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A CHECKLIST OF AQUATIC AND SEMI AQUATIC HEMIPTERA (INSECTA) OF RAJASTHAN, INDIA

G. THIRUMALAI AND RAMAKRISHNA*

Zoological Survey of India, Southern Regional Station, Chennai-600 028

INTRODUCTION

Aquatic and semi aquatic bugs play a vital role and form an important component in food webs of fresh water ecosystems. Studies also indicate that the quality of aquatic environment is partially dependent on aquatic bug population dynamics (Thirumalai & Raghunathan, 1988; Ramakrishna, 2000). Jansson (1977) demonstrated that members of the family Corixidae are used as indicators of water quality. Further, certain families of the bugs may be utilised in the biological control of mosquito larvae (Jenkins, 1964). Because of their diverse habitats and poor dispersal capability, these water bugs serve as zoogeographical indicators (Jordon, 1951; Hungerford & Matsuda, 1958). Some of the aquatic bugs are key stone predators; their abundance is essential to the existence of animal communities in an aquatic habitat (Murdoch *et al.*, 1984).

Out of 285 genera and about 3558 species distributed all over the world, aquatic bug fauna in India is represented by 78 genera and about 269 species under 15 major families. (Thirumalai, 1999). Perusal of literature indicates paucity of information on water bugs of Rajasthan except for the reporting of 12 species under 9 genera accommodated in 7 families of aquatic and semi aquatic bugs (Bhargava, 1985) and 6 species under 4 genera accommodated in 2 families of semi aquatic bugs (Thirumalai, 2001).

The present checklist includes the collection of aquatic and semiaquatic Heteroptera made available to the authors from various aquatic habitats of Rajasthan. The list comprises of 25 species accommodated under 16 genera and in 8 families. Under each species, the citation for the original description and other accompanying work necessary to understand the taxon or its occurrence in India is given.

**Zoological Survey of India, Kolkata-700 053*

AQUATIC AND SEMI AQUATIC HEMIPTERA OF RAJASTHAN

Infraorder GERROMORPHA

Family GERRIDAE

Subfamily EOTRECHINAE

Genus ***Onychotrechus*** Kirkaldy, 1903

1. ***Onychotrechus rhexenor*** Kirkaldy, 1903

   Onychotrechus rhexenor Kirkaldy, 1902. *Entomologist*, **36** : 44.

   Onychotrechus rhexenor Kirkaldy : Distant, 1903. *Fauna British India*, **2** : 183.

   O. rhexenor Kirkaldy : Anderson, 1980. *Steenstrupia*, **6**(10) : 128.

Genus ***Amemboa*** Esasi, 1925

Subgenus ***Amemboa*** Esaki, 1925

2. ***Amemboa (Amemboa)*** sp.

Subfamily GERRINAE

Genus ***Aquarius*** Schellenberg, 1800

3. ***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 British India*, **2** : 180.

Genus ***Limnogonus*** Stal, 1868

Subgenus ***Limnogonus*** Stal, 1868

4. ***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 Stal, 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.

5. ***Limnogonus (Limnogonus) nitidus*** (Mayr, 1995)

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

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

Limnogonus nitidus (Mayr) : Kirkaldy, 1908. *Wissenschafl. 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.

Family VELIIDAE

Subfamily MICROVELIINAE

Genus ***Microvelia*** Westwood, 1834

Subgenus ***Microvelia*** Westwood, 1834

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

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

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

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

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

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

Family MESOVELIIDAE

Subfamily MESOVELIINAE

Genus ***Mesovelia*** Mulsant & Rey, 1852

7. ***Mesovelia vittigera*** Horvath, 1895

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

Mesovelia mulsanti White : Distant, 1903. *Fauna British India*, **2** : 169.

Mesovelia orientalis Kirkaldy, 1901. *Annali Mus. civ. Stor. Nat. Giacomo Doria*, **20** : 1908.

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

Family HYDROMETRIDAE

Subfamily HYDROMETRINAE

Genus ***Hydrometra*** Latreille, 1796

8. ***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 (Stal) : Distant, 1903. *Fauna British India,* **2** : 170.

Infraorder NEPOMORPHA

Family NOTONECTIDAE

Subfamily ANISOPINAE

Genus ***Anisops*** Spinola, 1837

9. ***Anisops barbatus*** Brooks, 1951

Anisops barbata Brooks, 1951. *Kans. Univ. Sci. Bull.*, **34** : 387.

A. barbata Brooks : Thirumalai, 1994. *Misc. Occ. Pap., Rec. zool. Surv. India,* **165** : 13.

10. ***Anisops bouvieri*** Kirkaldy, 1904

Anisops bouvieri Kirkaldy, 1904. *Wiener Ent. Zeit.*, **23** : 116.

11. ***Anisops cavifrons*** Brooks, 1951

Anisops cavifrons Brooks, 1951. *Kans. Univ. Sci. Bull.*, **34** : 418.

12. ***Anisops sardeus*** Herrich-Shaffer, 1850

Anisops sardea Herrich-Shaffer, 1850. *Die wanzennartigen Insecten,* **9** : 41.

Anisops sardea Herrich-Shaffer, Thirumalai, 1989. *Misc. Occ. Pap., Rec. zool. Surv. India,* **118** : 19.

Subfamily NOTONECTINAE

Tribe NOTONECTINI

Genus ***Enithares*** Spinola, 1837

13. ***Enithares ciliata*** (Fabricius, 1798)

Notonecta ciliata Fabricius, 1798. *Suppl. Ent. Syst.*, 524.

Enithares indica Spinloa : Distant, 1906. *Fauna British India*, **3** : 42.

Enithares paviana Distant, 1910. *Fauna British India*, **5** : 329.

E. lacta Paiva, 1919. *Rec. Indian Mus.*, **19** : 155.

E. abbreviata (Kirby) : Hafiz and Mathai, 1938. *Rec. Indian Mus.*, **40** : 210.

Family NEPIDAE

Subfamily RANATRINAE

Tribe RANATRINI

Genus ***Ranatra*** Fabricius, 1790

14. ***Ranatra elongata*** Fabricius, 1790.

Ranatra elongata Fabricius, 1790. *Skrif. Nat. Selesk.*, **1** : 228.

Ranatra elongata Fabricius : Thirumalai, 1994. *Misc. Occ. Pap., Rec. zool. Surv. India*, **165** : 22.

15. ***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.

Subfamily NEPINAE

Tribe NEPINI

Genus ***Laccotrephes*** Stal, 1866

16. ***Laccotrephes griseus*** (Guerin-Meneville, 1835).

Nepa griseus Guerin, 1844. *Iconogr. Regne. Anim.*, 352.

Laccotrephus griseus (Guerin) : Distant, 1910. *Fauna British India*, **5** : 314.

L. griseus (Guerin) : Thirumalai, 1994. *Misc. Occ. Pap., Rec. zool. Surv. India*, **165** : 22.

17. ***Laccotrephes ruber*** (Linnaeus, 1764).

Nepa ruber Linneus, 1764. *Mus. Lud. Ulr.*, 165.

Laccatrephes ruber (Linn.); Distant, 1906. *Fauna British India*, **3** : 18.

L. ruber (Linn.) : Thirumalai, 1994. *Misc. Occ. Pap., Rec. zool. Surv. India*, **165** : 22.

Family BELOSTOMATIDAE

Subfamily BELOSTOMATINAE

Genus ***Diplonychus*** Laporte, 1833

18. ***Diplonychus rusticus*** (Fabricius, 1781).

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

Sphaerodema rusticum (Fab.) : Distant, 1906. *Fauna British 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, 1853

Subgenus ***Lethocerus*** Mayr, 1853

19. ***Lethocerus indicus*** (Lepeletiler & Serville, 1825).

Belostoma indicum Lepeletiler & Serville, 1825. *Encyclopedia Methodique Paris*, **10** : 272

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

Lethocerus indicus (Lep. & Serv.) : Lundblad, 1933. *Arch. Hydrobiol. Suppl.*, **12** : 52.

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

Family PLEIDAE

Genus ***Paraplea*** Esaki & China, 1928

20. ***Paraplea buenoi*** (Kirkaldy, 1904).

Plea buenoi Kirkaldy, 1904. *Wien. ent. Zeit.*, **23** : 128.

P. buenoi Kirkaldy : Distant, 1906. *Fauna British India*, **3** : 48.

P. buenoi Kirkaldy : Bhargava, 1985. *Proc. Nat. Sympos. Evalu. Environ*, (1981), 319.

21. ***Praplea frontalis*** (Fieber, 1844).

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

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

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

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

Family CORIXIDAE

Subfamily CORIXINAE

Tribe AGRAPTOCORIXINI

Genus ***Agraptocorixa*** Kirkaldy, 1898

22. ***Agraptocorixa hyalinipennis hyalinipennis*** (Fabricius, 1803)

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

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

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

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.

Genus ***Sigara*** Fabricius, 1775

Subgenus ***Tropocorixa*** Hutchinson, 1940

23. ***Sigara promontoria*** (Distant, 1910).

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

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

Subfamily MICRONECTINAE

Genus ***Micronecta*** Kirkaldy, 1897

Subgenus ***Basilonecta*** Hutchinson, 1940

24. ***Micronecta scutellaris scutellaris*** (Stal, 1858).

Sigra scutellaris Stal, 1858. *Vetens akad. Forh.*, **15** : 339.

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

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

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

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

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

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

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

Subgenus ***Sigmonecta*** Wroblewski, 1962

25. ***Micronecta quadristrigata*** Breddin, 1905.

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

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

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. Warzawa*, **10** : 176.

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

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

SUMMARY

The aquatic and semi aquatic groups of Insects represent a significant level of diversity (Ghosh, 1996). As checklists of provincial areas are of immense value in diversity studies, (Daniels, 1977; Ananthakrishnan, 1999) this account presents base line data to the functional aspects of fresh water communities and to dispel taxonomic uncertainties existing at various levels. While studying the diversity of water bugs in India, Thirumalai & Krishnan (2000) stated that more than 50% of the semi aquatic bugs are from the states through which the Western Ghats run. Though Karnataka ranks first in total area of wetlands availability, the number of species so far reported (56) is less than Tamilnadu (95) which ranks eighth in India. On the contrary, Arunachal Pradesh

that ranks fifteenth in the wetland area availability, the total species is 42. The present study area is twelfth and the report of 25 species so far invites more effort for systematic exploration of this group intensively.

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