

A CHECKLIST OF AQUATIC AND SEMI-AQUATIC HEMIPTERA (INSECTA) OF KARNATAKA

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INTRODUCTION

Aquatic and semi aquatic heteropterans form food in different trophic levels of fresh water ecosystems. Due to their poor dispersal capabilities, these bugs serve as zoogeographical indicators for diverse habitats (Jordon, 1951; Hungerford & Matsuda, 1958). Further, many families of the bugs may be utilized in the biological control of mosquito larvae (Jenkins, 1964). Some corixids are used as indicators of water quality. Studies also indicate that the quality of aquatic environment is partially dependent on the abundance of bugs population (Murdoch *et al*, 1984; Ramakrishna, 2000; Thirumalai & Raghunathan, 1988).

Out of 285 genera and around 3558 species distributed globally, aquatic and semi aquatic heteropteran fauna in India is represented by 78 genera and 269 species accommodated in 16 families (Thirumalai, 1999). The aquatic and semi aquatic bugs of Karnataka received only rather cursory attention largely by foreign scientists limited to taxonomic preliminaries, including recording of species from different parts of the state. However, an attempt to consolidate the information on the group by throwing more light on the present taxonomic status of some families has been made by Thirumalai & Krishnan (2000), Thirumalai (2001 & 2002), Zettel & Thirumalai (2001a & b).

The present checklist includes the collections of aquatic and semi aquatic Heteroptera made by the author from intensive and extensive surveys of Karnataka during the last five years. The study comprises of 40 genera and 67 species under 12 families that are listed in this paper. The study also revealed the rich diversity of aquatic and semi aquatic heteropteran fauna occurring in the state. Under each species citation for the original description and other accompanying work necessary to understand the taxon or its occurrence in India is provided.

AQUATIC AND SEMI AQUATIC HETEROPTERA OF KARNATAKA

Order HEMIPTERA

Suborder HETEROPTERA

INFRAORDER GERROMORPHA

Family GERRIDAE

Subfamily CYLINDROSTETHINAE

Genus *Cylindrostethus* Mayr, 18651. *Cylindrostethus productus* (Spinola, 1840)*Gerris productus* Spinola, 1840. *Essai Sur less insectes hemipteres rhynchotes on heteropteres*, 64.*Cylindrostethus productus* (Spinola) : Distant, 1903. *Fauna Brit. India*, 2 : 184.*Cylindrostethus productus* (Spinola) : Polhemus, 1994. *Bishop Mus. Occ. Pap.*, 38 : 10.*Janias elegantulus* Distant, 1910. *Ann. Mag. nat. Hist.*, 5(8) : 145.

Subfamily EOTRECHINAE

Genus *Amemboa* Esaki, 1925Subgenus *Amemboa* Esaki, 19252. *Amemboa (Amemboa) kumari* (Distant, 1910)*Onychotrechus kumari* Distant, 1910. *Ann. Mag. nat. Hist.*, 5(8) : 145.*Onychotrechus kumari* (Distant) : Esaki, 1928. *Ann. Mag. nat. Hist.*, 2(10) : 509.*Amemboa (Amemboa) kumari* (Distant) : Polhemus & Andersen, 1984. *Steenstrupia*, 10(3) : 85.*Amemboa pervati* Pradhan, 1950. *Rec. Indian Mus.*, 48(3 & 4) : 12.

Subgenus AMEMBOIDES Polhemus & Andersen, 1984

3. *Amemboa (Amemboides) perlata* Polhemus & Andersen, 1984*Amemboa (Amemboides) perlata* Polhemus & Andersen, 1984. *Steenstrupia*, 10(3) : 100.Genus *Onychotrechus* Kirkaldy, 19034. *Onychotrechus rhexenor* Kirkaldy, 1903*Onychotrechus rhexenor* Kirkaldy, 1903. *Entomologist*, 36 : 44.*Onychotrechus rhexenor* Kirkaldy : Andersen, 1980. *Steenstrupia*, 6(10) : 128.5. *Onychotrechus rupestris* Andersen, 1980*Onychotrechus rupestris* Andersen, 1980. *Steenstrupia*, 6(10) : 132.6. *Oncychotrechus spinifer* Andersen, 1980*Oncychotrechus spinifer* Andersen, 1980. *Steenstrupia*, 6(10) : 138.

Genus *Tarsotrechus* Andersen, 19807. *Tarsotrechus polhemi* Andersen, 1980

Tarsotrechus polhemi Andersen, 1980. *Steenstrupia*, 6(10) : 143.

Subfamily GERRINAE

Genus *Aquarius* Schellenberg, 18008. *Aquarius adelaidis* (Dohrn, 1860)

Aquarius adelaidis Dohrn, 1860. *Stettin. ent. Ztg.*, 21 : 408.

Aquarius adelaidis (Dohrn) : Andersen, 1990. *Steenstrupia*, 16(4) : 61.

Gerris spinolae Leth. & Ser., 1896. *Cat. gen. Hemiptera*, 3 : 63.

Gerris spinolae (Leth. & Ser.) : Distant, 1903. *Fauna Brit. India*, 2 : 180.

Genus *Limnogonus* Stål, 1868Subgenus *Limnogonus* Stål, 18689. *Limnogonus (Limnogonus) fossarum fossarum* (Fabricius, 1775)

Cimex fossarum Fabricius, 1775. *Syst. Ent.*, 727.

Gerris fossarum Fabricius, 1794. *Ent. Syst. emen. aucta*, IV : 188.

Limnogonus fossarum Stål, 1868. *K. Svenska Vetensk. Akad.*, 7 : 133.

L. (Limnogonus) fossarum (Fab.) : Hungerford & Matsuda, 1959. *J. Kans. Ent. Soc.*, 32(1) : 40.

L. (L.) fossarum (Fab.) : Andersen, 1975. *Ent. Scand. Suppl.*, 7 : 30.

10. *Limnogonus (Limnogonus) nitidus* (Mayr, 1865)

Hydrometra nitida Mayr, 1865. *Verh. zool. -bot. Ges. Wien*, 15 : 443.

Gerris nitida (Mayr) : Distant, 1903. *Fauna Brit. India*, 2 : 178.

Limnogonus nitidus (Mayr) : Kirkaldy, 1908. *Wissenschaftl. Ergebn. der Schwed. zool. Exped. nach dem Kilimandjaro*, 12 : 21.

L. (Limnogonus) nitidus (Mayr) : Matsuda, 1960. *Kans. Univ. Sci. Bull.*, 41 : 198.

L. (Limnogonus) nitidus (Mayr) : Andersen, 1975. *Ent. Scand. Suppl.*, 7 : 62.

Subgenus *Limnogonoides* Poisson, 196511. *Limnogonus (Limnogonoides) pectoralis* (Mayr, 1865)

Hydrometra pectoralis Mayr, 1865. *Verh. zool. bot. Ges. Wien*, 15 : 443.

Gerris pectoralis (Mayr) : Distant, 1903. *Fauna Brit. India*, 2 : 181.

Limnogonus (Limnogonoides) pectoralis (Mayr) : Andersen, 1975. *Ent. Scand. Suppl.*, 7 : 69.

Genus *Limnometra* Mayr, 186512. *Limnometra anadyomene* (Kirkaldy, 1901)

Gerris anadyomene Kirkaldy, 1901. *Entomologist*, **34** : 117.

Tenagogonus anadyomene (Kirkaldy) : Bergroth, 1915. *Zool. Meded. Leiden*, **1**(2) : 122.

Limnometra anadyomene (Kirkaldy) : Lundblad, 1934. *Arch. Hydrobiol. Suppl.*, **12** : 371.

Tenagogonus (Limnometra) anadyomene (Kirkaldy) : Matsuda, 1960. *Kans. Univ. Sci. Bull.*, **41** : 206.

Limnometra anadyomene (Kirkaldy) : Andersen, 1995. *Steenstrupia*, **21** : 117.

Tenagogonus (Limnometra) longispinulus Thirumalai, 1986. *Rec. zool. Surv. India*, **84**(1-4) : 11.

13. *Limnometra fluviorum* (Fabricius, 1798)

Cimex fluviorum Fabricius, 1798. *Ent. Syst. Suppl.*, 543.

Gerris fluviorum (Fab.) : Distant, 1903. *Fauna Brit. India*, **2** : 177.

Limnometra fluviorum (Fab.) : Lundblad, 1934. *Arch. Hydrobiol. Suppl.*, **12** : 371.

Tenagogonus (Limnometra) fluviorum (Fab.) : Matsuda, 1960. *Kans. Univ. Sci. Bull.*, **41** : 206.

Limnometra fluviorum (Fab.) : Andersen, 1995. *Steenstrupia*, **21** : 118.

Gerris armata Spinola : Distant, 1903. *Fauna Brit. India*, **2** : 180.

Genus *Neogerris* Matsumura, 191314. *Neogerris parvula* (Stål, 1859)

Gerris parvula Stål, 1859. *Zoology*, **4** : 265.

Limnogonus parvulus (Stål) : Lundblad, 1934. *Arch. Hydrobiol. Suppl.*, **12** : 384.

L. (Limnogonellus) parvulus (Stål) : Hungerford & Matsuda, 1959. *J. Kans. Ent. Soc.*, **32** : 41.

L. (Neogerris) parvulus (Stål) : Hungerford & Matsuda, 1961. *Insecta matsum.*, **24** : 114.

Neogerris parvula (Stål) : Andersen, 1975. *Ent. Scand. Suppl.*, **7** : 86.

Gerris tristan Kirkaldy, 1899. *Revue. Ent.*, **18** : 88.

Genus *Tenagogonus* Stål, 185415. *Tenagogonus ceylonensis* Hungerford & Matsuda, 1962

Tenagogonus ceylonensis Hungerford & Matsuda, 1962. *Bull. Brooklyn ent. Soc.*, **57** : 141.

Subfamily HALOBATINAE

Genus *Metrocoris* Mayr, 186516. *Metrocoris communis* (Distant, 1910)

Euodus communis Distant, 1910. *Ann. Mag. nat. Hist.*, **5**(8) : 151.

Metrocoris communis (Distant) : Esaki, 1929. *Ann. Mag. nat. Hist. Soc.*, **4**(10) : 419.

Metrocoris communis (Distant) : Den Boer, 1965. *Zool. Verh. Leiden.*, **74** : 13.

Metrocoris communis (Distant) : Chen & Nieser, 1993. *Steenstrupia*, **19**(2) : 49.

17. *Metrocoris indicus* Chen & Nieser, 1993

Metrocoris indicus Chen & Nieser, 1993. *Steenstrupia*, **19**(2) : 48.

Metrocoris Ståli (Dohrn) : Distant, 1903. *Fauna Brit. India*, **2** : 190.

Metrocoris Ståli (Dohrn) : Den Boer, 1965. *Zool. Verh. Leiden*, **74** : 8.

Metrocoris Ståli (Dohrn) : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 37.

Note : Specimens from Southern India earlier identified as *Metrocoris Ståli* (Dohrn, 1860) refer to *M. indicus*.

18. *Metrocoris malabaricus* Thirumalai, 1986

Metrocoris malabaricus Thirumalai, 1986. *Rec. zool. Surv. India*, **84** : 22.

19. *Metrocoris variegans* Thirumalai, 1986

Metrocoris variegans Thirumalai, 1986. *Rec. zool. Surv. India*, **84** : 25.

Genus *Ventidius* Distant, 1910

Subgenus *Ventidius* Distant, 1910

20. *Ventidius (Ventidius) aquarius* Distant, 1910

Ventidius aquarius Distant, 1910. *Ann. Mag. nat. Hist.*, **5**(8) : 150.

Ventidius (Ventidius) aquarius Distant : Hungerford & Matsuda, 1960. *Kans. Univ. Sci. Bull.*, **40**(7) : 324.

Subfamily PTILOMERINAE

Genus *Jucundus* Distant, 1910

21. *Jucundus custodiendus* Distant, 1910

Jucundus custodiendus Distant, 1910. *Ann. Mag. nat. Hist.*, **5**(8) : 143.

Rheumatogonus custodiendus (Distant) : Esaki, 1927. *Eos Revista Espanola Entomologia*, **3** : 267.

Jucundus custodiendus Distant : Zettel & Thirumalai, 2001b. *Ann. Naturhist. Mus. Wien*, **103B** : 276.

Pleciobatus tuberculatus Esaki : Thirumalai, 1992. *Hexapoda*, **4** : 173 (male, misidentification).

Genus *Ptilomera* Amyot & Serville, 1843

Subgenus *Ptilomera* Amyot & Serville, 1843

22. *Ptilomera (Ptilomera) agroides* Schmidt, 1926

Ptilomera agroides Schmidt, 1926. *Ent. Mitt.*, **15**(1) : 63.

Ptilomera (Ptilomera) agroides Schmidt : Matsuda, 1960. *Kans. Univ. Sci. Bull.*, **41**(2) : 269.

Ptilomera (Ptilomera) agroides Schmidt : Thirumalai, 1986. *Rec. zool. Surv. India*, **84**(1-4) : 15.

Ptilomera laticaudata (Hardwicke) : Distant, 1903. *Fauna Brit. India*, **2** : 185 (Fig. 133).

Ptilomera lachne Schmidt, 1926. *Ent. Mitt.*, **15**(1) : 64.

Genus *Stridulobates* Zettel & Thirumalai, 200123. *Stridulobates anderseni* Zettel & Thirumalai, 2001

Stridulobates anderseni Zettel & Thirumalai, 2001a. *Insect Syst. Evol.*, **31**(4) : 434.

Pleciobatus tuberculatus Esaki : Thirumalai, 1992. *Hexapoda*, **4** : 173 (Female, misidentification).

24. *Stridulobates nostras* (Thirumalai, 1986)

Pleciobatus nostrus Thirumalai, 1986. *Rec. zool. Surv. India*, **84**(1-4) : 19.

Stridulobates nostras (Thirumalai) : Zettel & Thirumalai, 2001b. *Insect Syst. Evol.*, **31**(4) : 436.

Subfamily RHAGADOTARSINAE

Genus *Rhagadotarsus* Breddin, 1905Subgenus *Rhagadotarsus* Breddin, 190525. *Rhagadotarsus (Rhagadotarsus) kraepelini* Breddin, 1905

Rhagadotarsus kraepelini Breddin, 1905. *Mitt. Naturhist. Mus. Hamb.*, **22** : 137.

R. (Rhagadotarsus) kraepelini Breddin : Matsuda, 1960. *Kans. Univ. Sci. Bull.*, **41**(2) : 322.

R. (Rhagadotarsus) kraepelini Breddin : Polhemus & Karunaratne, 1993. *Bull. Raffles Mus. (Zoology)*, **41**(1) : 100.

Nacebus dux Distant, 1910. *Ann. Mag. nat. Hist.*, **5**(8) : 152.

Subfamily TREPOBATINAE

Genus *Gnomobates* Polhemus & Polhemus, 1995a.26. *Gnomobates kuiterti* (Hungerford & Matsuda, 1958)

Cryptobates kuiterti Hungerford & Matsuda, 1958. *J. Kans. Ent. Soc.*, **31**(4) : 246.

Gnomobates kuiterti (Hungerford & Matsuda) : Polhemus & Polhemus, 1995. *Ent. Scand.*, **26**(1) : 108.

Genus *Naboandelus* Distant, 191027. *Naboandelus signatus* Distant, 1910

Naboandelus signatus Distant, 1910. *Ann. Mag. nat. Hist.*, **5**(8) : 151.

Naboandelus signatus Distant : Thirumalai, 2002. *Rec. zool. Surv. India*, **100** : 71.

Family VELIIDAE

Subfamily HALOVELIINAE

Genus *Strongylovelia* Esaki, 192428. **Strongylovelia* sp.

*Could turn out new to science (Zettel personal Communication)

Subfamily MICROVELIINAE

29. *Baptisa angulata* Andersen, 1989

Baptisa angulata Andersen, 1989. *Ent. Scand.*, **19** : 373.

Genus *Microvelia* Westwood, 1834

Subgenus *Microvelia* Westwood, 1834

30. *Microvelia (Microvelia) douglasi* Scott, 1874

Microvelia douglasi Scott, 1874. *Ann. Mag. nat. Hist.*, **14** : 448.

Microvelia (Microvelia) douglasi Distant : Andersen, 1995. *Cat. Het. Palaearctic Region*, **1** : 87.

Microvelia douglasi Scott : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 40.

Microvelia repentiana Distant, 1903. *Fauna Brit. India*, **3** : 174.

M. kumaonensis Distant, 1909. *Ann. Mag. nat. Hist.*, **3(8)** : 500.

Genus *Pseudovelina* Hoberlandt, 1950

Subgenus *Pseudovelina* Hoberlandt, 1950

31. *Pseudovelina (Pseudovelina) sexualis* (Paiva, 1917)

Micronecta (Kirkaldya) sexualis Paiva, 1917. *Mem. Asiatic Soc. Bengal*, **6** : 77.

Pseudovelina (Pseudovelina) sexualis (Paiva) : Andersen, 1983. *Ent. Scand.*, **14** : 256.

Subfamily RHAGOVELIINAE

Genus *Rhagovelia* Mayr, 1865

Subgenus *Neorhagovelia* Matsuda, 1956

32. *Rhagovelia (Neorhagovelia) nilgiriensis* Thirumalai, 1994

Rhagovelia (Neorhagovelia) nilgiriensis Thirumalai, 1994. *Rec. zool. Surv. India*, **94** : 390.

Subgenus *Rhagovelia* Mayr, 1865

33. *Rhagovelia (Rhagovelia) tibialis* Lundblad, 1936

Rhagovelia tibialis Lundblad, 1936. *Ark. Zool.*, **28(21)** : 31.

R (Rhagovelia) tibialis Lundblad : Thirumalai, 1994. *Rec. zool. Surv. India*, **94** : 382.

Genus *Tetraripis* Lundblad, 1936

34. *Tetraripis asymmetricus* Polhemus & Karunaratne, 1979

Tetraripis asymmetricus Polhemus & Karunaratne, 1979. *Bull. Fish. Res. Stn., SriLanka*, **29** : 99.

Tetraripis asymmetricus Polhemus & Karunaratne : Thirumalai & Dam, 1996. *Hexapoda*, **8(2)** : 67.

Family HEBRIDAE

Subfamily HEBRINAE

Genus *Neotimasius* Andersen, 198135. *Neotimasius orientalis* Andersen, 1981

Neotimasius orientalis Andersen, 1981. *Syst. Entomol.*, **6** : 405.

Genus *Timasius* Distant, 190936. *Timasius splendens* Distant, 1909

Timasius splendens Distant, 1909. *Ann. Mag. nat. Hist.*, **3(9)** : 499.

Timasius splendens Distant : Andersen, 1981. *Syst. Entomol.*, **6** : 392.

Family MESOVELIIDAE

Subfamily MESOVELIINAE

Genus *Mesovelgia* Mulsant & Rey, 185237. *Mesovelgia vittigera* Horvath, 1895

Mesovelgia vittigera Horvath 1895. *Revue. ent.*, **14** : 160.

Mesovelgia vittigera Horvath : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 28.

Mesovelgia mulsanti White : Distant, 1903. *Fauna Brit. India*, **2** : 169.

Mesovelgia orientalis Kirkaldy, 1901. *Annali Mus. civ. Stor. Nat. Giacomo Doria*, **20** : 808.

Family HYDROMETRIDAE

Subfamily HYDROMETRINAE

Genus *Hydrometra* Latreille, 179638. *Hydrometra butleri* Hungerford and Evans, 1934

Hydrometra butleri Hungerford and Evans, 1934. *Ann. Mag. nat. Hist.*, **28** : 71.

Hydrometra butleri Hungerford and Evans. : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 29.

39. *Hydrometra greeni* Kirkaldy, 1898

Hydrometra greeni Kirkaldy, 1898. *Entomologist*, **31** : 2.

Hydrometra greeni Kirkaldy : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 29.

Hydrometra greeni Kirkaldy : Polhemus & Polhemus, 1995. *Bishop. Mus. Occ. Pap.*, **43** : 22.

Hydrometra vittata (Stål) : Distant, 1903. *Fauna Brit. India*, **2** : 170.

INFRAORDER NEPOMORPHA

Family NOTONECTIDAE

Subfamily ANISOPINAE

Genus *Anisops* Spinola, 1837

40. *Anisops barbatus* Brooks, 1951
Anisops barbata Brooks, 1951. *Kan. Univ. Sci. Bull.*, **34** : 387.
Anisops barbata Brooks : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 13.
41. *Anisops bouvieri* Kirkaldy, 1904
Anisops bouvieri Kirkaldy, 1904. *Wiener Ent. Zeit.*, **23** : 116.
42. *Anisops campbelli* Brooks, 1951
Anisops campbelli Brooks : Lansbury, 1964. *Ann. zool. Warszawa*, **22** : 213.
Anisops campbelli Brooks : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 14.
43. *Anisops cavifrons* Brooks, 1951
Anisops cavifrons Brooks 1951. *Kans. Univ. Sci. Bull.*, **34** : 418.
Anisops cavifrons Brooks : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 16.
44. *Anisops nigrolineatus* Lundblad, 1933
Anisops nigrolineata Lundblad, 1933. *Arch. Hydrobiol. Suppl.*, **12** : 160.
Anisops nigrolineatus Lundblad : Polhemus, 1995. *Cat. Het. Palaerctic region*, **1** : 65.
45. *Anisops sardeus* Herrich-Shaffer, 1849
Anisops sardeus Herrich-Shaffer, 1849. *Die wanzenartigen Insecten*, **9** : 41.
Anisops sardeus Herrich-Shaffer : Distant, 1906. *Fauna Brit. India*, **3** : 45.
Anisops sardeus Herrich-Shaffer : Pavia, 1918. *Rec. Indian Mus.*, **14** : 28.
Anisops sardeus Herrich-Shaffer : Distant, 1951. *Univ. Kansas Sci. Bull.*, **34** : 423.
Anisops sardea Herrich-Shaffer : Thirumalai, 1989. *Misc. Occ. Pap. Rec. zool. Surv. India*, **118** : 26.

Subfamily NOTONECTINAE Latreille, 1802

Tribe NOTONECTINI Latreille, 1802

Genus *Enithares* Spinola, 1837

46. *Enithares ciliata* (Fabricius), 1798
Notonecta ciliata Fabricius, 1798. *Suppl. Ent. Syst.*, 524.
Enithares indica Spinola : Distant, 1906. *Fauna Brit. India*, **3** : 42.
Enithares paviana Distant, 1910. *Fauna Brit. India*, **5** : 329.
E. lacta Paiva, 1919. *Rec. Indian Mus.*, **19** : 155.
E. abbreviata (Kirby) : Hafiz and Mathai. 1938. *Rec. Indian Mus.*, **40** : 210.

47. *Enithares fusca* Brooks, 1948

- Enithares fusca* Brooks, 1948. *J. Kans. Ent. Soc.*, **21** : 46.
E. fusca Brooks : Lansbury, 1968. *Pacif. Insects*, **10** : 412.
E. fusca Brooks : Thirumalai, 2001. *ZSI. Fauna Conservation area*, **11** : 115.

Family NEPIDAE

Subfamily RANATRINAE

Tribe RANATRINI

Genus *Cercotmetus* Amyot & Serville, 184348. *Cercotmetus pilipes* (Dallas, 1850)

- Ranatra (Cercotmetus) pilipes* Dallas, 1850. *Trans. R. ent. Soc. Lond.*, **1** : 9.
Cercotmetus pilipes (Dallas) : Montandon, 1903. *Bull. Soc. Sti. Buck.*, **12** : 110.
Cercotmetus pilipes (Dallas) : Distant, 1906. *Fauna Brit. India*, **3** : 23.
C. pilipes (Dallas) : Paiva, 1918. *Rec. Indian Mus.*, **14** : 26.
C. pilipes (Dallas) : Bal & Basu, 1997. *Zool. Surv. India, State Fauna*, **6** : 267.

Genus *Ranatra* Fabricius, 179049. *Ranatra elongata* Fabricius, 1790

- Ranatra elongata* Fabricius, 1790. *Skrif. Nat. Selesk.*, **1** : 228.
Ranatra elongata Fabricius : Lansbury, 1972. *Trans. R. ent. Soc. Lond.*, **124** : 306.
Ranatra elongata Fabricius : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 22.

50. *Ranatra filiformis* Fabricius, 1790

- Ranatra filiformis* Fabricius, 1790. *Skrit. Nat. Selsk.*, **1** : 228.
Ranatra filiformis Fabricius, : Thirumalai, 1994. *Misc. Occ. Pap. Rec zool. Surv. India*, **165** : 22.
Ranatra filiformis Fabricius, : Bal & Basu, 1997. *Zool. Surv. India, State Fauna*, **6** : 266.

Subfamily NEPINAE

Tribe NEPINI

Genus *Laccotrephes* Stål, 186651. *Laccotrephes griseus* (Guerin-Meneville, 1835)

- Nepa griseus* Guerin, 1844. *Iconogr. Regne. Anim.*, 352.
Laccotrephus griseus (Guerin) : Distant, 1910. *Fauna Brit. India*, **5** : 314.
Laccotrephus griseus (Guerin) : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 21.

52. *Laccotrephes ruber* (Linnaeus, 1764)

- Nepa ruber*, Linnaeus 1764. *Mus. Lud. Ulr.*, 165.
Laccotrephes ruber (Linn.) : Distant, 1906. *Fauna Brit. India*, **3** : 18.
Laccotrephes ruber (Linn.) : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 22.

Family BELOSTOMATIDAE

Subfamily BELOSTOMATINAE

Genus *Diplonychus* Laporte, 183353. *Diplonychus rusticus* (Fabricius, 1781)

Nepa rustica Fabricius, 1781. *Ent. Sept.*, 4 : 62.

Sphaerodema rusticum (Fab.) : Distant, 1906. *Fauna Brit. India*, 3 : 36.

D. rusticus (Fab.) : Lauck & Menke, 1961. *Ann. Entomol. Soc. Amer.*, 54 : 649.

D. rusticus (Fab.) : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, 165 : 25.

Diplonychus indicus Venkatesan & Rao, 1980. *J. Bombay nat. Hist. Soc.*, 88 : 299.

Subfamily LETHOCERINAE

Genus *Lethocerus* Mayr, 1853Subgenus *Lethocerus* Mayr, 185354. *Lethocerus indicus* (Lepeletier & Serville, 1825)

Belostoma indica Lepeletier & Serville, 1775. *Encycl. Meth.*, X : 272.

Belostoma indicum Lepeletier & Serville, Mayr, 1871. *Verh. zool.-bot. Ges. Wien*, 12 : 426.

B. indicum (Lepeletier & Serville) : Distant, 1906. *Fauna Brit. India*, 3 : 38.

Lethocerus indicus (Lep. & Serv.) : Buneo, 1927. *Bull. Brooklyn Entomol. Soc.*, 12 : 30.

Lethocerus indicus (Lep. & Serv.) : Lundblad, 1934. *Arch. Hydrobiol. Suppl.*, 12 : 52.

Lethocerus indicus (Lep. & Serv.) : Polhemus, 1995. *Cat. Het. Palaerctic region*, 1 : 23.

Family PLEIDAE

Genus *Paraplea* Esaki & China, 192855. *Paraplea frontalis* (Fieber, 1844)

Plea frontalis Fieber, 1844. *Entomologische Mongraphien, Leipzig*, 18.

P. (Paraplea) frontalis (Fieber) : Hafiz & Pradhan. 1947. *Rec. Indian Mus.*, 45 : 349.

Paraplea frontalis (Fieber, 1844) : Thirumalai. 1999. *IAAB*, 7 : 34.

Plea pelopea Distant, 1910. *Fauna Brit. India*, 5 : 336.

Family HELOTREPHIDAE

Subfamily HELOTREPHINAE

Tribe LIMNOTREPHINI

Genus *Limnotrephes* Esaki & China, 192856. *Limnotrephes campbelli* Esaki & China, 1928

Limnotrephes campbelli Esaki & China, 1928. *Eos. Revta. Esp. Entomol.*, 4 : 161.

Limnotrephes campbelli Esaki & China : Polhemus, 1990. *Acta. Entomol. Bohemoslov*, 87 : 61.

Family CORIXIDAE

Subfamily CORIXINAE

Tribe AGRAPTORIXINI

Genus *Agraptocorixa* Kirkaldy, 189857. *Agraptocorixa hyalinipennis hyalinipennis* (Fabricius, 1803)

Sigara hyalinipennis Fabricius, 1803. *Syst. Rhya. Brusvigae*, 105.

Agraptocorixa hyalinipennis (Fab.) : Jaczewski, 1926. *Ann. Zool. Mus. Polon Warsw.*, 5 : 18.

Agraptocorixa hyalinipennis (Fab.) : Thirumalai 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, 165 : 8.

Corixa unicolor Paiva, 1918. *Rec. Indian Mus.*, 14 : 30.

Corixa paivana Paiva & Dover, 1922. *Rec. Indian Mus.*, 24 : 333.

Tribe CORIXINI

Genus *Sigara* Fabricius, 1775Subgenus *Tropocorixa* Hutchinson, 194058. *Sigara promontoria* Distant, 1910

Corixa promontoria Distant, 1910. *Fauna Brit. India*, 5 : 341.

Corixa (Tropocorixa) promontoria Distant : Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, 33 : 437.

59. *Sigara pruthiana* (Hutchinson, 1940)

Corixa (Tropocorixa) pruthiana Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, 33 : 447.

C. (T.) pruthiana Hutchinson : Thirumalai 1989. *Misc. Occ. Pap. Rec. zool. Surv. India*, 118 : 13.

Subfamily CYMATINAE

Genus *Cymatia* Flor, 186060. *Cymatia apparens* (Distant, 1910)

Corixa apparens Distant, 1910. *Fauna Brit. India*, 5 : 343.

Cymatia apparens (Distant) : Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, 33 : 405.

Corixa hieroglyphia Distant, 1879. *Rhynchota*, 2 : 13.

Subfamily MICRONECTINAE

Genus *Micronecta* Kirkaldy, 1897Subgenus *Basilonecta* Hutchinson, 194061. *Micronecta scutellaris scutellaris* (Stål, 1858)

Sigara scutellaris Stål, 1858. *Vetens akad. Forh.*, 15 : 339.

M. (Basilonecta) scutellaris scutellaris (Stål, 1858) : Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, 33 : 365.

M. (Basilonecta) scutellaris scutellaris (Stål, 1858) : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India.*, **165** : 9.

Micronecta dione Distant, 1910. *Fauna Brit. India*, **5** : 348.

Micronecta malabarica Kirkaldy, 1908. *Canad. Ent.*, **40** : 209.

Micronecta malabarica Kirkaldy : Distant, 1910. *Fauna Brit. India*, **5** : 347.

Micronecta proba Distant, 1910. *Fauna Brit. India*, **5** : 348.

M. scutellaris pseudostriata Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, **33** : 371.

62. *Micronecta siva* (Kirkaldy, 1897)

Sigara siva Kirkaldy, 1897. *Entomologist London*, **30** : 240.

Micronecta (Basilonecta) siva (Kirkaldy) : Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, **33** : 371.

Micronecta striata Fieber : Distant, 1906. *Fauna Brit. India*, **3** : 50.

Subgenus *Dichaetonecta* Hutchinson, 1940

63. *Micronecta desertana dravida* Hutchinson, 1940

M. (Dichaetonecta) desertana dravida Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, **33** : 392.

M. (D). desertana dravida Hutchinson : Thirumalai, 2001. *ZSI. Fauna Conservation area*, **11** : 114.

M. (D). desertana dravida conconensis Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, **33** : 390.

64. *Micronecta prashadana* Hutchinson, 1940

Micronecta (Dichaetonecta) prashadana Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, **33** : 387.

65. *Micronecta sanctae-catherine* Hutchinson, 1940

Micronecta (Dichaetonecta) sanctae-catherine Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, **33** : 384.

Subgenus *Indonectella* Hutchinson, 1940

66. *Micronecta grisea* (Fieber, 1844)

Sigara grisea Fieber, 1844. *Entomol. Mono. Leipzig*, **14**.

Micronecta thyesta Distant, 1910. *Fauna Brit. India*, **5** : 349.

M. (Indonectella) thyesta Distant : Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, **33** : 363.

M. (I). thyesta Distant : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India.*, **165** : 8.

M. (I). thyesta Distant : Thirumalai, 2001. *ZSI. Fauna Conservation area*, **11** : 115.

Subgenus *Sigmonecta* Wroblewski, 196267. *Micronecta quadristrigata* Breddin, 1905

Micronecta quadristrigata Breddin, 1905. *Soc. Ent. Zurich*, **20** : 57.

Micronecta quadristrigata Breddin : Lundblad, 1933. *Arch. Hydrobiol. Supp.*, **12** : 87.

Micronecta (Basileonecta) quadristrigata Breddin : Hutchinson, 1940. *Trans. Connecticut Acad. Art. Sci.*, **33** : 376.

Micronecta (Sigmonecta) quadristrigata Breddin : Wroblewski, 1962. *Bull. Acad. Pol. Sc. II. Warszawa*, **10** : 176.

M. (S.) quadristrigata Breddin : Thirumalai, 1994. *Misc. Occ. Pap. Rec. zool. Surv. India*, **165** : 8.

M. minthe Distant, 1910. *Fauna Brit. India*, **5** : 347.

Note : Jansson (1995) regarded *M. minthe* as a separate species found in SriLanka. However, certain forms of *minthe* are *quadristrigata*.

DISCUSSION

The aquatic and semi-aquatic groups of insects are highly specialised and represent a significant level of diversity (Pennak, 1978; Ghosh, 1996). As checklists of provincial area are of immense value in diversity studies, this account provides baseline information for the assessment of change, to identify key variables and gives a snapshot of the state of biodiversity (Daniels, 1997; Ananthakrishnan, 1999). The present study includes the unique genus, *Stridulobates* Zettel & Thirumalai, 2001a, which possess a mesotrochontial abdominal stridulation unknown from any other insect, from Karnataka. Extensive collections from Karnataka have resulted in the resurrection of the genus *Rheumatogonus* Kirkaldy, 1909 by removing synonymy with *Jucundus* Distant, 1910.

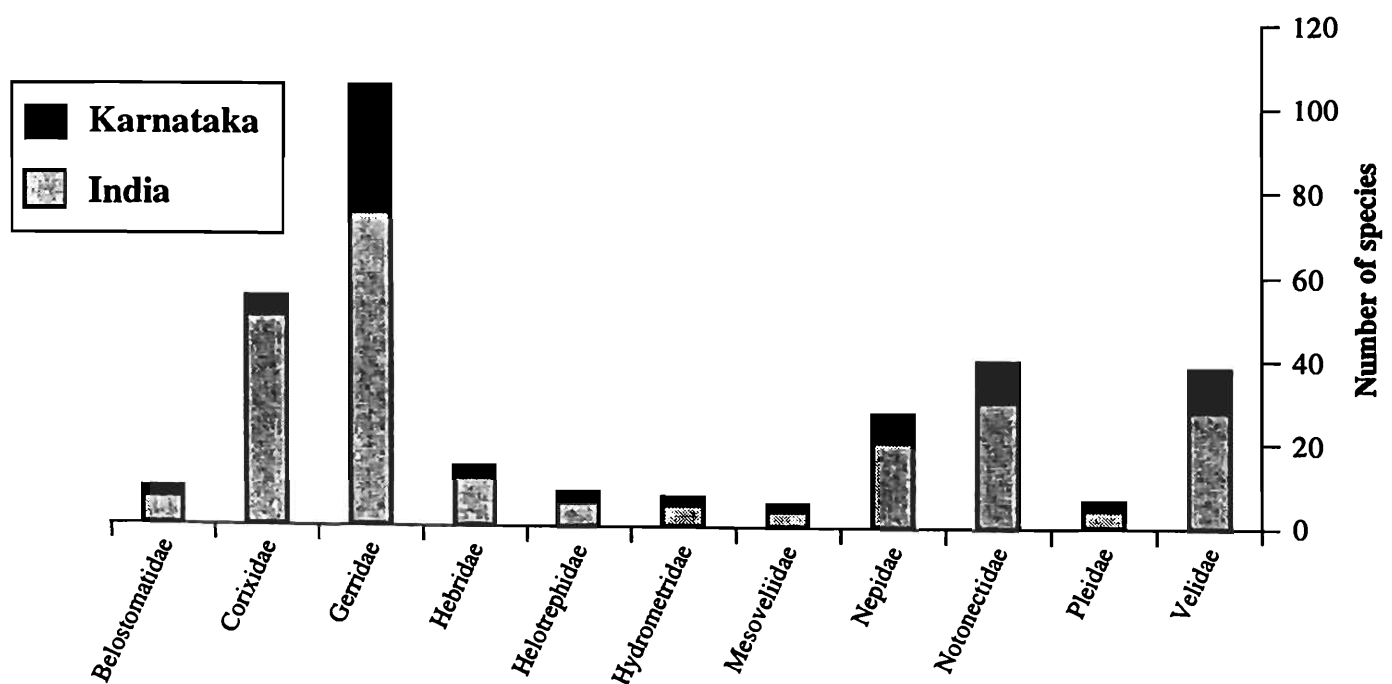


Fig. 1. Distribution of Species of aquatic & semi-aquatic bugs.

Though Karnataka ranks first in total wetland area availability (Anonymous, 1990), the number of species so far reported (67) is less than the neighbouring state, Tamilnadu (95) that ranks 8-th in India. The study forms the authentic report of all the five families of Gerromorpha so far known from India, from this state. Out of 3000 species of insects reported to occur in Indian freshwater habitats (Alfred and Nandi, 2001), the aquatic and semi aquatic bugs constitute 9%. The comparative distribution of aquatic and semi-aquatic bugs is given in the Figure 1. The present report of 67 species of water bugs belonging to 12 families from Karnataka constituting 25% of Indian occurrence reiterates the necessity to explore the group intensively. Since the aquatic and semi aquatic groups of insects are over all indicators of long-term environmental conditions and constitute integral components of almost all freshwater communities, inventorisation of aquatic insect resources forms a high priority area.

SUMMARY

A checklist of Aquatic and semi-aquatic Heteroptera of Karnataka State comprising of 40 genera and 67 species accommodated under 12 families is provided.

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REFERENCES

- Alfred, J. R. B. and Nandhi, N. C. 2001. Wetlands : Freshwater ecosystems of India, *ENVIS, ZSI* : 165-193.
- Anonymous. 1990. Wetlands of India – A directory, Govt. of India, Ministry of Environment and Forests, New Delhi. 150pp.
- Ananthakrishnan, T. N. 1999. Multidimensional links in biodiversity research : An integrated exercise. *Curr. Sci.*, **77**(3) : 356-358.
- Daniels, R. J. R. 1997. Taxonomic uncertainties and conservation assessment of the Western Ghats. *Curr. Sci.*, **73**(2) : 169-170.
- Ghosh, A. K. 1996. Insect biodiversity in India. *Oriental Insects*, **30** : 1-10.
- Hungerford, H. B. and Matsuda, R. 1958. Some interesting aspects of the world distribution and classification of aquatic and semi-aquatic Hemiptera. *Proc. 10-th International Cong. Ent.*, **1**(1956) : 337-348.
- Jansson, A. 1995. Family : Corixidae. *Cat. Heteroptera Palaearctic region*, **1** : 26-56.

- Jenkins, D. W. 1964. Pathogens, parasites and predators of medically important Arthropods, annotated list and bibliography. *Bull. WHO*, **30**(Suppl.) : 1-150.
- Jordon, K. H. C. 1951. Zoogeographische Betrachtungen über das ostliche Sachsen dargestellt durch die Neufurter Heteropteren. *Zool. Anz.*, **147** : 79-84.
- Murdoch, W. W. Scott, M. A. and Ebsworth, P. 1984. Effects of the general predator Notonectidae (Hemiptera) upon a fresh water community. *J. anim. Ecol.*, **53** : 791-808.
- Pennak, R. W. 1978. Fresh-water invertebrates of the United States. 2-nd ed. John Wiley & Sons, Inc. New York. 803 pp.
- Ramakrishna. 2000. Limnological investigation and distribution of micro and macro invertebrates and vertebrates of Fox Sagar Lake, Hyderabad. *Rec. zool. Surv. India*, **98**(1) : 169-196.
- Thirumalai, G. 1999. Aquatic and semi-aquatic Heteroptera of India. *Indian Association of Aquatic Biologists (IAAB) Publication No. 7* : 1-74 pp.
- Thirumalai, G., 2001. Insecta-Aquatic and semi-aquatic Heteroptera, Fauna of Niligiri Biosphere Reserve, *Fauna of Conservation Area Series*, **11** : 111-127. (Published-Director, Zoological Survey of India, Kolkatta)
- Thirumalai, G. 2002. A checklist of Gerromorpha (Hemiptera) from India. *Rec. zool. Surv. India*, **100**(1-2) : 55-97.
- Thirumalai, G and Raghunathan, M. B. 1988. Population fluctuations of three families of aquatic Heteroptera in a perennial pond. *Rec. zool. Surv. India*, **85**(3) : 381-389.
- Thirumalai, G and Krishnan, S. 2000. Diversity of Gerromorpha (Heteroptera : Hemiptera : Insecta) in the Western Ghats States of India. *Rec. zool. Surv. India*, **98**(4) : 59-77.
- Zettel, H. and Thirumalai, G. 2001a. *Stridulobates anderseni*, a new genus and species of ptilomerine Gerridae (Hemiptera : Heteroptera) with stridulatory devices from South India. *Insect Syst. Evol.*, **31**(4) : 433-439.
- Zettel, H. and Thirumalai, G. 2001b. Re-establishment of ptilomerine genus *Jucundus* Distant, 1910 (Insecta : Heteroptera : Gerridae) with redescription of the type species *Jucundus custodiendus* Distant, 1919 from south India and notes on *J. vittatus* (Esaki, 1928) *comb. n.* from Sri Lanka. *Ann. Naturhist. Mus. Wien*, **103B** : 273-282.