is known to feed on large insects and also is attracted towards light. Members of this genus usually prefer large water bodies like ponds, lakes etc., but they are occasionally found in streams and reservoirs.

Family GERRIDAE

Subfamily GERRINAE

4. *Limnometra anadyomene* (Kirkaldy)

*Gerris anadyomene* Kirkaldy, 1901, *Entomologist*, 34 : 117; Distant, 1903, *Fauna British India*, 2 : 177; Dover, 1928, *J. Bombay nat. Hist.*, 32 : 614. *L. anadyomene* (Kirk.) : Lundblad, 1934, *Arch. Hydrobiol. Suppl.*, 12 : 37; Hungerford & Matsuda, 1958, *Kans. Univ. Sci. Bull.*, 39 : 402; *Tenagogonus (Limnometra) anadyomene* (Kirk.) : Matsuda, 1960, *Kans. Univ. Sci. Bull.*, 41 : 206; Thirumalai, 1986, *Rec. zool. Surv. India*, 84 : 10; Thirumalai, 1989, *Misc. Occ. Pap. Rec. zool. Surv. India*, 118 : 42; *Tenagogonus (Limnometra) longispinulus* Thirumalai, 1986, *Rec. zool. Surv. India*, 84 : 11.

**Diagnosis :** Larger species (fig. 8), size ranging from 11.1 to 14.6 mm; the male connexival spines equal or surpassing the tip of abdomen, never so in females.

**Materials examined :** Winged 4 males, 5 females from Pullody, 27.x.1993. *Coll* : K. C. Gopi.

**Distribution :** India : Karnataka, Kerala, Tamilnadu; Malaysia; Myanmar; Singapore; Philippines; SriLanka.

**Remarks :** The habitat of *L. anadyomene* is restricted to forest streams. Recently, Nieser & Chen (1992) treated *Limnometra* a separate genus where as Mastuda (1960) and Andersen (1975, 1982) considered it a subgenus of *Tenagogonus*.

## Subfamily CYLINDROSTETHINAE

5. *Cylindrostethus productus* (Spinola)

*Gerris productus* Spinola, 1840, Essaisur les insectus Hemipteras, Rhynchotes ou Heteropteres, 64; *Cylindrostethus productus* (Spinola) : Distant, 1903, *Fauna British India*, 2 : 184; Dover, 1928, *J. Bombay nat. Hist. Soc.*, 32 : 614; Hungerford and Matsuda, 1962, *Kans. Univ. Sci. Bull.* 43 : 86. *Janias elongatulus* Distant, 1910a, *Ann. Mag. nat. Hist.*, 5(8) 5 : 145.

**Diagnosis :** The connexival spines surpassing the surnal plate (Fig. 9) and the black coloured costal margin of hemelytra are the distinguishing characters of this species.

**Material examined :** Wingless 3 males, winged 1 female and 1 immature stage from Chempilankai, Muliya R.F., 14.X.1993; Winged 1 male, wingless 1 male, 5 females from Payaradukka, 19.iii.1994, *Coll* : K. C. Gopi.

**Distribution :** India : Karnataka, Kerala, Madhya Pradesh, Orissa, Punjab, Tamilnadu, Uttar Pradesh, West Bengal; Nepal, SriLanka.

**Remarks :** This is the largest species of the genus so far known. In India this species has a wider range of distribution, occurring in Himalayan foot hills also.

## Subfamily PTILOMERINAE

6. *Ptilomera (Ptilomera) agroides* Schmidt.

*Ptilomera agroides* Schmidt, 1926, *Ent. Mitt.*, 15 : 63; Hungerford and Matsuda, 1965, *Kans. Univ. Sci. Bull.*, 45 : 431; Thirumalai, 1986, *Rec. Indian. Mus.*, 84 : 15. *P. lachne* Schmidt, 1926, *Ent. Mitt.*, 15 : 64. *P. laticaudata* (Hardwick) : Distant, 1903, *Fauna British India*, 2 : 185.

**Diagnosis :** The long dorsolateral projection of pygofer which extends half of its length beyond lateral wings of surnal plate differentiates this species from all other known species (Fig. 10). The distal half of middle femur in male bears a dense brush of long hairs. The connexival spines of female arising from beneath the connexival edge of the seventh abdominal segment near its base (Fig. 11).

**Material examined :** Winged 2 males & 1 immature stage from Maruthom, 26.x.1993; 2 immature stages from Pullody, 27.x.1993; wingless 9 males, 13 females from Ranipuram 25.i.1994; wingless 5 males, 2 females from Manjucholamala, 26.i.1994; wingless 11 males, 11 females from Beemanadi, 27.i.1994, *Coll* : K. C. Gopi.

**Distribution :** India : Karnataka, Kerala, Maharashtra, Tamilnadu.

**Remarks :** A very common gerrid found in the flowing mountain streams of Western Ghats.

## Subfamily HALOBATINAE

7. *Metrocoris malabaricus* Thirumalai, 1986

*Metrocoris malabaricus* Thirumalai, 1986, *Rec. zool. Surv. India*, 84 : 22; Chen & Nieser, 1993a, *Streenstrupia*, 19 : 54.

**Diagnosis :** *M. malabaricus* can easily be recognised by the thick dark band on dorsal half of mesopleura (Fig. 12) and thick long velvety pilosity. The slender male femur and prominent falciform paramere (Fig. 13) which extends beyond genital segments are the other distinguishing characters.

**Material examined :** Winged 1 male from Ranipuram, 25.i.1994, *Coll* : K. C. Gopi.

**Distribution :** India : Kerala, Karnataka.

**Remarks :** This species inhabiting fast flowing streams in upland habitats (altitudes between 871-1500 m), is endemic to Western Ghats.

#### 8. *Ventidius (Ventidius) aquarius* Distant, 1910

*Ventidius aquarius* Distant, 1910a, *Ann. Mag. Nat. Hist.*, **5** : 150; *V. (Ventidius) aquarius* Distant : Hungerford & Matsuda, 1960, *Kans. Univ. Sci. Bull.*, **40** : 124; Thirumalai, 1986, *Rec. zool. Surv. India*, **84** : 28.

**Diagnosis :** Eyes overlapping anteriolateral angles of mesonotum (Fig. 14), antennal segments 2nd and 3rd are equal in length, body oval and ochraceous, with 'T'-shaped black marking on pronotum in winged form; venter pale brown.

**Material examined :** Apterous 1 male, 5 females from Santhimala, Parappa R. F., 24.ix.1993; 4 examples (abdominal segments damaged) from Chempilankai, 14.x.1993, *Coll* : K. C. Gopi.

**Distribution :** India : Kerala, Tamilnadu.

**Remarks :** This species is commonly found in lotic habitat in the higher ranges of Kerala and Tamilnadu parts of Western Ghats (altitude between 400-2160 m).

### DISCUSSION

An analysis of the collection reveals that family Gerridae is well represented in the aquatic systems of Kasaragod district, being present in all the eight localities surveyed, while the family Notonectidae occupied three and Belostomatidae only one locality. Among all the aquatic bugs reported in this study, *Ptilomera (P.) agroides* dominates the rest both in terms of population and the area of distribution.

### SUMMARY

The aquatic Hemiptera of Kasaragod district, Kerala collected during the State Faunal Surveys is studied. This study revealed the presence of 6 genera and 8 species. All the species discussed are recorded for the first time from the study area. A systematic list of aquatic and semi-aquatic Hemiptera known from Kerala is also provided.

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**APPENDIX - I****SYSTEMATIC LIST OF AQUATIC AND SEMI-AQUATIC HEMIPTERA KNOWN FROM KERALA STATE**

Infraorder : Gerromorpha

Family : MESOVELIIDAE

Subfamily : MESOVELIINAE

1. *Mesovelia vittigera* Horvath

*Mesovelia orientalis* Kirkaldy

*M. mulsanti* White : Distant

Family : HYDROMETRIDAE

Subfamily : HYDROMETRINAE

2. *Hydrometra butleri* Hungerford and Evans

Family : VELIIDAE

Subfamily : MICROVELIINAE

3. *Microvelia (Microvelia) douglasi douglasi* Scott

*Microvelia repentina* Distant

*M. kumaonensis* Distant

Subfamily : RHAGOVELIINAE

4. *Rhagovelia (Rhagovelia) ceylanica* Lundblad

5. *Rhagovelia (Rhagovelia) tibialis* Lundblad

Family : GERRIDAE

Subfamily : RHAGADOTARSINAE

6. *Rhagadotarsus (Rhagadotarsus) krepelini* Breddin

*Nacebus dux* Distant

Subfamily : TREPOBATINAE

7. *Cryptobatus raja* (Distant)

*Gerris raja* Distant

Subfamily : GERRINAE

8. *Aquarius adelaidis* (Dohrn)

*Gerris spinolae* Leth. & Serv.

9. *Neogerris parvula* (Stal)

*Gerris parvula* Stal

*Gerris tristan* : Distant

*Limnogonus parvulus* : Hafiz & Ribeiro

10. *Limnogonus (Limnogonus) fossarum fossarum* (Fabricius)

*Cimex fossarum* Fabricius

*Gerris fossarum* : Distant

11. *Limnogonus (Limnogonus) nitidius* (Mayr)

*Hydrometra nitida*, Mayr

*Gerris nitida* Distant

12. *Limnometra anadyomene* (Kirkaldy)

*Gerris anadyomene* Kirkaldy

*Tenagobius (Limnometra) anadyomene* Hungerford & Matsuda

*Tenagobius (Limnometra) longispinulus* Thirumalai

13. *Limnometra fluviorum* (Fabricius)

*Cimex fluviorum* Fabricius

*Gerris fluviorum* Distant

*Gerris armata* Distant

*Tenagobius (Limnometra) fluviorum* Hungerford & Matsuda

Subfamily : EOTRECHINAE

14. *Amemboa (Amemboa) kumari* (Distant)

*Onychotrechus kumari* Distant

*Amemboa pervati* Pradhan

15. *Onychotrechus major* Andersen

16. *Onychotrechus rhexenor* Kirkaldy

17. *Onychotrechus spinifer* Andersen

18. *Tarsotrechus polhemi* Andersen

Subfamily : CYLINDROSTETHINAE

19. *Cylindrostethus productus* Spinola

*Janias elongatulus* Distant

Subfamily : PTILOMERINAE

20. *Pleciobates indicus* Thirumalai

21. *Pleciobates nostrus* Thirumalai

22. *Ptilomera (Ptilomera) agroides* Schmidt

*Ptilomera lachne* Schmidt

*P. laticudata* Hardwicke : Distant

23. *Rhematogonus custodiendus* (Distant)  
*Jucundus custodiendus* Distant  
 Subfamily : HALOBATINAE
24. *Metrocoris indicus* Chen and Nieser  
*Metrocoris stali*\* (Dohrn)
25. *Metrocoris malabaricus* Thirumalai
26. *Metrocoris variegans* Thirumalai
27. *Metrocoris velamentus* Chen & Nieser
28. *Ventidius (Ventidius) aquarius* Distant  
 Infraorder : Nepomorpha  
 Family : HELOTREPHIDAE  
 Subfamily : LIMNOTREPHINAE
29. *Limnotrephes minutissimus* Zettel  
 Subfamily : FISCHEROTREPHINAE
30. *Fistherotrephes indicus* Zettel  
 Subfamily : IDIOCORINAE
31. *Indotrephes bufula* Zettel  
 Family : NEPIDAE  
 Subfamily : NEPINAE
32. *Laccotrephes griseus* (Guerin)
33. *Laccotrephes ruber* (Linnaeus)  
 Subfamily : RANATRINAE
34. *Crecotmetus fumosus* Distant
35. *Crecotmetus pilipes* Distant
36. *Ranatra elongata* Fabricius
37. *Ranatra filiformis* Fabricius  
 Family : BELOSTOMATIDAE  
 Subfamily : BELOSTOMATINAE

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\* Specimens from India earlier identified.

38. *Diplonychus rusticus* (Fabricius)  
*Diplonychus indicus* Venkatesan & Rao
39. *Diplonychus annulatus* (Fabricius)  
 Subfamily : LETHOCERINAE
40. *Lethocerus indicus* (Lepelletier & Serville)  
 Family : CORIXIDAE  
 Subfamily : MICRONECTINAE
41. *Micronecta quadristrigata* Breddin  
*Micronecta minthe* Distant  
*Micronecta punctata* Fieber  
*Micronecta merope* Distant
42. *Micronecta scutellaris* (Stal)  
*Micronecta dione* Distant  
*Micronecta probe* Distant
43. *Micronecta issa* (Distant)  
*Synaptonecta breddini* Lundblad  
 Family : OCHTERIDAE
44. *Ochterus marginatus* (Latreille)  
*Pelogonus marginatus* Distant  
 Family : NAUCORIDAE  
 Subfamily : NAUCORINAE
45. *Naucoris scutellaris* Stal  
*Naucoris sordius* Distant  
*Naucoris vividus* Distant  
*Thurselinus clathratus* Distant  
 Subfamily : LACCOCORINAE
46. *Heleocoris vicinus* Montandon  
 Family : NOTONECTIDAE  
 Subfamily : ANISOPINAE
47. *Anisops breddeni* Krikaldy
48. *Anisops cavifrons* Brooks
49. *Anisops exigua* Horvath  
*Anisops exigera* Horvath



50. *Anisops extendofrons* Brooks

51. *Anisops nivea* (Fabricius)

*Notonecta nivea* Fabricius

*Anisops niveus* Distant

52. *Anisops varia* Fieber

*Anisops varius* Distant

Subfamily : NOTONECTINAE

53. *Enithares ciliata* (Fabricius)

*Notonecta ciliata* Fabricius

*Enithares indica* Distant

*E. paivana* Distant

*E. lactea* Paiva

54. *Enithares fusca* Brooks

55. *Enithares hungerfordi* Brooks

56. *Enithares triangularis* (Guerin-Meneville)

*Notonecta triangularis* Guerin-Meneville

Family : PLEIDAE

57. *Paraplea indistinguenda* (Matsumura)

Infraorder : Leptopodomorpha

Family : LEPTOPODIDAE

Subfamily : LEPTOPODINAE

58. *Leptopus travancorensis* Distant