United Nations Decade on Biodiversity

OCCASIONAL PAPER NO. 350

Aquatic Insects of Lakes in and around Hyderabad (Hempitera and Coleoptera)

DEEPA JAISWAL

ZOOLOGICAL SURVEY OF INDIA

OCCASIONAL PAPER No. 350

AQUATIC INSECTS OF LAKES IN AND AROUND HYDERABAD (HEMPITERA AND COLEOPTERA)

DEEPA JAISWAL

Zoological Survey of India
Freshwater Biology Regional Centre
Hyderabad-500048
Email: deepajzsi@gmail.com

Edited by
The Director, Zoological Survey of India

Zoological Survey of India
Kolkata

CITATION

Jaiswal, Deepa, 2013. Aquatic Insects of Lakes in and around Hyderbad (Hempitera and Coleoptera). *Rec. zool. Surv. India, Occ. Paper No.*, **350** : 1-51, (Published by the Director, *Zool. Surv. India*, Kolkata)

Published : July, 2013

ISBN 978–81–8171–346–9

PRICE
India : ₹ 350/-
Foreign : $ 20; £ 15

Published at the Publication Division by the Director, Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053 and printed at East India Photo Composing Centre, Kolkata-700 006.

RECORDS
OF THE
ZOOLOGICAL SURVEY OF INDIA
OCCASIONAL PAPER

350 **2013** **Page 1-51**

CONTENTS

INTRODUCTION

Hyderabad city in Andra Pradesh is located in the heart of Deccan plateau of the India at latitude 17°20´ N and longitude 78°30´E. It is spread over 1552 km and includes a major wetlands which constitutes lentic and lotic freshwater resources. Among lotic resources, the main river Musi passes through the city. The present study on insects was undertaken on four important man made lakes of Hyderabad which differ significantly in their nutrient status. The lakes studied were Hussain sagar, Miralam lake (eutrophic lakes), Himayat sagar, (oligotrophic lake) and Durgam cheruvu (mesotrophic lake). Hyderabad is famous for its beautiful lakes. The lakes are home for many beautiful migratory birds, which travel every year to the lakes and provide people with visual treat.

LAKES

Lakes, ponds, temporary ditches *etc*. form habitats for a number of aquatic insects and they to some extent indicate environmental conditions of the water bodies as well. The present account is a part of the work on the faunal diversity of the four lakes of Hyderabad *viz*. Hussain sagar and Mialam tank, (Eutrophic lakes), Himayat sagar (Oligotrophic lake) Durgam Cheruvu (Mesotrophic lake), being carried out by the Zoological Survey of India, Hyderabad. The study reports the presence of 14 species of Hemiptera belonging to 5 families and 8 genera, which forms the first report of this group from insects of lakes of Hyderabad. The inventory also comprises of 31 species of coleopteran accommodated under 20 genera and four families. Under each species, citation for original description and other accompanying work necessary to undertake the taxon is given. Taxonomic treatments of the taxa are dealt.

1. Hussain sagar :

The Hussain Sagar Lake in Hyderabad is an enchanting lake and is one of the largest man-made Lake in Asia. This gem of a lake is truly a masterpiece given shape by Hussain Shah Wahi on the tributary of the river named Musi in the year 1562. Hyderabad and Secunderabad are the two cities that are connected to each other by this Lake. The place where it is located is called ‘Tank Bund’. The Lake doubles up as an important landmark as well as picnic and recreation spot. The Lake is bordered by four major spans of greenery, Indira Park in the east, Sanjeevaiah Park in the north, Lumbini Park in the south and a green belt stretch squeezed in between the Raj Bhavan road and the Necklace Road. The 16 meter tall, 350-tonne monolithic gigantic sculpture Buddha Statue rises high from the calm waters of the scenic lake, being situated at a distance of approximately 1.5 kilometers from the city of Hyderabad stands out

amongst the very limited number of man-made lakes in the country. The dam was originally fed by Balkapur river which branched off from Musi river, about 32 km from Hyderabad.The lake is located at about 51 cm above the sea level, its maximum length and breadth are reported to be 3.02 km and 2.80 km respectively with a maximum depth of 12.50 m and mean depth of 2.50 m. The total catchement area is about 240.80 Km^2.

2. Himayat Sagar lake :

The Himayat Sagar lake is one of the beautiful lakes dotting the Hyderabad region. Himayat Sagar lake is 20 kilometers distant from Hyderabad city. It lies parallel to another lake-Osman Sagar. Himayat Sagar is named after Himayat Ali Khan. Himayat Ali Khan was the youngest son of the 7^{th} Nizam of Hyderabad. Constructed across the Esi, a tributary of Musi river, during the periods 1920 and 1927 AD. The reservoir is located southwest of the city at a distance of 9.66 km from the city. Its catchement area is reported to be 1315 sq. km. its maximum length and breadth area is 3.22 km and 2.80 km with maximum depth of 12.5 m and mean depth of 2.5 m. It has realitvely smaller water spread area of 29.27 m^2 at full tank level. The origin of Himayat Sagar lake at Hyderabad is purely due to practical man made causes. The Deccan region-where the city of Hyderabad lies-receives seasonal rainfall during the monsoons. The region receives minimal rainfall during the rest of the year. Maximum rainfall occurs during the time of the Indian monsoons. This yearly precipitation occurs during the months which extend from June to September. The primary purpose of the lake is to impound and store rainwater to cover the liquid requirement for the rest of the year. It provides drinking water and meets irrigation water requirements in the region. It also serves another secondary function-the lake recharges the groundwater level in the immediate geological area.

3. 'Durgam Cheruvu', Secret lake of Hyderabad :

The Secret lake is situated near HITEC city in Hyderabad. Secret lake is situated close to Shilparamam Crafts Village. The vernacular name of Secret lake is 'Durgam Cheruvu'. Secret lake in Hyderabad extends over an area comprising 63 acres. The name 'Secret lake' was probably due to its concealed location. The lake is picturesque and is encircled by hills of interesting rocky formations. Secret lake was constructed during the reign of the Quli Qutub Shahs. The primary purpose of Secret lake at the time of its construction was to supply potable drinking water to Golconda fort. The rainfall is stored and utilized for economic needs when and where required.

4. Mir Alam Tank :

Mir Alam Tank is a small lake in Hyderabad. It is 16 kilometers distant from Hyderabad. The nearest landmark to Mir Alam Tank is Nehru Zoological Park. The unique feature of the

tank is that the structure of the man made water body has 21 in-built small masonry dams. The complete architectural arrangement imparts a majestic look to the structure. The nomenclature of Mir Alam Tank in Hyderabad betrays its origin to Mir Alam, the builder of the tank. It was built during the early 19th Century. Mir Alam laid the foundation of the tank on July 20, 1804. It was completed in 2 years. According to historical documentary records, Mir Alam Tank was completed on June 8, 1806. It supplied potable, drinking water before more modern storage facilities came into existence. It is located about 1 km southwest of the old city of Hyderabad. The lake has comparatively reduced water spread area of 1.69 km^2 and catchmenet area of 15.24 km^2. The maximum length and breadth of the lake are 2.088 and 1.5 km^2 respectively with maximum depth of 31.40 m and mean depth of 4.80 m.

AQUATIC INSECTS

Insects are the most diverse group of organisms in freshwater. Estimates on the global number of aquatic insect species derived from the fauna of North America, Australia and Europe is about 45,000 sps, of this about 5,000 species are estimated to inhabit inland wetlands of India. Eventhough the insects are terrestrial in origin, a large number of species belonging to several orders have adapted to aquatic mode of life. The present study, “Studies on aquatic insects of lakes of Hyderabad” is a part of the work faunal diversity of lakes of Hyderabad. The study is based on Insect collections made from various surveys to the four different lakes of Hyderabad, during April, 2008-March, 2010. During the course of local surveys, aquatic insects were collected from water bodies. Collections were made with the help of hand operated nets of varying sizes by randomly netting different areas of wetland. Insects collected for study were preserved in 70% alcohol. The collections were identified with the aid of standard literature on the groups. This study is significant due to its maiden effort to study the entomofaunal diversity of lakes of Hyderabad, Andhra Pradesh.

HEMIPTERA

Aquatic bugs are living throughout of their life cycle inside the waterbody and they are placed under the series Hydrocorisae while semiaquatic bugs are dwelling on the surface of waterbody and belong to series Amphibicorisae. In spite of 80 genera and 275 species accommodated in 16 major families of aquatic and semi aquatic Hemiptera known from India (Thirumalai, 2002), very little information on water bugs of Andhra Pradesh is available. Limited number of studies has also been carried out on general entomofauna of some specific wetlands from taxo-ecological view points which includes the work of Roy (1988), Bhattacharya (2000), Ramakrishna (2000), Ghosh (1996), Bal and Basu (1994) and Tonapi (1959), Deepa & Rao (2010) and Deepa (2010).

COLEOPTERA

The order Coleoptera, or beetles, is represented by some 3,50,000 known species (Lawrence *et al.*,1982), but recent estimates suggest there are hundreds of thousands or even millions of undescribed species. Although the vast majority of beetles are terrestrial, it is estimated that about 18,000 species of aquatic Coleoptera are present on the earth at present. About 12,600 (70%) of these are already described. About 30 beetle families have aquatic representatives, and in 25 of these families at least 50% of the species are to be considered as aquatic. Six families are supposed to include 1,000 or more aquatic species : Dytiscidae (3,908 described species/5,000 estimated), Hydraenidae (1,380/2,500), Hydrophilidae (1,800/2,320), Elmidae (1,330/1,850), Scirtidae (900/1,700) and Gyrinidae (750/1,000). Scirtidae and Hydraenidae, Haliplidae, are regarded as the least explored families. (Jäch and Balke, 2008).

Although aquatic coleopterans are highly diverse and distributed to nearly 30 families, but only four families namely Dytiscidae, Gyrinidae Hydrophilidae and Haliplidae are chiefly represented in the present report of lakes of Hyderabad. The members of the family Dytiscidae (Predacious diving beetles) have adapted perfectly well to aquatic life. All adults and larvae are aquatic. The members of family Gyrinidae (Whirlig beetles) are found in fresh water ponds, lakes, open flowing streams etc. When the Gyrinid beetles are swimming on the surface of the water, the dorsal portion of the eye is in air, and the ventral portion in water. The Hydrophilids (water scavenger beetles) are predominant in rivers and streams. The members of Haliplidae (crawling water beetles) live among aquatic vegetation along the edges of ponds, lakes streams or creeks.

Aquatic Coleoptera constitute an important part of the macrozoobenthos of freshwater habitats. Small and temporary water bodies have more species than large and permanent ones (Larson, 1974). Aquatic beetles have their greatest abundance and diversity in temperate regions. These insects are not selective in their choice of water bodies and occur in a wide variety of habitats. Many of them, especially dytiscids and many hydrophilids, are generally found in habitats of small shallow water bodies or on the margin of rivers and marshes, and they occupy the zone of emergent vegetation, mats of plant debris.

Water beetles can be used to control water plants that have become pests. *Agasicles hygrophila*, an alticine chrysomelid was, for instance, introduced into the USA from South America to control Alligatorweed (*Alternanthera*). Species of Dytiscidae are aquatic predators and may play an important role in controlling mosquitoes. Dytiscids cause considerable harm to fish fry but there were few actual studies on that subject, and more research would be needed to assess potential harm as well as benefits of water beetles to aquaculture (Vazirani, 1972). Adults of larger *Cybister*, *Eretes*, (Dytiscidae) and *Hydrophilus*, (Hydrophilidae), are still part of the diet of man in China, Thailand, and New Guinea (Jach & Easton, 1998). Ochs

(1924) believes these gyrinids to be an aphrodisiac. More than a century ago, a Riffle Beetle, *Austrelmis condimentarius* (Elmidae), was used as seasoning for food in South America. This species was reported to have considerable commercial value. In Hong Kong, *Cybister* are sold as pets for use in the aquarium (Jach & Easton, 1998).

The water beetles show wide diversity of colour, form and life pattern. (Vazirani, 1968). The earlier knowledge and scientific contribution on aquatic beetles (Vazirani, 1968, 1970, 1984, Mukhopadhyay, 2007) are noteworthy to understand the present fauna. Beside Vazirani, a number of other workers contributed greatly, among them are Jach & Balke, 2008, Balfour-Brown (1939), Wewalka, 1975. The major studies on aquatic Coleoptera also includes the works from Andhra Pradesh (Mukhopadhyaya, 2007 & Mukhopadhyaya & Ghosh, 2007), West Bengal, (Biswas & Mukhopadhyay, 1995), Sikkim (Mukhopadyaya & Ghosh, 2003). More than 223 species of aquatic coleopteran are know from India, Only 31 species of Beetles are reported from the present study. More intensive survey spread over different seasons would be required to provide a complete picture of the aquatic beetle diversity of this area.

The inventory comprises of 31 species accommodated under 20 genera and four families. Under each species, citation for original description and other accompanying work necessary to undertake the taxon is given.

MATERIAL AND METHODS

During the course of monthly surveys in connection with studies on the lakes of Hyderabad during 2007-2009, collections was made with the help of hand operated nets of varying sizes by randomly netting different areas of wetland. While surface floating/swimming insects were collected with small circular nets made of either coarsely meshed cotton cloths or finely meshed polyester mosquito curtain cloth. Macrophytes associated insects were collected with help of hand operated 'D' framed sweep net of the size of 50 cm length, 25 cm maximum breadth of the 'D'. The frame was attached to a bag net made of fine malmal cloth with mesh size of approximately 200µ. The design and operation of the net was roughly based on those described by Junk (1977). Insects collected for study were preserved in 4% formalin or 70% alcohol. All the aquatic insect material reported here-in has been collected by the author herself.

Aquatic hemiptera in the collections was identified with the aid of standard literature on the group *viz.*, Thirumalai (1999) and Bal and Basu (1994a & 1994b) and Aquatic coleoptera were identified by literature on group by Vazirani (1970, 1984), Biswas & Mukhopadyaya (1995). Under each species citation for the original description and other accompanying work necessary to understand the taxon or its occurrence in India is given.

SYSTEMATIC LIST

AQUATIC INSECTS : HEMIPTERA

Order HEMIPTERA

Suborder HETEROPTERA

Infraorder NEPOMORPHA Popov, 1968

Family NEPIDAE Latereille, 1802

Subfamily RANANTRINAE Latereille, 1802

Tribe RANATRINI Latereille, 1802

Genus ***Ranatra*** Fabricius, 1790

1. *Ranatra elongata* Fabricius, 1790
2. *Ranatra filiformis* Fabricius, 1790
3. *Ranatra digitata* Hafiz & Pradhan, 1947

Subfamily NEPINAE Latereille, 1802

Tribe NEPINI Latereille, 1802

Genus ***Laccotrephus*** Stal, 1866

4. *Laccotrephus griseus* Guerin-Meneville, 1844
5. *Laccotrephus ruber* Linnaeus, 1764
6. *Laccotrephus elongatus* Montandon, 1907

Family BELOSTOMATIDAE Leach, 1815

Subfamily BELOSTOMATINAE Leach, 1833

Genus ***Diplonychus*** (Laporte), 1833

7. *Diplonychus rusticus* Fabricius, 1781
8. *Diplonycus annulatus* Fabricius, 1781

Subfamily LETHOCERINAEA Lauck & Menke, 1961

Genus ***Lethocerus*** Mayr, 1853

9. *Lethocerus indicus* Lepeletiler & Serville, 1852

Family NOTONECTIDAE Latereille, 1802

Subfamily ANISOPINAE Hutchinson, 1929

Genus ***Anisops*** Spinola, 1837

10. *Anisops bouvieri* Kirkaldy, 1904
11. *Anisops sardeus sardeus* Herrich-Shaffer, 1850

Family CORIXIDAE Leach, 1815

Subfamily MICRONECTINAE Leach, 1815

Genus ***Micronecta*** Kirkaldy, 1897

12. *Micronecta scutellaris scutellaris* Stal, 1858

Infra order GERROMORPHA Popov, 1971

Family GERRIDAE Leach, 1815

Subfamily GERRINAE Bianchi, 1896

Genus ***Limnogonus*** (Stal, 1868

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

Genus ***Limnometra*** Mayr, 1865

14. *Limnometra fluviorum* (Fabricius, 1798)

SYSTEMATIC ACCOUNT

Order HEMIPTERA

Suborder HETEROPTERA

Infraorder NEPOMORPHA Popov, 1968

Family NEPIDAE Latereille, 1802

The insects belonging to this family are popularly known as “water scorpions” because of fact that forelegs somewhat resemble to the pedipalps of scorpions. The body is dorsoventrally fattened or cylindrical with long slender legs, the anterior pair being raptorial with long and stout femur used mainly for capture of prey. One jointed tarsi and absence of ocelli are the characteristic feature of family. Two long slender non retractile caudal filaments with grooves on median surface and fitted together constitute the respiratory tube. By placing its tip at the surface film, oxygen in the tracheal system is replenished.

Nepids are sluggish in nature and prefer still water. They are usually found in trash and mud or remain entangled with aquatic vegetation in the shallow littoral region of wetlands. Highly predacious insect species feed mainly on live insects and their nymph. The prey is captured with the help of raptorial forelegs. The most important cosmopolitan genus Ranatra occurs abundantly in this region.

Subfamily RANANTRINAE Latereille, 1802

Tribe RANATRINI Latereille, 1802

Genus ***Ranatra*** Fabricius, 1790

1. ***Ranatra elongata*** Fabricius, 1790

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

1994. *Ranatra elongata* Fabricius : Thirumalai, *Rec. zool. Surv. India, Occ. Pap. No.* **165** : 22.

Material examined : 8 exs, FBRC/ZSI/728, Durgam cheruvu, 04.ix.2007; 4 exs., FBRC/ ZSI/739, Hussainsagar, 04.ix.2007; FBRC/ZSI/731, Hussainsagar, 19.xii.2007; 11 exs. FBRC/ ZSI/730, Miralam Tank, 19.xii.2007; 02 exs., FBRC/ZSI/729, Durgam cheruvu, 4.iii.2008.

Diagnostic characters : It is reported to be feeding on tadpoles, nymph of mayflies and other aquatic Hemipterans and during dry seasons it is known to migrate in search of suitable areas. This species can be identified by the structure of the anterior femur, which is provided with a triangular tooth beyond the middle of its length, and the metasternal process, which is sub triangular.

Distribution : India : Andhra Pradesh, Bihar, Delhi, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Australia, Nepal, Sri Lanka.

2. ***Ranatra filiformis*** Fabricius, 1790

1970. *Ranatra filiformis* Fabricius, *Skri. Nat. Selsk.*, **1** : 228.

1989. *Ranatra filiformis* : Thirumalai, *Rec. zool. Surv. India, Occ. Pap. No.* **118** : 31.

Material examined : 03 exs., FBRC/ZSI/734, Hussain sagar, 30.i.2007; 02 exs., FBRC/ ZSI/732, Miralam Tank, 19.ii.2009.

Diagnostic characters : This species is found in shallow parts of water, clinging to submerged vegetation and feeds on nymphs of dragon flies and mosquito pupae. This species is smaller in size than *R. elongata.* Head provided with distinct tubercle on the vertex, eyes are more prominent.

Distribution : India : AndhraPradesh, Arunachal Pradesh, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Manipur, Meghalaya, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : China, Nepal, Pakistan, Philippines, Srilanka.

3. ***Ranatra digitata*** Hafiz & Pradhan, 1947

1947. *Ranatra* digitata; Hafiz & Pradhan, *Rec. Indian Mus.*, **45** : 371.

1999. *Ranatra* digitata : Thirumalai, I.A.A.B., **7** : 32.

Material examined : 01 exs, FBRC/ZSI/736, Hussain sagar, 30.i.2007; 01 exs., FBRC/ ZSI/ 738, Durgam cheruvu, 4.iii.2008 ;02 exs., FBRC/ZSI/ 737, Himayatsagar, 28.v.2008.

Diagnostic characters : Body length may be 28-31 mm while abdominal appendages may be 26-28 mm in adult specimens, metatsternatal process broadly rounded with a slight median keel at the posterior.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Manipur, Meghalaya, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : China, Nepal, Pakistan, Philippines, Srilanka.

Subfamily NEPINAE Latereille, 1802

Tribe NEPINI Latereille, 1802

Genus ***Laccotrephus*** Stal, 1866

4. ***Laccotrephus griseus*** Guerin-Meneville, 1844

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

1906. *Laccotrephus griseus* (Guerin) : Distant, *Fauna British India,* **5** : 314.

1994. *Laccotrephus griseus* (Guerin) : Thirumalai, *Rec. zool. Surv. India,* Occ. Pap. No. **165** : 21.

Material examined : 02 exs., FBRC/ZSI/740, Hussain sagar, 30.i.2007.

Diagnostic characters : A very common sluggish species, found at the bottom of slow or stagnant water. It can be identified by the presence of slightly hooked and symmetrical parameres, abdominal appendages shorter than the body, presence of an obtusely rounded tooth at the base of the anterior femora.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Manipur, Meghalaya, Nagaland, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Malaysia, Myanmar, Seychelles, Srilanka, Thailand.

5. ***Laccotrephus ruber*** Linnaeus, 1764

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

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

1994. *Laccotrephus ruber* (Linn.) : Thirumalai, *Rec. zool. Surv. India, Occ. Paper No.* **165** : 22.

Material examined : 6 exs., FBRC/ZSI/735, Miralam tank, 4.ix.2007; 02 exs. FBRC/ZSI/742, Himayatsagar, 28.v.2008.

Diagnostic characters : This is a larger species with the abdominal appendices slightly longer than the body. The male parameres are curved and hook shaped. It is a common species with wide distribution in the Indo-Australian region.

Distribution : India : Arunachal Pradesh, Assam, Bihar, Delhi, Gujarat, Himachal Prdesh, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Manipur, Meghalaya, Nagaland, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : China, Japan, Nepal, Pakistan, Taiwan.

6. ***Laccotrephus elongatus*** Montandon, 1907

1907. *Laccotrephus elongatus* : Montandon, *Buul. Soc. Sci. Buc.*, **15** : 330.

1910. *Laccotrephus elongtus* : Distant, *Fauna Brit. India, Rhynchota,* **5** : 313.

2002. *Laccotrephus elongates* : Bal & Basu, *Fauna of Kabar lake, Wetland Ecosystem series,* **4** : 80.

Material examined : 12 exs., FBRC/ZSI/746, Miralam tank, 4.ix.2007; 02 exs., FBRC/ ZSI/767, Hussainsagar, 28.i.2009.

Diagnostic characters : This is a larger species with the abdominal appendices slightly longer than the body. The male parameres are curved and hook shaped. It is a common species with wide distribution in the Indo-Australian region.

Distribution : India : Arunachal Pradesh, Assam, Bihar, Delhi, Gujarat, Himachal Prdesh, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Manipur, Meghalaya, Nagaland, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : China, Japan, Nepal, Pakistan, Taiwan.

Family BELOSTOMATIDAE, Leach, 1815

These insects are commonly known as “Giant water bugs” because of their large size (10-110 mm in length). The body is flat, oval or oblong, brown or dull greenish colour. Antennae 4 segmented and concealed in pockets beneath the head, eyes prominent. The Strong and thick front legs are raptorial and used for grasping. The middle and hind legs are broad, flat and fringed with swimming hair. The tarsi are 3 segmented, ocelli absent. The most characteristic feature in adult is presence of retractile strap like appendages at the abdominal apex, which are used to obtain air. These air straps are homologous with respiratory siphon of related family Nepidae, being derived from 8th abdominal tergum, each bearing a basal spiracle. About 150 sps. of Belostomatids are so far known from the world.

Subfamily BELOSTOMATINAE Leach, 1833

Genus ***Diplonychus*** (Laporte), 1833

7. ***Diplonychus rusticus*** Fabricius, 1781

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

1994. *Diplonychus rusticus* (Fab.) : Thirumalai, *Rec. zool. Surv. India, Occ. Pap. No.* **165** : 25.

Material examined : 6 exs., FBRC/ZSI/723, Durgam cheruvu, 04.iii.2008. 03 exs., FBRC/ ZSI/762, Hussainsagar, 28.i.2009.

Diagnostic characters : This species is voracious feeder on fish fry, mosquito larvae. It has single segmented fore tarsus with claw, pale lateral basal margins of pronotum and its head length is shorter than the intraocular space. Body 15-17 mm long. It is a voracious feeder and has been reported to attack fish fry and fingerlings.

Distribution : India : Andaman & Nicobar Island, Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Rajasthan, Tamil Nadu, West Bengal.

Elsewhere : Malaysia, Myanmar, China, Indonesia, Japan, New Guinea, New Zealand, Srilanka, Thailand.

8. ***Diplonychus annulatus*** Fabricius, 1781

1980. *Diplonychus* inicus : Venkatesan & Rao, J. Bombay nat. Hist. Soc., **77** : 229.

Material examined : 5 exs., FBRC/ZSI/715, Miralam tank, 19.xii.2007; 12 exs., FBRC/ZSI/716, Durgam cheruvu, 30.i.2007; 02 exs., FBRC/ZSI/717, Miralam tank, 28.v.2008.

Diagnostic characters : Rostrum long and Segment I of rostrum twice longer than segment II, pronotum with lateral margins nearly straight, anterior tarsus two segmented and terminated by two small and equal claws which are shorter than the width of the tarsal segment.

Distribution : India : Tamil Nadu, Andaman & Nicobar Island, Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Rajasthan, Tamil Nadu, West Bengal.

Elsewhere : Malaysia, Myanmar, China, Indonesia, Japan, New Guinea, New Zealand, Srilanka, Thailand.

Subfamily LETHOCERINAEA Lauck & Menke, 1961

Genus ***Lethocerus*** Mayr, 1853

9. ***Lethocerus indicus*** (Lepeletier & Serville, 1825)

1825. Belostoma indica Lepeletier & Serville, *Encycl. Meth.*, 272.

1909. Lethocerus indicus : Montandon, *Bull. Soc. Sci. Buc.*, **17** : 138.

2002. Lethocrus indicus : Bal & Basu, *Fauna of Kabar lake, Wetland Ecosystem series*, **4** : 81.

Material examined : 02 exs., FBRC/ZSI/724, Hussain sagar, 20.viii.2005; 2 exs., FBRC/ZSI/726, Himayatsagar, 20.viii.2005; 02 exs., FBRC/ZSI/725, Miralamtank, 30.ix.2008.

Diagnostic characters : This species is known as Giant Indian water-bugs. Adult insects may be 62-85 mm in boby length, head between eues with parallel sides, pronotum with a transverse fasciae at the baseal end and a fine mid-longitudinal carination, hemielytra with distinct membrane which provided with promionent and thick longitudinal veins, posterior legs provided with thick sets of long swimming hairs on the ventral sides.

Distribution : India : Andaman & Nicobar Island, Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Rajasthan, Tamil Nadu, West Bengal.

Elsewhere : Malaysia, Myanmar, China, Indonesia, Japan, New Guinea, New Zealand, Srilanka.

Family NOTONECTIDAE Latereille, 1802

Subfamily ANISOPINAE Hutchinson, 1929

Genus ***Anisops*** Spinola, 1837

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

1904. *Anisops bouvieri* : Kirkaldy, *Wein. ent. Ztg.*, **23** : 116.

2001. *Anisops bouvieri* : Thirumalai, *fauna of Niligiri Biosphere Reserve, Cons. Area series*, **11** : 116.

Material examined : 04 exs. FBRC/ZSI/747, Himayatsagar, 28.v.2008; 3 exs., FBRC/ZSI/749, Miralam tank, 4.ix.2007.

Diagnostic characters : Body length of males and females 6.0 to 6.3 mm and 5.5 to 6.0 mm respectively. General body colour perlaceous.Moderately prominent cephalic horn with frons excavate triangularly and bordered laterally by two carinae, rostral prong as long as the 3rd rostral segment, male stidulatory comb of about 12 teeth.

Distribution : India : Andaman & Nicobar Island, Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Rajasthan, Tamil Nadu, West Bengal.

Elsewhere : Myanmar, China, Indonesia, Japan, New Guinea.

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

1850. *Anisops* sardea : Herrich-Shaffer, *Die.Wanz. Ins.* m, **9** : 41.

2001. *Anisops sardeus sardeus* : Thirumalai, *Fauna of Niligiri Biosphere Reserve, Cons. Area series*, **11** : 117.

Material examined : 01 ex., FBRC/ZSI/710, Miralam tank,19.ii.2009; 02 exs., FBRC/ZSI/727, Hussain sagar, 20.viii.2005.

Diagnostic characters : Males may reach 7.5 to 8.4 mm and females 7.2 to 7.5 mm in body length, general body colour pale yellow or brownish yellow.Much promionent cephalic horn with frons excavate of its entire length and bordered laterally by two carinae, rostral prong slightly shorter than the 3rd rostral segments, stidulatory comb of male on the first tibiae of about 18 teeth.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Bihar, Kerala, Tamil Nadu, West Bengal.

Elsewhere : Myanmar, China, Africa, Turkey, Pakistan.

Family CORIXIDAE Leach, 1815

The members of this family usually called “Water Boatmen” are medium to small insects usually 2-16 mm in length. Although the family Corixidae is the largest family of aquatic Hemiptera consisting of about 500 species, distributed widely in the world from below sea level to as high as 4575 meters in Himalaya, from arctic water beneath ice to hot springs with

temperature around 35°C (Thirumalai, 1989). In India it is represented only 35 species belonging to 4 genera (Thirumalai, 1994). During present investigation only one species was recorded.The body is somewhat flattened above and colour is dark grayish with yellow or black markings. The wing membrane is without veins. Head is triangular with short, unsegmented labium. Antennae short, concealed with 3-4 segments. Front tarsus-1-jointed, flattened and scoop like called "Pala" which is the characteristic of family. Scutellum is concealed and male abdominal segments are asymmetrical. A file like plate called "Strigil" is present in tergum VI of male .Abdominal terga III-IV of nymphs and adults have metathoracic scent glands opening near the 3rd coaxae. Dorsum of the abdomen with alternative dark and transverse band.

Subfamily MICRONECTINAE Leach, 1815

Genus ***Micronecta*** Kirkaldy, 1897

12. ***Micronecta scutellaris scutellaris*** Stal, 1858

1858. *Sigra scutellaris* Stal , *Vetens akad. Forh.,* **15** : 319.

1940. *Micronecta (Basilonecta) scutellaris* (Stal,1858) : Hutchinson, *Trans. Cnnecticut Acad. Art. Sci.,* 33 : 365.

1994. *Micronecta (Basilonecta) scutellaris* (Stal,1858) : Thirumalai, *Rec. zool. Surv. India, Occ. Pap. No.* **165** : 9.

Material examined : 2 exs., FBRC/ZSI/709, Hussainsagar, 20.viii.2005; 3 exs., FBRC/ ZSI/741, Hussainsagar, 20.viii.2005; 3exs., FBRC/ZSI/708, Durgam cheruvu, 4.iii.2008; 01 ex., FBRC/ZSI/718, Durgam cheruvu, 4.iii.2008.

Diagnostic characters : This species is very widely distributed in India and mostly found in stagnant pools, pond and ditches. It is the largest species (2.8 to 3.1 mm) of the genus. Pronotum grey or grayish brown, paler margins and with obscure elytral pattern.

Distribution : India : Andhra Pradesh, Himachal Pradesh, Bihar, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Malaysia, China, Indonesia, Japan, Srilanka, Vietnam, Africa (Central).

Infraorder GERROMORPHA Popov, 1971

Family GERRIDAE Leach, 1815

Family GERRIDAE

These are popularly known as "Water Striders" or "Pond Skaters". They are semiaquatic long legged hemipterans. These insects are found skating or leaping about on the surface film of wetlands. When disturbed they scatter widely in all directions. They feed upon a number of microcrustaceans and insects that are caught just below water surface.The family is represented by about 450 species in the world. The body is oval shaped and covered with a velvety hydrofuge hair pile. Both winged And nonwinged forms occur but the latter are more common (Thirumalai, 1986).

Subfamily GERRINAE Bianchi, 1896

Genus ***Limnogonus*** Stal, 1868

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

1865. *Hydrometra nitida* Mayr, *Verh. Zool. Bot. Ges. Wein,* **15** : 443.

1994. *L. (Limnogonus) nitidus (Mayr)* : Bal & Basu, Zool. Surv. India, *State Fauna, Series* **3**, *Fauna of West Bengal* : 525.

Material examined : 3 exs., FBRC/ZSI/733, Hussainsagar, 30.i.2007; 2 exs., FBRC/ZSI/748, Miralam tank, 4.ix.2007; 1 ex., FBRC/ZSI/752, Himayatsagar, 28.v.2008.

Diagnostic characters : This species can be identified from all the known species of this genus by the presence of fairly, prominent connexival spines and yellow markings at the anterior pronotal lobe. It has been recorded from temporary pools, rice fields, ponds from sea level to 1000 metres and found as winged individual.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Bihar, Delhi,Chandigarh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Manipur, Meghalaya, Rajasthan, Tamil Nadu,Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Malaysia, Myanmar, China, Indonesia, Srilanka, Thailand, Vietnam, Singapore.

Genus ***Limnometra*** Mayr, 1865

14. ***Limnometra fluviorum*** (Fabricius, 1798)

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

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

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

Material examined : 02 exs., FBRC/ZSI/745, Miralamtank, 4.ix.2007; 5 exs., FBRC/ZSI/707, Hussainsagar, 2.vii.2007; 3 exs., 755, Durgam cheruvu, 4.iii.2008.

Diagnostic characters : This species can be identified from all the known species of this genus by the presence of spine like projection on the dorsolateral rear margin of the middle coxae. It is commonly found in fresh water habitats of Southern India.

Distribution : India : Karnataka, Kerala, Maharashtra, Pondicherry, Tamil Nadu, West Bengal.

Elsewhere : Philippines, Srilanka.

The aquatic and semi aquatic groups of insects are overall indicators of both recent and long term environmental conditions (Thirumalai & Raghunathan,1988; Ramakrishna, 2000). The study reports the presence of 14 species belonging to 5 families and 8 genera, which forms the first report of this group from insects of lakes of Hyderabad.

AQUATIC INSECTS : COLEOPTERA

SYSTEMATIC LIST

Order COLEOPTERA

Family-I DYTISCIDAE

Subfamily HYDROPORINAE

Tribe-I HYDROVATINI

1. Genus ***Hydrovatus***, Motschulsky, 1855

1. *Hydrovatus confertus* Sharp, 1882

Tribe-II BIDESSINI

2. Genus ***Guignotus Houlbert***, 1934

2. *Guignotus flammulatus* Sharp, 1854

3. *Guignotus inconstans* Regimbart,1863

Subfamily NOTORINAE

Tribe HYDROCANTHINI

3. Genus ***Canthydrus Sharp***, 1882

4. *Canthydrus laetabilis* Walker, 1882

5. *Canthydrus morsbachi* Wehncke, 1876

4. Genus ***Hydrocoptus Motschulsky***, 1859

6. *Hydrocoptus subvittulus* Motschulsky, 1859

Subfamily LACCOPHILINAE

5. Genus ***Laccophilus Leach***, 1817

7. *Laccophilus elegans Sharp,* 1882

8. *Laccophilus ellipticus* Regimbart, 1899

9. *Laccophilus uniformis* Motschulsky,1859

Subfamily DYTISCINAE

Tribe-I CYBISTERINI

6. Genus ***Cybister Curtis***, 1827

10. *Cybister (Melanectes) tripunctatus asciaticus* Sharp, 1899

11. *Cybister (Melanectes) convexus* Sharp, 1882

12. *Cybister (Melanectes) pectoralis* Sharp, 1882

Tribe-II ERETINI

7. Genus ***Eretes*** Castelnau, 1833

13. *Eretes sticticus* (Linnaeus, 1833)

Tribe-III HYDATICINI

8. Genus ***Hydaticus***, Leach, 1817

14. *Hydaticus (Guignotites) fabricii* Macleay, 1833

15. *Hydaticus (Guignotites) vittatus* (Fabricius, 1838)

Family-II GYRINIDAE

Subfamily ENHYDRINAE

9. Genus ***Dineutus Macleay***, 1825

16. *Dineutus (Protodineutus) indicus* Aube, 1838

Subfamily GYRININAE

10. Genus ***Gyrinus Geoffroy***, 1762

17. *Gyrinus convexiusculus* Macleay, 1871

Subfamily ORECHTOCHILINAE

11. Genus ***Orechtochilus Eschscholtz***, 1833

18. *Orectochilus (Patrus) semivestitus* Guerin, 1893

19. *Orectochilus (Patrus) discifer* (Walker, 1859)

Family-III HYDROPHILIDAE

Subfamily HYDROPHILINAE

Tribe-I HYDROPHILINI

12. Genus ***Hydrophilus Leach***, 1764

20. *Hydrophilus olivaceous* (Fabricius, 1781)

Tribe-II HYDROBINI

13. Genus ***Helochares*** Muls., 1844

21. *Helochares anchoralis* Sharp, 1890

22. *Helochares pallens* Macleay, 1825

14. Genus ***Enochrus*** Thoms., 1859

23. *Enochrus esuriens* Walker, 1858

Tribe-III BEROSINI

15. Genus ***Regimbartia Zaitz.***, 1908

24. *Regimbartia attenuate* Fabricius, 1801

16. Genus ***Berosus*** Leach, 1817

25. *Berosus indicus* Mots., 1861

26. *Berosus pulchellus* Macleay, 1825

Subfamily HYDROCHINAE

17. Genus ***Hydrochus*** Leach, 1817

27. *Hydrochus bindosus* Mots., 1860

Subfamily SPHAERIDIINAE

Tribe-I SPHAERIDIINI

18. Genus ***Dactylosternum*** Woll., 1854

28. *Dactylosternum abdominale* Fabricius, 1792

19. Genus ***Sphaeridium*** F., 1775

29. *Sphaeridium dimidiatum* Gory, 1834.

Family-IV HALIPLIDAE

30. *Haliplus* (*Liaphlus) angustifrons* Regimbart, 1892

31. *Haliplus* (*Liaphlus) pulchellus indicus* Regimbart, 1899

Family DYTISCIDAE

The members of this family have adapted perfectly well to aquatic life. All adults and larvae are aquatic. These beetles are commonly known as “Predacious diving beetles” as they feed vigorously upon almost all invertebrates and fish eggs and fry. Both adults and larvae are predaceous, and attack a wide variety of small aquatic organisms. These beetles generally occupy clean and fresh macrophytic leaves near the bottom along littoral zone. They are active swimmers and swift divers. Adult dytiscids range from 1.4 to 3.8 mm in length. Although most species are small to medium sized, some adults can attain a length of 35 mm. The body is covered with an adherent layer of grease which holds dust particles or detritus. They are usually black or brownish colour, sometimes marked with dull yellow, orange or brown shades. The hind coxae is very large and 2nd and third legs are widely separated. Hind legs of dytiscid beetles are very important and contribute mainly to swimming movements. Antennae very long, thread like with 11 segments. Ten pairs of spiracles are present, the first two on thorax, three to nine on the abdominal segments and 10th on tip of abdomen. The spiracles open in subelytral chambers and help in oxygen supply. During submergence these beetles utilize the oxygen from tracheae and subelytral chambers. De and Sengupta (1993) have recorded 16 species from a few wetlands of Kolkata and surrounding districts. More than 3700 species are known (Pederzani 1995; Nilsson 2001), of which 223 have been recorded from India.

Family DYTISCIDAE

Subfamily HYDROPORINAE

1. ***Hydrovatus confertus*** Sharp, 1882

1882. *Hydrovatus confertus* Sharp, *Sci. Trans. R. Dublin Soc.*, **2** : 329.

Material examined : 2 exs., FBRC/ZSI/621, Durgam cheruvu, 20.viii.2005.

Diagnostic characters : Body broadly oval, about 2.2-2.5 mm long; head reddish-brown, head elongate, prothorax reddish brown, punctures irregular, elytra also reddish brown, puncturation somewhat regular, moderate and rather denser than on pronotum.

Distribution : India : Kerala, Tamil Nadu, West Bengal and Andhra Pradesh.

Elsewhere : Myanmar, China, Indonesia, Srilanka, Thailand and Vietnam.

2. ***Guignotus flammulatus*** Sharp, 1854

1934. *Bidessus (Guignotus)* Sharp, *Sci. Trnas. R. Dubhin Soc.*, **2** : 359.

1954. *Guignotus flammulatus*, Vazirani, *Rec. Zool. Surv. India, Occ. Paper No.* **6** : 32.

2003. *Guignotus flammulatus*, Mukhopadhyay & Gosh. *Fauna of Sikkim. State Fauna series*, **9** (Part : 3) 27. Zool. Surv. India.

Material examined : 2 exs, FBRC/ZSI/581, Hussainsagar, 21.ix.2007; 2 exs, FBRC/ZSI/589, Miralam Tank, 30.ix.2008; 2 exs, FBRC/ZSI/627, Hussainsagar, 30.i.2007.

Diagnostic characters : Body oblong, about 2.4 mm long, Head with a basal blackish marking, vertex punctate, antennae long and slender. Elytra with black markings and with minute setiferous, dense puncturation, legs with front and middle tarsi armed with spines and hairs, hind tarsi elongate and with hairs.

Distribution : India : Kerala, Tamil Nadu, West Bengal, Uttar Pradesh, Gujarat, Andhra Pradesh.

Elsewhere : China, Indonesia, Thailand and Vietnam.

3. ***Guignotus inconstans*** (Regimbart) 1863

1892. *Bidessus inconstans* Regimbart, *Ann. Soc. Ent. Fr.*, **36** : 119.

1977. *Guignotus inconstans*, Vazirani, *Rec. Zool. surv. India. Occ. Paper No.*, **6** : 33-34.

Material examined : 3 exs, FBRC/ZSI/582, Miralam Tank, 19.xii.2007; 5 exs. FBRC/ZSI/605, Miralam Tank & Nehru park, 4.ix.2007; 4 exs, FBRC/ZSI/661, Hussainsagar, 4.iii.2008.

Diagnostic characters : Body oval, about 3 mm long, elytra with dense punctures, legs with front and middle tarsi armed with spines. This species was first recorded from Andhra Pradesh by Mukhpadyay & Gosh (2007).

Distribution : India : Kerala, Tamil Nadu, West Bengal., Uttar Pradesh, Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu, Goa.

Elsewhere : China, Indonesia, Thailand and Vietnam.

Subfamily NOTORINAE

4. ***Canthydrus laetabilis*** (Walker), 1858

1858. *Hydroporus laetabilis* Walker, *Ann. Mag. Nat. Hist*. **3**(2) : 205.

1882. *Canthydrus laetabilis*, Sharp, *Sci.Trans. R. Dublin Soc*., **2** : 277.

1995b. *Canthydrus laetabilis* : Biwas *et al*., Insecta : Coleoptera : Adephaga, In : *State Fauna Series*.3 : *Fauna of West Bengal*, pt. **6**(a) : 85.

Material examined : 2 exs, FBRC/ZSI/583, KBR, National park, 4.iii.2008; 2 exs, FBRC/ ZSI/603, Miralam Tank, 30.ix.2008; 3 exs, FBRC/ZSI/624, Miralam Tank, 19.xii.2007.

Diagnostic characters : Body oblong- oval, head brownish yellow, eyes large, antennae brownish yellow, short and slender, prothorax with its front margin darker and with dark punctures, elytra streamlined, brownish black with two basal orange yellow spots and one transverse irregular spot situated post medially, legs with front tibiae short and its apical spur curved, hind tarsi with swimming hairs, claws simple.

Distribution : India : Kerala, West Bengal, Andhra Pradesh, Assam, Bihar, Orissa, Punjab, Rajasthan, Uttar Pradesh.

Elsewhere : Philippines, Srilanka.

5. ***Canthydrus morsbachi*** (Wehncke), 1876

1876. *Hydrocanthus morsbachi* Wehncke, *Dtsch. ent. Z*., **20** : 222.

1977. *Canthydrus morsbachi* : Vazirani, *Rec. Zool. surv. India. Occ. Paper No*., **6** : 7.

Material examined : 3 ex, FBRC/ZSI/584, Miralam Tank, 28.v.2008; 1 ex, FBRC/ZSI/ 648, Durgamcheruvu, 4.iii.2008; 3 ex, FBRC/ZSI/692, Miralam Tank, 30.ix.2008.

Diagnostic characters : Body 3.0-3.5 mm long, head brownish black with anterior portion yellowish, curved spurs present on the apex of fore tibiae.

Distribution : India : Kerala, West Bengal, Andhra Pradesh, Orissa, Kerala, Goa.

Elsewhere : Thailand, Indonesia, Myanmar, Africa.

6. ***Hydrocoptus subvittulus*** Motschulsky, 1859

1860. *Hydrocoptus subvittulus Mots. Etud. Entom*., **8** : 53.

1977. *Hydrocoptus subvittulus*, Vazirani, *Rec. Zool. surv. India. Occ. Paper No*. **6** : 4.

Material examined : 2 exs, FBRC/ZSI/585, Durgamcheruvu, 20.viii.2005.

Diagnostic characters : Body oblong oval, 1.9-2.3 mm long, eyes large with fine row of puctures, antennae pale yellow, curves spurs absent on the apex of fore tibiae.

Distribution : India : Kerala, West Bengal, Andhra Pradesh, Assam, Bihar, Orissa, Punjab, Rajasthan, Uttar Pradesh.

Elsewhere : Srilanka, China.

Subfamily LACCOPHILINAE

7. ***Laccophilus elegans*** Sharp, 1882

1882. *Laccophilus elegans* Sharp, *Sci. Trans, R. Dublin Soc.*, **2** : 302-303.

1977. *Laccophilus elegans* Vazirani, *Rec. Zool. surv. India. Occ. Paper No.* **6** : 11.

Material examined : 3 ex. FBRC/ZSI/586, Miralam Tank, 30.ix.2008; 1 exs, FBRC/ZSI/637, KBR, 4.iii.2008.

Diagnostic characters : Body elongate, 3.7 to 4.0 mm long, Head brownish yellow, Elytra testaceous reddish with zig-zag double markings. Ventral surface with metacoaxal plate, hind tarsi with swimming hairs and has straight single claw.

Distribution : India : Kerala, West Bengal, Andhra Pradesh, Assam, Bihar, Orissa, Andaman & Nicobar islands.

Elsewhere : Srilanka, China, Vietnam, Thailand, Cambodia, Indonesia.

8. ***Laccophilus ellipticus*** Regimbart, 1899

1889. *Laccophilus ellipticus*, Regimbart., *Ann. Soc., ent. Fr.* (6) **9** : 152.

1977. *Laccophilus ellipticus* Vazirani, *Rec. Zool. surv. India. Occ. Paper* No., **6** : 11.

Material examined : 5 exs, FBRC/ZSI/587, Himayatsagar, 29.iv.2010; 4 exs, FBRC/ZSI/611, Durgamcheruvu, 2.vii.2007; 2 exs, FBRC/ZSI/669, Hussainsagar, 20.viii.2005; 5 exs, FBRC/ZSI/678, Hussainsagar, 4.ix.2007.

Diagnostic characters : Body oval in shape, length 3.25-3.75 mm. Elytra marked with regular wavy lines.

Distribution : India : Kerala, West Bengal, Andhra Pradesh, Assam, Bihar, Orissa, Punjab, Rajasthan, Uttar Pradesh.

Elsewhere : Srilanka, China, Vietnam, Thailand, Cambodia, Indonesia.

9. ***Laccophilus uniformis*** Motschulsky, 1859

1859. *Laccophilus uniformis* Motschulsky., *Etudis Entom.*, **8** : 46.

1977. *Laccophilus uniformis* Vazirani, *Rec. Zool. surv. India. Occ. Paper No.*, **6** : 17.

Material examined : 1 ex, FBRC/ZSI/588, Hussainsagar, 20.viii.2005; 3 exs, FBRC/ZSI/592, Durgamcheruvu, 20.viii.2005; 1 exs, FBRC/ZSI/630, Miralam Tank, 19.xii.2007; 2 exs, FBRC/ZSI/653, Miralam Tank, 30.ix.2008; 2 exs FBRC/ZSI/666, hussainsagar, 4.iii.2008; 2 exs, FBRC/ZSI/689, Durgamcheruvu, 4.iii.2008.

Diagnostic characters : Elytra testaceous with brown irrations, sometimes slightly distinct.

Distribution : Sikkim, Manipur, Andhra Pradesh.

Elsewhere : China, Vietnam, Thailand, Cambodia, Indonesia, Myanmar, Laos.

Subfamily DYTISCINAE

10. ***Cybister (Melanectes) tripunctatus asciaticus*** Sharp, 1899

1832. *Cybister asciaticus* Sharp, *Sci. Trans. R. Dublin Soc.* **2** : 731.

1977. *Cybister tripunctatus asciaticus* : Vazirani, *Rec. Zool. Surv. India, Occ. Paper No.* **6** : 62.

2003. *Cybister (Meganectes) tripunctatus asciaticus*. Mukhopadhyay & Gosh. *Fauna of Sikkim. State Fauna series*, **9** (Part : 3) 32-33.

Material examined : 3 exs., FBRC/ZSI/600, Himayatsagar, 17.xii.2008; 2 exs., FBRC/ZSI/609, Miralam Tank, 30.ix.2008; 3 exs., FBRC/ZSI/610, Durgamcheruvu, 20.viii.2005; 1 exs., FBRC/ZSI/634, KBR, 30.i.2007; 10 exs., FBRC/ZSI/635, Himayatsagar, 2.vii.2007.

Diagnostic characters : Body elongate–oval, about 28 mm long, head blackish, antennae long, narrow yellowish red, prothorax concolourous with head, Scutellum triangular, legs with spines and swimming hairs, ventral surface reddish brown to black. This is the largest species of Dytiscidae, prefers mainly slow flowing waters, ponds and urban lakes with sparse vegetation.

Distribution : India : Kerala, West Bengal, Andhra Pradesh, Assam, Bihar, Orissa, Rajasthan, Uttar Pradesh, Tamil Nadu.

Elsewhere : Nepal, China, Philippines, Srilanka, Afghanistan.

11. ***Cybister (Melanectes) convexus*** Sharp, 1882

1832. *Cybister convexus* Sharp, *Sci. Trans. R. Dublin Soc*., **2** : 718.

1955. *Cybister (Melanectes*) *convexus* : Biswas, Mukhopadhyay & Saha, *State fauna series*, **3** : *Fauna of West Bengal,* Part **6**(A), pp. 109 Zool. Surv. India.

Material examined : 2 exs. FBRC/ZSI/650, Hussainsgar, 20.viii.2005.

Diagnostic characters : Hind margins of four basal metatarsal segments not fringed with any ciliae,tibial spurs of hind leg reaching two basal tarsal segments combined.

Distribution : India : Kerala, West Bengal, Manipur, Andhra Pradesh, Assam, Bihar, Orissa.

Elsewhere : China.

12. ***Cybister (Melanectes) pectoralis*** Sharp, 1882

1882. *Cybister pectoralis Sharp, Sci. Trans. R. Dublin Soc.,* **2** : 736.

1977. *Cybister (Melanectes) pectoralis* : Vazirani, *Rec. zool. surv. India. Occ. Paper No.,* **6** : 91-92.

Material examined : 2 exs. FBRC/ZSI/663, Hussainsgar, 20.viii.2005. 1 exs. FBRC/ZSI/699, Durgamcheruvu, 30.i.2007.

Diagnostic characters : Abdominal sternites 3-6 with anterior border black.

Distribution : India : West Bengal, Bihar, Maharashtra, Madhya Pradesh, Andhra Pradesh

Elsewhere : Srilanka.

13. ***Eretes sticticus*** (Linnaeus), 1833

1767. *Dytiscus sticticus* L. *Syst. Nat., ed.* **12**, pp. 666.

1833. *Eretes sticticus,* Castelnau, *Ann. Soc., ent. Fr.* (5) **8** : 450.

Material examined : 8 exs. FBRC/ZSI/590, Durgamcheruvu, 2.vii.07.

Diagnostic characters : Sides of pronotum rebordered, lateral borders of elytra serrated at posterior half.

Distribution : India : West Bengal, Bihar, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka, Goa, Andaman islands.

Elsewhere : Nepal, Pakistan, Myanmar, Thailand.

14. ***Hydaticus (Guignotites) fabricii*** Macleay, 1833

1833. *Hydaticus fabricii* Macleay, *Annulosa Javanica,* p. 134.

1977. *Hydaticus (Guignotites) fabricii* : Vazirani, *Rec. zool. surv. India. Occ. Paper No.,* **6** : 76-77.

Material examined : 2 exs. FBRC/ZSI/591, Hussainsgar, 19.12.2007; 2 exs. FBRC/ZSI/631, Hussainsagar, 30.i.2007; 2 exs. FBRC/ZSI/613, Miralam tank,19.xii.2009.

Diagnostic characters : Suture between the meta episternum and metasternal wings straight, apical spurs of the hind tibia simple pointed.

Distribution : India : Sikkim, Manipur, Rajasthan, Uttar Pradesh, Andhra Pradesh, Tamil Nadu, Goa, Andaman islands.

Elsewhere : Indonesia, Vietnam, Philippines.

15. ***Hydaticus (Guignotites) vittatus*** (Fabricius, 1838)

1775. *Dytiscus vittatus*. F., *Syst. ent.*, App. : 825.

1838. *Hydaticus vittatus* : Aube., *In Dejeans species Col.* **6** : 208.

1977. *Hydaticus (Guignotites) vittatus* : Vazirani, *Rec. zool. surv. India. Occ. Paper No.,* **6** : 81.

Material examined : 4 exs. FBRC/ZSI/598, Hussainsagar, 26.iii.2009.; 01 ex. FBRC/ZSI/676, Miralamtank, 19.ii.2009.

Diagnostic characters : Elytra brown, head and pronotum without any band.

Distribution : India : Kerala, Pondicherry, Madhya Pradesh, Maharashtra, West Bengal, Manipur, Andhra Pradesh, Assam, Bihar, Orissa.

Elsewhere : Pakistan.

Family II GYRINIDAE

Subfamily ENHYDRINAE

16. ***Dineutus (Protodineutus) indicus*** Aube, 1838

1938. *Dineutus indicus* Aube, *Species coleopteres.* **6** : 772.

1926. *Dineutus (Protodineutus) indi*cus : Ochs., *Ent. Z. Frankf.* **40** : 13.

Material examined : 2 exs. FBRC/ZSI/701, Miralamtank, 28.v.2008; 1 ex. FBRC/ZSI/707, Himayatsagar, 02.vii.2007; 2 exs. FBRC/ZSI/703, Durgamcheruvu, 28.i.2009.

Diagnostic characters : Body elongate, black, 7-8 mm in length, antennae very short, epipleural angle extended into a strong spine and apex with fine denticles, legs with front tarsi armed.

Distribution : India : Kerala, Pondicherry, Madhya Pradesh, Maharashtra,West Bengal, Manipur, Andhra Pradesh, Assam, Bihar, Orissa.

Elsewhere : Pakistan.

Subfamily GYRININAE

17. ***Gyrinus convexiusculus*** MacLeay, 1871

1871. *Gyrinus convexiusculus* MacLeay *Hist. ins. Paris*, **1** : 93.

1984. *Gyrinus convexiusculus* : Vazirani, *Fauna of British India, col.* : *Fam. Gyrinidae and Fam. Haliplidae.*, Govt. of India, : 30-32.

Material examined : 3 exs. FBRC/ZSI/607, Miralamtank, 19.xii.2007; 3 exs. FBRC/ZSI/593, Himayatsagar, 30.ix.2008.

Diagnostic characters : 5-6 mm in length, shiny black in colour, depressed body, abdomen extending beyond elytra. The middle and hind legs are greatly flattened paddle like and fringed, the third segment of antennae is very much enlarged and the other segments are spindle shaped.

Distribution : India : Kerala, Pondicherry, Madhya Pradesh, Maharashtra, West Bengal, Manipur, Andhra Pradesh, Assam, Bihar, Orissa, Karnataka.

Elsewhere : Sri lanka.

Subfamily ORECHTOCHILINAE

18. ***Orectochilus (Patrus) semivestitus*** Guerin, 1893

1840. *Orectochilus (Patrus) semivestitus Guerin, Revue. Zool*., **3** : 38.

1984. *Orectochilus (Patrus) semivestitus*, Vazirani, *Fauna of British India,* col. : *Fam. Gyrinidae and Fam. Haliplidae*., Govt. of India, : 45-46.

Material examined : 6 exs. FBRC/ZSI/639, Himayatsagar, 19.xii.2007.

Diagnostic characters : Body elongate, black, 4-4.5 mm long, scutellum short and transverse, legs with front legs simple, middle and hind legs short, paddle like, flattened and tarsi folded.

Distribution : India : West Bengal, Bihar, Maharashtra, Madhya Pradesh, Andhra Pradesh, Kerala, Tamil Nadu.

Elsewhere : Srilanka.

19. ***Orectochilus (Patrus) discifer*** (Walker, 1859)

1859. *Gyrinus discifer,* Walker, *Ann. Mag. Nat. Hist.,* **3**(3) : 51.

1930. *Orectochilus (Patrus) discifer,* Ochs, *Cat. Ind. Ins.,* pt. **19** : 24.

Material examined : 1 exs. FBRC/ZSI/618, Hussainsgar, 26.iii.2009; 3 exs. FBRC/ZSI/640, Hussainsgar, 21.i.2007; 1 exs. FBRC/ZSI/641, Miralamtank, 19.xii.2007.

Diagnostic characters : Body elongate, brownish balck, 3-5 mm long, scutellum short and transverse, front legs simple, middle and hind legs short, paddle like, flattened and tarsi folded.

Distribution : India : West Bengal, Bihar, Maharashtra, Madhya Pradesh, Andhra Pradesh.

Elsewhere : Srilanka.

Family HYDROPHILIDAE

Subfamily HYDROPHILINAE

20. ***Hydrophilus olivaceous*** Fabricius, 1781

1781. *Hydrophilus olivaceous* F. *Spec. ins.,* **1** : 289.

Material examined : 1 ex. FBRC/ZSI/645, Himayatsagar, 19.xii.2007; 1 exs. FBRC/ZSI/665, Durgamcheruvu, 04.iii.2008; 3 exs. FBRC/ZSI/680, Hussainsgar, 28.i.2009.

Diagnostic characters : 7-8 mm in length, body elongate, blackish brown, convex normally. Antennae 9-segmented, prothorax transverse, tarsi strongly compressed and oar like. Claws of all tarsi dentate at base. Prostital carina is not cultriform, excavate to receive the anterior side which is widely emarginated.

Distribution : India : Maharashtra, West Bengal, Andhra Pradesh, and Manipur.

Elsewhere : Nil.

21. ***Helochares anchoralis*** (Sharp, 1890)

1890. *Helochares anchoralis* Sharp, *Trans. Ent. Soc. Lond.,* 352.

1924. *Helochares anchoralis* Knisch. *Col. Cat.,* **14**(79) : 193.

Material examined : 8 exs. FBRC/ZSI/664, Hussainsagar, 04.ix.2007; 3 exs. FBRC/ZSI/698, Miralamtank, 19.xii.2007.

Diagnostic characters : Body elongate, about 6 mm in length, dark brown with blackish patches, head densely punctate, Y-shaped frontal suture, 1st joint of hind tarsi very short and the 2nd joint slightly longer and claws with basal swelling and characteristic expodium.

Distribution : India : Maharashtra, West Bengal. Bihar, Andhra Pradesh.

Elsewhere : Srilanka, China, Indonesia, Cambodia, Philippines.

22. ***Helochares pallens*** (Macleay, 1825)

1825. *Helochares pallens* (Macleay), *Annal. Javan.*, p. 35.

1926. *Helochares pallens* : d' Orchymont, *Ann. Bull. Soc. Ent. Beig.*, **66** : 232.

Material examined : 3 exs. FBRC/ZSI/667, Durgamcheruvu, 04.iii.2008.

Diagnostic characters : Body oblong, about 4-5 mm in length, antennae nine segmented, second segment of maxillary palpi concave or straight on anterior side and convex on posterior side.

Distribution : India : West Bengal. Bihar,Assam, Andhra Pradesh.

Elsewhere : Indonesia, Philippines, Egypt, Syria, Madagascar.

23. ***Enochrus esuriens*** Walker, 1858

1858. *Enochrus esuriens*, Walker, *Ann. Mag. Nat. Hist.*, (32) **2** : 209.

1924. *Enochrus esuriens, Knisch, Col. Cat.*, **14**(79) : 208.

Material examined : 4 exs. FBRC/ZSI/623, Miralamtank, 19.xii.2007; 2 exs. FBRC/ZSI/595, Miralamtank, 17.xii.2008.

Diagnostic characters : Body oval, 2.5 mm long, reddish brown, head black with a yellow spot in front of eyes, antennae nine segmented, second segment of maxillary palpi convex on anterior side and concave posteriorly, clubs darker and curved pseudobasal segment of maxillary palpi convex anteriorly.

Distribution : India : West Bengal, Manipur, Nicobar islands.

Elsewhere : Srilanka, Indonesia, Philippines, Australia.

Remarks : This species is recorded for the first time from Andhra Pradesh by Mukhopadhyay (2007).

24. ***Regimbertia attenuate*** Fabricius, 1801

1801. *Regimbartia attenuata* F., *Syst. Eleuth.*, **1** : 253.

1924. *Regimbartia attenuata*, Knisch. *Col. Cat.*, **14**(79) : 276.

2000. *Regimbartia attenuat*a, Ghosh, Mukhopadhyay & Biswas, Zool. Surv. India, *Fauna of Tripura, State Fauna series*, **7** (Part-3) : 49.

Material examined : 16 exs. FBRC/ZSI/695, Himayatsagar, 16.i.2007.

Diagnostic characters : Body elongate, blackish brown, convex normally. Antennae 9-segmented, and fifth ventral segment is retractile, more or less prominent and emarginated in male, prothorax transverse, tarsi strongly compressed and oar like. Claws of all tarsi dentate at base. Elytra strongly narrowed posteriorly, mid and hind tibiae with long swimming hairs on inner side.

Distribution : India : Maharashtra, West Bengal, Andhra Pradesh, and Manipur.

Elsewhere : Srilanka, South Asia, Australia, Japan.

25. ***Berosus indicus*** Motschulsky, 1861

1861. *Berosus indicus* Mots., *Bull. Soc. Imp. Nat. Moscou,* **34**(1) : 110.

1996. *Berosus indicus,* Biwas and Mukhopadhyay *State Fauna Series.* 3 : *Fauna of West Bengal,* 3 pt. **6** A : 163.

Material examined : 1 exs. FBRC/ZSI/660, Himayatsagar, 17.xii.2008; 1 exs. FBRC/ZSI/691, Miralamtank, 20.viii.2005.

Diagnostic characters : Body elongate, more than 3 mm long with brown to yellow colour and punctuate, antennae seven segmented, scutellum is like triangle and punctuate, elytra highly patterned, narrowed posteriorly with about 10 rows of dark punctures, legs with long swimming hairs.

Distribution : India : West Bengal, Manipur, Bihar, Punjab, Rajasthan, Tripura, Karnataka,Kerala, Tamil Nadu, Andhra Pradesh.

Elsewhere : Indonesia, Philippines, Nepal, China.

26. ***Berosus pulchellus*** Macleay, 1825

1825. *Berosus pulchellus,* Macleay, *Annul. Jav* : 35.

1995. *Berosus pulchellus* : Biwas and Mukhopadhyay *State Fauna Series.* 3 : *Fauna of West Bengal,* 3 pt. **6** A : 163.

Material examined : 9 exs. FBRC/ZSI/632, Durgamcheruvu, 2.vii.2007; 3 exs. FBRC/ZSI/657, Himayatsagar, 17.xii.2008.

Diagnostic characters : 3-4 mm in length. Antennae seven segmented, eyes convex, hind legs with long swimming hairs.

Distribution : India : West Bengal, Meghalaya, Rajasthan, Delhi, Haryana Tripura, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh.

Elsewhere : Indonesia, Philippines, Nepal, China, Japan, Hongkong, Taiwan, Malaysia.

Remarks : This species is recorded for the first time from Andhra Pradesh by Mukhopadhyay (2007).

Subfamily HYDROCHINAE

27. ***Hydrochus bindosus*** Motschulsky, 1860

1860. *Hydrochus bindosus* Motschulsky *Schrenka Reis.,* **2** : 104.

1922. *Hydrochus bindosus,* d'Orchymont, *Rec. Ind. Mus.,* **8** : 624.

Material examined : 1 exs. FBRC/ZSI/619, Hussainsgar, 21.xi.2007; 2 exs. FBRC/ZSI/620, Himayatsagar, 19.ii.2009.

Diagnostic characters : 3-4 mm in length. Body contour is not uniformly curved and not regularly convex, proyhorax not narrower than hind body and distinctly separated.

Distribution : India : West Bengal, Assam.

Elsewhere : Srilanka, Indonesia.

Subfamily SPHAERIDIINAE

28. ***Dactylosternum abdominale*** Fabricius, 1792

1792. *Dactylosternum abdominale* F., *Entom.Syst.*, **1** : 98.

1924. *Dactylosternum abdominale*, Knisch, *Col. Cat*., **14**(79) : 115.

Material examined : 1 ex. FBRC/ZSI/647, Durgamcheruvu, 04.iii.2008; 1 ex. FBRC/ZSI/722, Miralamtank, 19.xii.2007.

Diagnostic characters : Antennae usually longer than maxillary palpi, pygidium not exposed, elytra normally with sutural stria and several other striae with serially arranged large puncture. Scutellum short triangular. First ventral segment well developed and usually carinated along its whole length.

Distribution : India : West Bengal, Manipur, Andhra Pradesh.

Elsewhere : North &South America.

29. ***Sphaeridium dimidiatum*** Gory, 1834

1834. *Sphaeridium dimidiatum*, Gory, *In Guerin, Icon, regne Anim & Ins*. : 73, Fig. 15.

1924. *Sphaeridium dimidiatum*, Biwas and Mukhopadhyay *State Fauna Series*, **3** : *Fauna of West Bengal*, 3 pt. **6** A : 151.

Material examined : 2 exs. FBRC/ZSI/673, Himayatsagar, 19.xii.2007; 1 ex. FBRC/ZSI/675, Miralamtank, 19.ii.2009.

Diagnostic characters : Antennae eight segmented and inserted below the laminated border, concealing base of antennae from above, Pygidium exposed, elytra with sutural stria, scutellum as an elongate triangle. First ventral segment not carinated.

Distribution : India : West Bengal, Andhra Pradesh.

Elsewhere : Srilanka, Indonesia, Philippines, Nepal, China, S. Asia.

Family IV HALIPLIDAE

30. ***Haliplus* (Liaphlus) *angustifrons*** Regimbart, 1892

1892. *Haliplus angustifrons*, Regimbart, *Ann. Soc. Ent. Belg*. **36** : 112.

1995. *Haliplus* (Liaphlus) *angustifrons*, Biwas and Mukhopadhyay *State Fauna Series*, **3** : *Fauna of West Bengal*, 3(Pt. **6** A) : 134.

Material examined : 3 *exs.* FBRC/ZSI/705, Durgamcheruvu, 28.i.2009.

Diagnostic characters : Body 3-3.5 mm long, head brownish yellow, vertex sparsely puctured, antennae long, legs slender and long with fringed hairs. They have enlarged plate

like coaxae on hind legs covering third to fifth ventral abdominal segments. Prontum with a notch on lateral side before posterior angle.

Distribution : India : West Bengal, Manipur, Bihar, Punjab, Rajasthan, Tripura, Karnataka, Kerala, Tamil Nadu and Andhra Pradesh.

Elsewhere : Srilanka, Indonesia, Philippines, Nepal, China.

31. ***Haliplus* (Liaphlus) *pulchellus indicus*** Regimbart, 1899

1899. *Haliplus pulchellus var. indicus* Regimbart, *Ann. Soc. ent. Fr.*, **68** : 188-189.

1984. *Haliplus* (Liaphlus) *pulchellus indicus*, Vazirani, Fauna of India, pp 119-120.

Van Vondel (1991 : 127) included *Haliplus indicus* Regimbart 1899 : 189 as a variety of *Haliplus pulchellus* Clark, but subsequently (Van Vondel 1993 : 299) considered it a distinct species.

- *Haliplus pulchellus* var. *indicus* Regimbart 1899 : 189, by Van Vondel 1993 : 299.
- *Haliplus pulchellus* ab. *indicus* Regimbart 1899 : 189, by Zimmermann 1924 : 140.
- *Haliplus pulchellus indicus* Regimbart 1899 : 189, by Vazirani 1966 : 133.

Material examined : 1 exs. FBRC/ZSI/706, Durgamcheruvu, 28.i.2009; 2 exs. FBRC/ZSI/713, Miralamtank, 19.xii.2007.

Diagnostic characters : Prosternal process canaliculated and without any distinct pit at apex, elytra with two dilations on either side.

Distribution : India : West Bengal, Bihar, Orissa, Rajasthan and Andhra Pradesh.

Elsewhere : Srilanka, Indonesia, Philippines, Nepal, China.

CHECKLIST OF AQUATIC COLEOPTERA OF INDIA

(Dytiscidae, Gyrinidae Hydrophilidae, Haliplidae, and Elmidae)

A check list of Gerromorpha (Hemiptera) from India (Thirumalai, 2002) and a synoptic list of Nepomorpha (Hemiptera : Heteroptera) from India (Thirumalai, 2007) are also given in ZSI website www.zsi.gov.in. An attempt has been made to update the Checklist of Aquatic coleopteran (only five families). Of the 18 families of aquatic coleoptera known from the world representative of five families namely Dytiscidae, Gyrinidae, Hydrophilidae, Haliplidae, Elmidae, Dryopidae, & Notoridae are chiefly represented in the India. The checklist of Aquatic coleopteran from India presented here, includes five families and lists a total of 396 species under five families. The earlier knowledge and scientific contribution on aquatic beetles (Vazirani, 1968, 1970, 1984) are noteworthy to understand the present fauna. The major studies on aquatic Coleoptera also includes the works of Jach & Balke (2008) Balfour-Brown (1939), Mukhopadhyaya & Ghosh (2003 & 2007), Biswas & Mukhopadhyay (1995). The members of the family **Dytiscidae (Predacious diving beetles)** feed vigorously upon almost

all invertebrates and fish eggs and fry. These beetles generally occupy clean and fresh macrophytic leaves near the bottom along littoral zone. They are active swimmers and swift divers. Adult dytiscids range from 1.4 to 3.8 mm in length. Although most species are small to medium sized, some adults can attain a length of 35 mm. The hind coxae is very large and 2nd and third legs are widely separated. Antennae very long, thread like with 11 segments. The members of family **Gyrinidae (Whirlig beetles)** are found in fresh water ponds, lakes, open flowing streams etc. First abdominal sternite divided by hind coxae (suborder Adephaga), Short, clubbed antennae, seemingly 2 pairs of eyes, 1 above and 1 below the water level. Forelegs long and thin; middle and hind legs short and paddle like, not extending beyond margin of abdomen (only front legs visible in dorsal view), body elongate-oval and flattened, 3 to 15 mm in length.The members of **Haliplidae (Crawling water beetles)** live among aquatic vegetation along the edges of ponds, lakes streams or creeks. They are best identified by the large coxal plates covering base of hind legs and abdomen. Their tarsi have two claws. They are omnivores found in the vegetation of pools. They are small beetles with their size at maturity of about 2-6 mm. Regimbart (1892) recorded the first Indian species *Haliplus angustifrons* from Bihar. So far 05 species recorded under the genus Haliplus from India.

The **Hydrophilids (Water scavenger beetles)** are predominant in rivers and streams. They are characterized by their short-clubbed antennae that generally remain concealed beneath the head and long maxillary palps resembling antennae like Dystiscidae, they also make contact with surface water film with the anterior edge of their body but unlike former, their hind legs move alternatively while swimming and are not very good swimmers. Beetles belonging to family **Elmidae (Riffle beetles)** live in running water. Some breathe under water using an air film trapped by hairs as a physical gill, mostly aquatic in both adult and larval stages. This is a family of small beetles 2-5mm long. They have punctured elytra and raised lines on the thorax. The riffle beetles usually have filiform antennae that are much longer that the head Their tarsi are distinctly five segmented and have 5-6 abdominal segments. They are underwater crawlers and do not swim, therefore they have no swimming hairs on their hind legs.

Order COLEOPTERA

Suborder I ADEPHAGA

Family I DYTISCIDAE Leach, 1815

Subfamily I AGABINAE Thomson, 1867

Tribe AGABINI Thomson, 1867

Genus ***Agabus*** Leach, 1817

1. *Agabus biguttatus* (Olivier, 1795)
2. *Agabus freudei* Guéorguiev, 1975

3. *Agabus glazunovi* (Zaitzev, 1953)
4. *Agabus guttatus guttatus* (Paykull, 1798)
5. *Agabus lobonyx* Guignot, 1952
6. *Agabus longissimus* Régimbart, 1899
7. *Agabus winkleri* (Gschwendtner, 1923)
8. *Agabus conspersus* (Marsham, 1802)
9. *Agabus dichrous* Sharp, 1878
10. *Agabus adustus* Guignot, 1954
11. *Agabus bipustulatus* (Linnaeus, 1767)
12. *Agabus debilipes* Régimbart, 1899
13. *Agabus solskii* Jakovlev, 1897

Genus ***Hydronebrius*** Jakovlev, 1897

14. *Hydronebrius kashmirensis* (Vazirani, 1964)
15. *Hydronebrius mattheyi mattheyi* Brancucci, 1980

Genus ***Platambus*** Thomson, 1859

16. *Platambus balfourbrownei* Vazirani, 1965
17. *Platambus biswasi* Vazirani, 1965
18. *Platambus dembickyi* Brancucci, 2006
19. *Platambus fletcheri* Zimmermann, 1928
20. *Platambus incrassatus* Gschwendtner, 1935
21. *Platambus lindbergi* Guéorguiev, 1963
22. *Platambus nepalensis* (Guéorguiev, 1968)
23. *Platambus satoi* Brancucci, 1982
24. *Platambus wittmeri* Wewalka, 1975
25. *Platambus coriaceus* (Régimbart, 1899)
26. *Platambus princeps* (Régimbart, 1888)
27. *Platambus kempi* (Vazirani, 1970)
28. *Platambus lineatus* Gschwendtner, 1935
29. *Platambus sogdianus* (Jakovlev, 1897)
30. *Platambus wewalkai* Brancucci, 1982

Genus ***Platynectes*** Régimbart, 1887 (3 spp.)

31. *Platynectes dissimilis* (Sharp, 1873)
32. *Platynectes kashmiranus kashmiranus* J. Balfour-Browne, 1944

Subfamily II COLYMBETINAE Erichson, 1837

Tribe COLYMBETINI Erichson, 1837

Genus ***Colymbetes***

33. *Colymbetes fuscus* (Linnaeus, 1758)
34. *Colymbetes semenowi* (Jakovlev, 1896)

Genus ***Rhantus*** Dejean, 1833 (9 spp.)

35. *Rhantus interclusus* (Walker, 1858)
36. *Rhantus ovalis* Gschwendtner, 1936
37. *Rhantus rugulosus* Régimbart, 1899
38. *Rhantus sexualis* Zimmerman, 1919
39. *Rhantus sikkimensis* Régimbart, 1899
40. *Rhantus suturalis* (W.S. Macleay, 1825)
41. *Rhantus taprobanicus* Sharp,1890
42. *Rhantus tigris* Balke, 1995

Subfamily COPELATINAE Branden, 1885

Tribe COPELATINI Branden, 1885

Genus ***Copelatus*** Erichson, 1832

43. *Copelatus cryptarchoides* Régimbart, 1899
44. *Copelatus mysorensis* Vazirani, 1970
45. *Copelatus wewalkai* Holmen & Vazirani, 1990
46. *Copelatus biswasi* Mukherjee & Sengupta, 1986
47. *Copelatus assamensis* Vazirani, 1970
48. *Copelatus bacchusi* Wewalka, 1981
49. *Copelatus bangalorensis* Vazirani, 1970
50. *Copelatus bengalensis* Guignot, 1955
51. *Copelatus brivioi* Rocchi, 1976
52. *Copelatus ceylonicus* Vazirani, 1969
53. *Copelatus feae* Régimbart, 1888

54. *Copelatus freudei* Guignot, 1955
55. *Copelatus gibsoni* Vazirani, 1974
56. *Copelatus indicus* Sharp, 1882
57. *Copelatus irinus* Régimbart, 1899
58. *Copelatus karnatakus* Holmen & Vazirani, 1990
59. *Copelatus latipes* Sharp, 1882
60. *Copelatus malaisei* Guignot, 1954
61. *Copelatus minutissimus* J. Balfour- Browne, 1939
62. *Copelatus neelumae* Vazirani, 1973
63. *Copelatus oblitus* Sharp, 1882
64. *Copelatus schereri* Wewalka, 1981
65. *Copelatus spangleri* Vazirani, 1974
66. *Copelatus tenebrosus* Régimbart, 1880
67. *Copelatus filiformis* Sharp, 1882
68. *Copelatus schuhi* Hendrich & Balke, 1998
69. *Copelatus boukali* Hendrich & Balke, 1998
70. *Copelatus ternatensis* Régimbart, 1899

Genus ***Lacconectus*** Motschulsky, 1855

71. *Lacconectus arunachal* Brancucci, 2006
72. *Lacconectus basalis* Sharp, 1882
73. *Lacconectus biswasi* Brancucci, 1986
74. *Lacconectus fallaciosus* Brancucci, 1986
75. *Lacconectus fulvescens* Motschulsky, 1855
76. *Lacconectus gusenleitneri* Brancucci, 1986
77. *Lacconectus holzschuhi* Brancucci, 1986
78. *Lacconectus nicolasi* Brancucci, 1986
79. *Lacconectus pederzanii* Brancucci, 1986
80. *Lacconectus peguensis* Brancucci, 1986
81. *Lacconectus ritsemae* Régimbart, 1883
82. *Lacconectus shaverdoae* Brancucci, 2005
83. *Lacconectus simoni* Régimbart, 1893

84. *Lacconectus strigulifer* Zimmermann, 1928
85. *Lacconectus andrewesi* Guignot, 1952
86. *Lacconectus blandulus* Brancucci, 2003
87. *Lacconectus freyi* Guéorguiev, 1968
88. *Lacconectus klausnitzeri* Brancucci, 2006
89. *Lacconectus lambai* Vazirani, 1977
90. *Lacconectus munnarensis* Brancucci, 2003
91. *Lacconectus nepalensis* Brancucci, 1989
92. *Lacconectus ovalis* Gschwendtner, 1936
93. *Lacconectus pacholatkoi* Brancucci, 2003
94. *Lacconectus regimbarti* Brancucci, 1986
95. *Lacconectus satoi* Brancucci, 2003
96. *Lacconectus scholzi* Gschwendtner, 1922
97. *Lacconectus sikkimensis* Brancucci, 1989
98. *Lacconectus spangleri* Brancucci, 1986
99. *Lacconectus splendidus* Brancucci, 2003

Subfamily DYTISCINAE

Tribe ACILIINI Thomson, 1867

Genus ***Rhantaticus*** Sharp, 1882

100. *Rhantaticus congestus* (Klug, 1832)

Genus ***Sandracottus*** Sharp

101. *Sandracottus dejeanii* (Aubé, 1838)
102. *Sandracottus festivus* (Illiger, 1801)
103. *Sandracottus maculatus* (Wehncke, 1876)
104. *Sandracottus manipurensis* Vazirani, 1969
105. *Sandracottus mixtus* (Blanchard, 1843)

Tribe CYBISTRINI Sharp, 1880

Genus ***Cybister*** Curtis, 1827

106. *Cybister cardoni* Severin, 1890
107. *Cybister cognatus* Sharp, 1882
108. *Cybister concessor* Guignot, 1947

109. *Cybister confusus* Sharp, 1882
110. *Cybister dejeanii* Aubé, 1838
111. *Cybister extenuans* (Walker, 1858)
112. *Cybister gracilis* Sharp, 1882
113. *Cybister guerini* Aubé, 1838
114. *Cybister javanus* Aubé, 1838
115. *Cybister lateralimarginalis torquatus* (Fischer vonWaldheim, 1829)
116. *Cybister lewisianus* Sharp, 1873
117. *Cybister limbatus* (Fabricius, 1775)
118. *Cybister pectoralis* Sharp, 1882
119. *Cybister rugulosus* (Redtenbacher, 1844)
120. *Cybister tripunctatus lateralis* (Fabricius, 1798)
121. *Cybister ventralis* Sharp, 1882
122. *Cybister wittmeri* Brancucci, 1979
123. *Cybister convexus* Sharp, 1882
124. *Cybister dehaanii* Aubé, 1838
125. *Cybister posticus* Aubé, 1838
126. *Cybister siamensis* Sharp, 1882
127. *Cybister sugillatus* Erichson, 1834

Tribe DYTISCINI

Genus ***Dytiscus*** Linnaeus, 1758

128. *Dytiscus persicus* Wehncke, 1876

Tribe ERETINI Crotch, 1873

Genus ***Eretes*** Laporte, 1833 (2 spp.)

129. *Eretes griseus* (Fabricius, 1781)
130. *Eretes sticticus* (Linnaeus, 1767)

Tribe HYDATICINI Sharp, 1880 (1 genus)

Genus ***Hydaticus*** Leach, 1817 (21 spp.)

131. *Hydaticus bengalensis* Régimbart, 1899
132. *Hydaticus bipunctatus bipunctatus* Wehncke, 1876
133. *Hydaticus epipleuricus* Régimbart, 1891

134. *Hydaticus fabricii fabricii* (W.S. Macleay, 1825)
135. *Hydaticus fractifer* Walker, 1858
136. *Hydaticus histrio* Clark, 1864
137. *Hydaticus incertus* Régimbart, 1888
138. *Hydaticus litigiosus* Régimbart, 1880
139. *Hydaticus luczonicus* Aubé, 1838
140. *Hydaticus major* Régimbart, 1899
141. *Hydaticus mexaformis* Wewalka, 1979
142. *Hydaticus pacificus* Aubé, 1838
143. *Hydaticus pictus* (Sharp, 1882)
144. *Hydaticus ponticus* Sharp, 1882
145. *Hydaticus ricinus* Wewalka, 1979
146. *Hydaticus satoi satoi* Wewalka, 1975
147. *Hydaticus vaziranii* Wewalka, 1979
148. *Hydaticus vittatus vittatus* (Fabricius, 1775)

Subfamily HYDROPORINAE Aubé, 1836

Tribe BIDESSINI Sharp, 1880 (8 genera)

Genus ***Clypeodytes*** Régimbart, 1894

149. *Clypeodytes bufo* (Sharp, 1890)
150. *Clypeodytes jaechi* Wewalka & Biström, 1987
151. *Clypeodytes duodecimmaculatus* Régimbart, 1899
152. *Clypeodytes gestroi* (Régimbart, 1888)
153. *Clypeodytes severini* (Régimbart, 1892)
154. *Clypeodytes hemani* Vazirani, 1968
155. *Clypeodytes dilutus* (Sharp, 1882)

Genus ***Geodessus*** Brancucci, 1979

156. *Geodessus besucheti* Brancucci, 1979
157. *Geodessus kejvali* Balke & Hendrich, 1996

Genus ***Hydroglyphus*** Motschulsky, 1853

158. *Hydroglyphus angularis* (Klug, 1834)
159. *Hydroglyphus crassifrons* (Régimbart, 1903)

160. *Hydroglyphus flammulatus* (Sharp, 1882)
161. *Hydroglyphus geminus* (Fabricius, 1792)
162. *Hydroglyphus gujaratensis* (Vazirani, 1973)
163. *Hydroglyphus inconstans* (Régimbart, 1892)
164. *Hydroglyphus mysorensis* (Régimbart, 1903)
165. *Hydroglyphus orientalis* (Clark, 1863)
166. *Hydroglyphus pendjabensis* (Guignot, 1954)
167. *Hydroglyphus pradhani* (Vazirani, 1969)
168. *Hydroglyphus signatellus* (Klug, 1834)

Genus ***Leiodytes*** Guignot, 1936 (7 spp.)

169. *Leiodytes griseoguttatus* (Régimbart, 1893)
170. *Leiodytes horai* (Vazirani, 1969)
171. *Leiodytes indicus* (Régimbart, 1892)
172. *Leiodytes minutus* (Vazirani, 1969)
173. *Leiodytes nicobaricus* (Redtenbacher, 1867)
174. *Leiodytes orissaensis* (Vazirani, 1969)

Genus ***Peschetius*** Guignot, 1942 (2 spp.)

175. *Peschetius quadricostatus* (Aubé, 1838)
176. *Peschetius toxophorus* Guignot, 1942

Genus ***Pseuduvarus*** Biström, 1988 (1 sp.)

177. *Pseuduvarus vitticollis* (Boheman, 1848)

Genus ***Uvarus*** Guignot, 1939 (2 spp.)

178. *Uvarus livens* (Régimbart, 1892)
179. *Uvarus quadrilineatus* (Zimmermann, 1923)

Genus ***Yola*** Gozis, 1886 (3 spp.)

180. *Yola nilgirica* Biström, 1983

Tribe HYDROPORINI Aubé, 1836

Genus ***Boreonectes*** Angus, 2010

181. *Boreonectes griseostriatus* (De Geer, 1774)

Genus ***Deronectes*** Sharp, 1882 (6 spp.)

182. *Deronectes abnormicollis* Semenov, 1900

183. *Deronectes afghanicus* Wewalka, 1971
184. *Deronectes bameuli* Fery & Hosseinie, 1998
185. *Deronectes vestitus* (Gebler, 1848)

Genus ***Hydroporus*** Clairville, 1806

186. *Hydroporus discretus discretus* Fairmaire & Brisout de
187. *Hydroporus glasunovi glasunovi* Zaitzev, 1905
188. *Hydroporus martensi* Brancucci, 1981

Genus ***Nebrioporus*** Régimbart, 1906

189. *Nebrioporus airumlus* (Kolenati, 1845)
190. *Nebrioporus balli* (Vazirani, 1970)
191. *Nebrioporus indicus* (Sharp, 1882)
192. *Nebrioporus insignis* (Klug, 1834)
193. *Nebrioporus melanogrammus* (Régimbart, 1899)
194. *Nebrioporus ressli* (Wewalka, 1974)
195. *Nebrioporus stearinus stearinus* (Kolenati, 1845)

Tribe HYDROVATINI Sharp, 1880

Genus ***Hydrovatus*** Motschulsky, 1853

196. *Hydrovatus acuminatus* Motschulsky, 1859
197. *Hydrovatus confertus* Sharp, 1882
198. *Hydrovatus obtusus* Motschulsky, 1855
199. *Hydrovatus pinguis* Régimbart, 1892
200. *Hydrovatus punctipennis* Motschulsky, 1859
201. *Hydrovatus rangoonensis* Guignot, 1954
202. *Hydrovatus sinister* Sharp, 1890
203. *Hydrovatus subtilis* Sharp, 1882
204. *Hydrovatus fractus* Sharp, 1882
205. *Hydrovatus bonvouloiri* Sharp, 1882
206. *Hydrovatus castaneus* Motschulsky, 1855
207. *Hydrovatus picipennis* Motschulsky, 1859
208. *Hydrovatus rufescens* Motschulsky, 1859
209. *Hydrovatus rufoniger rufoniger* (Clark, 1963)

210. *Hydrovatus seminarius* Motschulsky, 1859
211. *Hydrovatus pumilus* Sharp, 1882
212. *Hydrovatus cardoni* Severin, 1890
213. *Hydrovatus subrotundatus* Motschulsky, 1859

Tribe **HYGROTINI** Portevin, 1929

Genus ***Herophydrus*** Sharp, 1880

214. *Herophydrus musicus* (Klug, 1834)
215. *Herophydrus vaziranii* (Nilsson, 1999)

Genus ***Hygrotus*** Stephens, 1828

216. *Hygrotus confluens* (Fabricius, 1787)
217. *Hygrotus flaviventris* (Motschulsky, 1860)
218. *Hygrotus impressopunctatus* (Schaller, 1783)
219. *Hygrotus lernaeus* (Schaum, 1857)
220. *Hygrotus parallellogrammus* (Ahrens, 1812)

Genus ***Hyphoporus*** Sharp, 1880 (18 spp.)

221. *Hyphoporus anitae* Vazirani, 1969
222. *Hyphoporus aper* Sharp, 1882
223. *Hyphoporus bengalensis* Severin, 1890
224. *Hyphoporus bertrandi* Vazirani,1969
225. *Hyphoporus caliginosus* Régimbart, 1899
226. *Hyphoporus dehraduni* Vazirani, 1969
227. *Hyphoporus elegans* Régimbart, 1888
228. *Hyphoporus elevatus* Sharp, 1882
229. *Hyphoporus geetae* Vazirani, 1969
230. *Hyphoporus josephi* Vazirani, 1969
231. *Hyphoporus kempi* Gschwendtner, 1936
232. *Hyphoporus montanus* Régimbart, 1899
233. *Hyphoporus nilghiricus* Régimbart, 1903
234. *Hyphoporus pacistanus* Guignot, 1959
235. *Hyphoporus pugnator* Sharp, 1890
236. *Hyphoporus severini* Régimbart, 1892

Tribe HYPHYDRINI, Gistel, 1848

Genus ***Hyphydrus*** Illiger, 1802

237. *Hyphydrus lyratus flavicans* Régimbart, 1892
238. *Hyphydrus lyratus lyratus* Swartz, 1808
239. *Hyphydrus gschwendtneri* Guignot, 1942
240. *Hyphydrus holmeni* Biström, 1983
241. *Hyphydrus intermixtus* (Walker, 1858)
242. *Hyphydrus pulchellus* Clark, 1863
243. *Hyphydrus renardi* Severin, 1890
244. *Hyphydrus sumatrae* Régimbart, 1880

Genus ***Microdytes*** J. Balfour-Browne, 1946

245. *Microdytes belli* J. Balfour-Browne, 1946
246. *Microdytes boukali* Wewalka, 1997
247. *Microdytes cameroni* K.B. Miller & Wewalka, 2010
248. *Microdytes championi* J. Balfour- Browne, 1946
249. *Microdytes elgae* Hendrich, Balke & Wewalka, 1995
250. *Microdytes maculatus* (Motschulsky, 1859)
251. *Microdytes sabitae* Vazirani, 1968
252. *Microdytes schoenmanni* Wewalka, 1997
253. *Microdytes shaverdoae* Wewalka, 2011
254. *Microdytes svensoni* K.B. Miller & Wewalka, 2010
255. *Microdytes tomokunii* Satô, 1981
256. *Microdytes whitingi* K.B. Miller & Wewalka, 2010

Tribe METHLINI Branden, 1885

Genus ***Methles*** Sharp, 1882

257. *Methles indicus* Régimbart, 1899

Subfamily LACCOPHILINAE Gistel, 1856

Tribe LACCOPHILINI Gistel, 1856

Genus ***Laccophilus*** Leach, 1815

258. *Laccophilus anticatus anticatus* Sharp, 1890
259. *Laccophilus anticatus translucidus* Régimbart, 1899

260. *Laccophilus auropictus* Régimbart, 1899
261. *Laccophilus boukali* Hájek & ŠÆastný, 2005
262. *Laccophilus chinensis* Boheman, 1858
263. *Laccophilus elegans* Sharp, 1882
264. *Laccophilus ellipticus* Régimbart, 1899
265. *Laccophilus flexuosus* Aubé, 1838
266. *Laccophilus guttalis* Régimbart, 1893
267. *Laccophilus indicus* Gschwendtner, 1936
268. *Laccophilus inefficiens* (Walker, 1859)
269. *Laccophilus kaszabi* Brancucci, 1983
270. *Laccophilus kempi kempi* Gschwendtner, 1936
271. *Laccophilus maindroni persicus* Brancucci, 1983
272. *Laccophilus medialis* Sharp, 1882
273. *Laccophilus minutus* (Linnaeus, 1758)
274. *Laccophilus parvulus obtusus* Sharp, 1882
275. *Laccophilus parvulus parvulus* Aubé, 1838
276. *Laccophilus poecilus* Klug, 1834
277. *Laccophilus punctatissimus* Brancucci, 1983
278. *Laccophilus ritsemae* Régimbart, 1880
279. *Laccophilus sharpi* Régimbart, 1889
280. *Laccophilus siamensis kavanaughi* Brancucci, 1983
281. *Laccophilus uniformis* Motschulsky, 1859
282. *Laccophilus wolfei* Brancucci, 1983

Genus ***Neptosternus*** Sharp, 1882

283. *Neptosternus annettae* Hendrich & Balke, 2000
284. *Neptosternus biharensis* Vazirani, 1963
285. *Neptosternus boukali* Hendrich & Balke, 1999
286. *Neptosternus circumductus* Régimbart, 1899
287. *Neptosternus horai* Vazirani, 1953
288. *Neptosternus hydaticoides* (Régimbart, 1877)
289. *Neptosternus kerala* Hendrich & Balke, 1999

290. *Neptosternus leyi* Hendrich & Balke, 2000

291. *Neptosternus rajasthanicus* Vazirani, 1975

292. *Neptosternus starmuehlneri* Wewalka, 1973

293. *Neptosternus taprobanicus* Sharp, 1890

Family II GYRINIDAE

Subfamily ENHYDRINAE

Genus ***Dineutus*** Macleay, 1825

Subgenus ***Protodineutus***, Ochs, 1926

294. *Dineutus (Protodineutus) indicus* Aube,1838

295. *Dineutus (Spinosodineutus) spinosus* (Fabricius) 1781

296. *Dineutus (Spinosodineutus) unidentatus* (Aube) 1833

Subfamily GYRININAE

Genus ***Aulonogyrus*** Motschulsky, 1853

297. *Aulonogyrus obliquus* (Walker) 1858

Genus ***Gyrinus*** Geoffroy, 1762

298. *Gyrinus convexiusculus* Macleay 1871

299. *Gyrinus smaragdinus Regimbart, 1891*

Genus ***Metagyrinus*** Brinck 1955

300. *Metagyrinus arrowi* (Regimbart) 1907

Subfamily ORECTOCHILINAE

Genus ***Orectochilus*** Eschscholtz, 1833

Subgenus ***Patrus***, Aube, 1836

301. *Orectochilus (Patrus) andamanicus* Regimbart , 1884

302. *Orectochilus (Patrus) cameroni Ochs,* 1925

303. *Orectochilus (Patrus) cardoni* Regimbart 1891

304. *Orectochilus (Patrus) cribratellus metallescens* Regimbart, 1907

305. *Orectochilus (Patrus) cuneatus* Regimbart, 1891

306. *Orectochilus (Patrus) cylindricus* Regimbart 1892

307. *Orectochilus (Patrus) desgodinsi* Regimbart, 1886

308. *Orectochilus (Patrus) discifer*(Walker), 1859

309. *Orectochilus (Patrus)figuratus* Regimbart, 1891

310. *Orectochilus (Patrus) fletcheri* Ochs, 1925
311. *Orectochilus (Patrus) gangeticus* (Wiedmann), 1930
312. *Orectochilus (Patrus) haemorrhous* Regimbart, 1893
313. *Orectochilus (Patrus) himalayensis Vazirani,* 1984
314. *Orectochilus (Patrus) horni* Ochs., 1933
315. *Orectochilus (Patrus) marginipennis angustilimbus Ochs,* 1925
316. *Orectochilus (Patrus) metallicus* Regimbart,1883
317. *Orectochilus (Patrus) murinus* Regimbart, 1891
318. *Orectochilus (Patrus) neglectus* Ochs, 1925
319. *Orectochilus (Patrus) oblogiusculus* Regimbart, 1886
320. *Orectochilus (Patrus) ribeiroi* Vazirani, 1958
321. *Orectochilus (Patrus) productus* Regimbart, 1883
322. *Orectochilus (Patrus) semivestitus* Guerin, 1893
323. *Orectochilus (Patrus) similis* Ochs, 1929

Family III HALIPLIDAE

Genus ***Haliplus*** Latreille, 1802

Subgenus ***Liaphlus*** Guignot, 1928

324. *Haliplus* (*Liaphlus) angustifrons* Regimbart, 1892
325. *Haliplus* (*Liaphlus) arrowi Guignot*, 1936
326. *Haliplus* (*Liaphlus) manipurensis* Vazirani,1966
327. *Haliplus* (*Liaphlus) pruthi* Vazirani, 1966
328. *Haliplus* (*Liaphlus) pulchellus indicus* Regimbart, 1899

Suborder II POLYPHAGA

Family IV HYDROPHILIDAE

Subfamily HYDRAENINAE

Genus ***Hydraena*** Kugelann, 1794

329. *Hydraena bihamata* Champ, 1920
330. *Hydraena cirrata* Champ, 1920
331. *Hydraena maculicollis* Champ, 1920
332. *Hydraena tenjikuana* Sato, 1979
333. *Hydraena wittmeri* Sato, 1979

Genus ***Ochthebius*** Leach, 1815

Subgenus ***Hymenodes Mulsant***, 1844

334. *Ochthebius (Hymenodes) foveolatus* Germer, 1824
335. *Ochthebius (Hymenodes) nitidipennis* Champ, 1920
336. *Ochthebius (Hymenodes) opacipennis* Champ, 1920
337. *Ochthebius (Hymenodes) rivalis* Champ, 1920
338. *Ochthebius (Hymenodes) scintillans* Champ, 1920
339. *Ochthebius (Hymenodes) sexfoveatus* Champ, 1920
340. *Ochthebius (Hymenodes) strigosus* Champ, 1920

Subgenus ***Bothochilus*** Rey, 1885

341. *Ochthebius (Bothochilus) nobilis* Villa, 1835

Subfamily LIMNEBIINAE

Genus ***Limnebius*** Leach, 1815

342. *Limnebius almoranus* Knisch, 1924
343. *Limnebius distinctus* Knisch, 1924
344. *Limnebius singularis* Knisch, 1924

Subfamily EPIMETOPINAE

Genus ***Epimetopus*** lacord, 1854

345. *Epimetopus asperatus* Champ, 1919

Subfamily SPERCHEININAE

Genus ***Spercheus*** Kugel, 1798

346. *Spercheus gibbus* Champion, 1919

Subfamily HYDROCHINAE

Genus ***Hydrochus*** Leach, 1817

347. *Hydrochus annamitra* Regimbart, 1903
348. *Hydrochus bindosus* Motsch
349. *Hydrochus locustris* Nietner, 1856

Subfamily SPHAERIDINAE

Tribe SPHAERIDINI d'Orchymont

Genus ***Coelostoma*** Brulle, 1835

350. *Coelostoma horni* Regimbart, 1902

351. *Coelostoma subditum* d'Orchymont, 1936

352. *Coelostoma stul*

Genus ***Dactylosternum*** Wollaston., 1854

353. *Dactylosternum abdominale* F., 1792

354. *Dactylosternum hydrophiloides* (M'Leay), 1825

Genus ***Sphaeridium*** Fabricius, 1775

355. *Sphaeridium cameroni* d'Orchymont, 1919

356. *Sphaeridium dimidiatum* Gory, 1834

357. *Sphaeridium quinquemaculatum* Fabricius 1798

358. *Sphaeridium seriatum* . d'Orchymont, 1919

359. *Sphaeridium severini* d'Orchymont, 1919

Tribe CERCYONINI

Genus ***Cercyonini*** Leach, 1817

360. *Cercyon dilutum* Regimbart, 1903

361. *Cercyon pseudodilutum* Sato,1979

362. *Cercyon punctigerum* Knisch, 1921

363. *Cercyon subditum* d'Orchymont, 1919

364. *Cercyon vicinalis* Walker 1859

Genus ***Oosternum*** Sharp, 1882

365. *Oosternum horni* d'Orchymont, 1914

Tribe MEGASTERNINI

Genus ***Pachysternum*** Motsch, 1863

366. *Pachysternum cardoni* d'Orchymont, 1926

367. *Pachysternum evanescens* Sharp, 1873

368. *Pachysternum nigrovittatum* Motschulsky 1863

369. *Pachysternum stevensi* d'Orchymont, 1942

Subfamily HYDROPHILINAE

Tribe HYDROBINII

Genus ***Crenetis*** Bedel, 1881

370. *Crenetis orientalis* Sato

Genus ***Paracymus***, Thomson, 1867

371. *Paracymus evanescens* Sharp, 1890

Genus ***Laccobius*** Erichson, 1837

372. *Laccobius rotundus* Regimbart, 1903

373. *Laccobius simulans* d'Orchymont, 1923

Genus ***Helochares*** Mulsant, 1844

374. *Helochares anchoralis* (Sharp), 1890

375. *Helochares crenatus* Regimbart, 1903

376. *Helochares densus Sharp,* 1890

377. *Helochares lentus* Sharp, 1890

378. *Helochares pallens* (Macleay), 1825

379. *Helochares taprobanicus Sharp*, 1890

Genus ***Enochrus*** Thomson, 1859

380. *Enochrus esuriens* Walker 1858

381. *Enochrus rubrocinctus (Regimbart)*, 1903

Tribe II HYDROPHILINI

Genus ***Sternolophus*** Solier, 1834

382. *Sternolophus rufipes* (F.), 1792

Genus ***Hydrophilus*** Leach, 1764

383. *Hydrophilus bilineatus caschmirensis* Redentenbacher, 1844

384. *Hydrophilus indicus* (Bedel)1892

385. *Hydrophilus olivaceous* F.1781

386. *Hydrophilus rufocinctus* (Bedel), 1888

387. *Hydrophilus senegalensis* Percheron, 1835

388. *Hydrophilus temnopteroides* (d'Orchymont) 1890

Tribe AMPHIPINI

Genus ***Amphiops*** erichson, 1843

389. *Amphiops pedestris* Sharp, 1890

390. *Amphiops simplex* Sharp, 1890

Tribe BEROSINI

Genus ***Berosus*** Leach, 1817

391. *Berosus fairmairei* Macleay 1908

392. *Berosus indicus* Mots. 1861

393. *Berosus pulchellus* Macleay 1825

Genus ***Regimbartia Zaitev,*** 1908

394. *Regimbartia attenuata* Fabricius 1801

Genus ***Globaria Latreille,*** 1829

395. *Globaria leachi* Hope, 1838

Family V ELMIDAE

Genus ***Stenelmis Dufour,*** 1835

396. *Stenelmis* sp.

SUMMARY

The aquatic and semi aquatic groups of insects are overall indicators of both recent and long term environmental conditions. The study reports the presence of 14 species of Aquatic Hemiptera belonging to 5 families and 8 genera, which forms the first report of this group from insects of lakes of Hyderabad. It also comprises of 31 species of aquatic coleoptera accommodated under 20 genera and four families. Aquatic coleopterans are highly diverse and distributed, only four families namely Dytiscidae, Gyrinidae and Hydrophilidae and Haliplidae are chiefly represented in the present report of lakes of Hyderabad. The diversity of insect fauna in different wetland types varied widely which was dependant on availabitity of macrophytes and general physico chemical conditions of water. An attempt has also been made to update the Checklist of Aquatic coleoptera, though the list includes only five families,

further studies on other aquatic families will be made. It is presumed that further intensive seasonal surveys to many more wetlans belonging to different types and detailed taxonomic studies may reveal some species which may be significant both ecologicall and taxonomically. Further studies aiming to improve our knowledge on water insects should focus on collecting in little known areas, revision of the still unstudied material from additional families and filling the large gaps in our knowledge regarding the diversity of water beetles in some specific habitats.

ACKNOWLEDGEMENTS

The author is thankful to Dr. K. Venkataraman, Director, Zoological Survey of India, Kolkata and Dr. D.V. Rao, Officer-in-Charge, ZSI, Hyderabad, for providing facilities to carry out this work. I sincerely thank Shri. C. Radhakrishnan, Additional Director, ZSI, Calicut, for providing valuable input, keen interest, and encouragement. My sincere thanks are also due to Late Dr. Thirumalai and Dr. Animesh Bal, ZSI, Dr. Kailash Chandra, Additional Directors, ZSI, Kolkata and Dr. Jach Manfred, Entomologist, Natural History Museum, Wienna, Austria for providing literature and scientific assistance. Thanks are also due to Dr. C.A.N. Rao, Dr. S.Z. Siddiqi, Retd. Scientists, ZSI and Dr. SVA Chandrasekar, Scientist B for encouragement and lucid suggestions, Mr. Anand & Mr. K. Pande for technical assistance and Sujit Kumar Ghosh, Coleoptera section, ZSI, Kolkata for providing catalogue of diving beetles.

REFERENCES

Bal, A. and R.C. Basu, 1994a. Insecta : Hemiptera : Mesoveliidae, Hydrometridae, Velidae and Gerridae. In : *State fauna Series* 5 : *Fauna of West Bengal,* Part 5, Zoological Survey of India, Kolkata : 511-534.

Bal, A. and R.C. Basu, 1994b. Insecta : Hemiptera : Mesoveliidae, Hydrometridae,Velidae and Gerridae. In : *State fauna Series* 5 : *Fauna of West Bengal,* Part-5, Zoological Survey of India, Kolkata : 535-558.

Balfour-Browne J. 1939. On *Copelatus* Erichson and *Leiopterus* Stephens (Col. Dytiscidae) with description of new species. *Transactions of the Royal Entomological Society London,* **88** : 57–88.

Bhattacharya, D.K. (2000). Insect fauna associated with large water hyacinth in freshwater wetlands of West Bengal. *Diversity and Environment*. Proceedings of National Seminar

on Environmental Biology (Eds. A.K. Aditya and P. Haldar), Daya Publishing House, Delhi : 165-169.

Biwas and Mukhopadhyay, 1995. Insecta : Coleoptera : *State Fauna Series.* 3 : *Fauna of West Bengal,* 3 pt. **6** A : 1-51, Zoological Survey Of India. Kolkata.

Crowson, R.A. 1955. *The Natural Classification of the families of Coleoptera.* Nathaniel Lloyd & Co., London.

Crowson, R.A. 1981. *The Biology of the Coleoptera.* Academic Press; London, New York, Toronto, Sydney, San Fracisco.

Deepa J. and. Rao C.A.N. 2010. Aquatic Entomofauna of Pocharam lake, Andhra Pradesh (Hemiptera & Coleoptera, *Wetland ecosystem series,* **13** : 37-49. *Zool. surv. India, Kolkata.*

Deepa J. and C.A.N. Rao 2007. Aquatic Hemiptera of Pocharam Lake, Andhra Pradesh. *Zoos' Print Journal,* **22**(12) : 2937-2939.

Deepa, J.& C.A.N. Rao. 2011. "On Collections of aquatic and semiaquatic bugs and beetles of KBR National Park, Hyderabad, Andhra Pradesh". *Bugs R All,* Newsletter of the Invertebrate Conservation & Information Network of South Asia, No. 17, March, 2011 : 13-15.

Deepa, J. 2010. Aquatic insects of Wyra lake, Khammam A.P, *Wetland ecosystem series,* **16** *Zool. surv. India,* Kolkata : 1-158.

Deepa, J. Kailash Chandra and C.A.N. Rao. 2010. Insecta : Aquatic Coleoptera, ZSI State Fauna series, Fauna of Madhya Pradesh, ZSI Publication (In Press).

Dey, M. & Sengupta, T., (1993) Beetles (Coleoptera : Insecta) of wetlands of Calcutta & its surroundings. *Rec. zool. Surv. India,* **93**(1-2) : 103-138.

Fabricius, J.C. 1775. *Systema Entomologica.* Flensburgi et Lipsiae.

Ghosh, A.K. 1996. Insect biodiversity in India. *Oriental Insects,* **30** : 1-10.

Hansen, M. 1991. The hydrophiloid beetles : Phylogeny, classification and a revision of the genera (Coleoptera, Hydrophiloidea). *Biol. Skrift.* 40. 367 pp.

Jach, M.A. 1994. Elmidae Curtis, 1830 and *Elmis* Latreille, 1802 (Insecta, Coleoptera) : Proposed conservation as correct spelling and of feminine gender respectively. *Bull. Zool. Nomencl.,* **51**(1) : 25-27.

Jach, M.A. & Balke, M., 2008. Developments in Hydrobiology, Fresh water Animal Diversity, Springer Netherlands Vol. **198** : 419-442.

Jach, M.A., and E. Matsui. 1994. The Japanese species of the genus *Limnebius* (Coleoptera, Hydraenidae). *Japanese J. Entomol.*, **62**(2) : 267-274.

Junk, W.J. (1977). The invertebrate fauna of floating vegetation of Bong Barapet, a reservoir in Central Thailand. *Hydrobiologia,* **53** : 229-238.

Larson, D.J. and Pritchard G. (1974). Organs of possible stridulatory function in water beetles (Coleoptera : Dytiscidae). *The Coleopterists Bulletin* 28 : 53–63. *Freshwater Invertebrates of the Malaysian Region,* 606.

Lawrence, J.F. 1982. Coleoptera. pp. 482-553. **In** : S.P. Parker (ed.) *Synopsis and Classification of Living Organisms,* **2**; McGraw Hill, New York.

Leconte, J.L. and Horn, G.E. 1883. *Classification of the Coleoptera of North America.* Smithsonian Misc. Coll. No. 507; Smithsonian Institution Publ., Washington.

Lefroy, H.M. 1909. *Indian Insect Life.* Thacker, Spink & Co., Calcutta.

Mukhopadhyay, P. 2007. Insecta : Coeloptera : Polyphaga : Hydrophilidae : Fauna of Andhra Pradesh, *State Fauna series*, 5 (Part-3)-Insects : 1-544. Zoological Survey of India. Kolkata.

Mukhopadhyay, P. and Gosh, S.K. (2003). Insecta : Coleoptera. *Fauna of Sikkim. State Fauna series,* **9** (Part : 3), 19-33. Zoological Survey Of India. Kolkata.

Nilsson, A.N. and Persson S. (1990). Dimorphism of the metasternal wing in *Agabus raffrayi* and *A. labiatus* (Coleoptera : Dytiscidae) questioned. *Aquatic Insects,* **12** : 135-144.

Ochs, G. 1925. Description of new Asiatic Gyrinidae. *Rec. Indian Mus.,* **27** : 193-204.

Ochs, G. 1931. *Catalogue of Indian Insects.* Pt. 19, Gyrinidae; Govt. of India Press, Calcutta.

Regimbart, M. 1882b. New species of Gyrinidae in the Leyden Museum. *Notes Leyden Mus.*, **4** : 59-71.

Schenkling, S. (ed.) 1910-40. *Coleopterorum Catalogus*. 31 vols., 170 pars; W. Junk Publ., The Hague.

Sharp, D. 1891. In : INDIA-Second Yarkand Mission. Scientific Results of the Second Yarkand Mission; based upon the collection and notes of F. Stoliczka. Calcutta; 13, Coleoptera C. Haliplidae, Dytiscidae, Gyrinidae.

Thirumalai, G. 1994. Aquatic and semi-aquatic Hemiptera (Insecta) of Tamil Nadu-I., Dharamapuri and Pudukkottai districts. *Records Rec. zool. Surv. India*, 165 : 1-45.

Thirumalai, G. 1999. Aquatic and semi-aquatic Heteroptera of India. *Indian Association of Aquatic Biologist (IAAB) Publication* No. **7** : 1-74.

Thirumalai, G. 2002. A check list of Gerromorpha (Hemiptera) from India. *Rec. zool. Surv. India,* **100**(1-2) : 55-97.

Thirumalai, G. 2007. A synoptic list of Nepomorpha (Hemiptera : Heteroptera) from India. *Rec. zool. Surv. India, Occ. Paper No.,* **273** : 1-84.

Tonapi, G.T. 1959. Studies on the aquatic insect fauna of Poona (Aquatic Heteroptera). *Proceedings of National Institute of Science. India,* **25** : 321-332.

Ushinger, R.L. (ed.), 1978. *Aquatic insects of California,* 2nd ed. University of California. Press, Berkeley, pp. 803.

Vazirani, T.G. 1969a. Contribution to the study of aquatic beetles (Coleoptera). 2. A review of the subfamilies Noterinae, Laccophilinae, Dytiscinae and Hydroporinae (in part) from India. *Oriental Ins.,* **2**(3 & 4) : 221-341.

Vazirani, T.G. 1969b. Contribution to the study of auatic beetles. IV. A review of *Pleurodytes* Regimbart (Col., Dytiscidae). *Annls. Soc. ent. Fr.* **5**(1) : 137-141.

Vazirani, T.G. 1969c. Contribution to the study of aquatic beetles (Coleoptera). VI. A review of Hydroporinae : Dytiscidae, in part, from India. *Bull. Mus. Nat. Hist. Nat. Paris* (2) **41**(1) : 203-225.

Vazirani, T.G. 1970. Contribution to the study of aquatic beetles (Coleoptera). IX. On a collection of Dytiscidae from South Andaman Islands. *Oriental Ins.,* **4**(2) : 177-184.

Vazirani T.G. 1971. Contributions to the study of aquatic beetles (Coleoptera). VII. A revision of Indian Colymbetinae (Dytiscidae). *Oriental Insects,* **4**(3) : 303-362.

Vazirani, T.G. 1972. Aquatic insects in relation to fisheries in India. *Cheetal, Journal of the Wildlife and Fisheries Service of India,* **17**(2) : 14-24.

Vazirani, T.G. 1973. Contribution to the study of aquztic beetles (Coleoptera) **XII.** On a collection of Dytiscidae from Gujarat *Rec. zool. Surv. India,* Calcutta, **67** : 287-302.

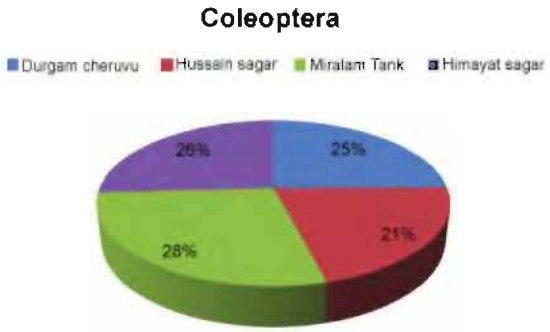
Vazirani, T.G. 1977. Catalogue of Oriental Dytiscidae. *Records of the zoological Survey of India, Miscellaneous Publications, Occasional Papers,* **6**. Pp 111.

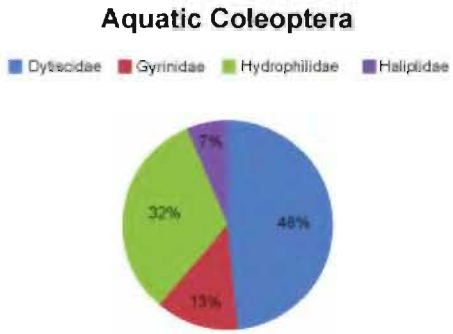
Vazirani, T.G. 1984. *The Fauna of India.* Coleoptera, Family Gyrinidae and Family Haliplidae; Zoological Survey of India, Calcutta.

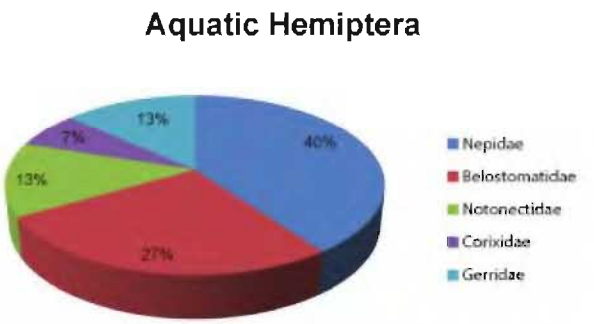
Vondel B. Van. 1995. Haliplidae : Review of the Haliplidae of China. *In* Jäch M.A. and Ji L. (Eds) *Water beetles of China.* Vol. 1. Pp 111-154. Zoologisch-Botanische Gesellschaft in Österreich and Wiener Coleopterologenverein, Wien.

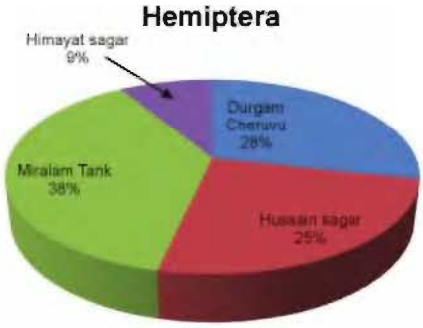
Walker, F. 1858. Characters of some apparently undescribed Ceylon insects. *Ann. Mag. Nat. Hist. 3rd ser.,* **2**(9) : 202-209.

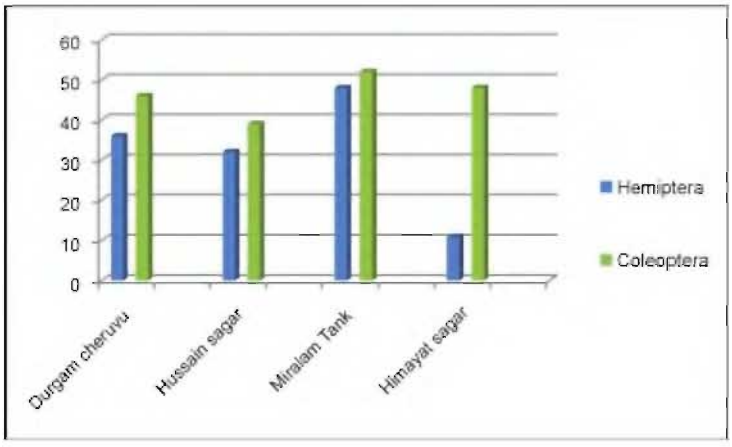
Wewalka, G., Balke, M. and Hendrich, L. 2001. *Anginopachria*, a new genus for an enigmatic species previously assigned to *Allopachria* (Coleoptera : Dytiscidae). *Entomological Problems,* **32**(1) : 91-92.











Comparison of no. of insects belonging to Hempitera and Coleoptera from four different lakes.

PLATE - I

Hussain sagar-Collection localities

Collection spot -1

Collection spot -2

Collection spot -3

Collection spot -4

PLATE - II

Durgam cheruvu (Silent lake)

Collection spot 1

Collection spot 2

Water pollution-Washing clothes at Durgam cheruvu

Regular Cultural fest organised at Durgam cheruvu

PLATE - III

A View of Miralam Tank

Miralam Tank collection spot - 1

Miralam Tank collection spot - 2

Miralam Tank collection spot - 4

Miralam lake water used for different purposes

Miralam lake-5

Miralam lake-6

Boating unit at Miralam lake-7

PLATE - IV

Himayat Sagar

Collection spot -1

Collection spot -2

Collection spot -3

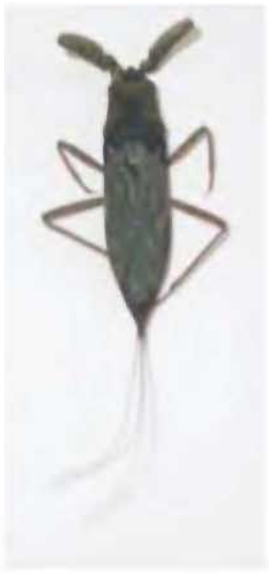
Insects collected from crevices of underlying stones at Himayat Sagar

PLATE - V

Aquatic Hemiptera

Diplonychus rusticus

Limnometra fluviorum



laccotrephus griseus

Coleoptra: Aquatic Families

Hydrophilidae

Haliplidae

Gyrinidae

PLATE - VI

Berosus sp.

Cybister sp.

Diplonychus rusticus

Haliplus pulchellus indicus

Hemipteran clinged to mesh of the net

Hydrochus sp.

Hydaticus fabricii

Hydrophilus sp.

Insect trapped in net

PLATE - VII

Laccophilus ellipticus

Lethocerus indicus

Limnogonus sp.

Orectochilus semivestitus

Sandracottus mixtus

Sphaeridium dimidiatum