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BEETLES (COLEOPTERA : INSECTA) OF WETLANDS OF CALCUTTA AND ITS SURROUNDINGS

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INTRODUCTION

Wetlands comprises a unique habitat exhibiting many features of the aquatic and terrestrial ecosystems. The species riches in such area is quite high, as it offers a specialised habitat for many macrophytes, invertebrates and vertebrates. Insect communities constitute the most varied and important invertebrate biotic component of wetland ecosystem.

Among a number of wetlands inspected in and around Calcutta 3 areas have been selected for detailed study. These are (i) Freshwater wetland of Bartibill near Barrackpore (ii) Sewage-fed wetland of Bantala of eastern Calcutta and (iii) Brackish-water wetland of Khariberia of north-east Calcutta.

Coleoptra comprise the largest order of insects which includes about 3,50,000 described species (Arnett, 1973) and approximately 5,000 aquatic members (White, Brigham and Doyen, 1984) and rank as one of the major groups of freshwater arthropods. Both adults and larvae are generally predaceous and carnivorous and prey upon larvae and adults of other aquatic insects, shrimps, warms, fishes, molluscs etc. On the other hand, these insects themselves are predated by fishes, amphibians, reptiles and aquatic birds. Thus they play a major role in the food chain of aquatic ecosystem.

Some of the important works on taxonomy and biology on aquatic beetles pertaining to the present study are done mainly by Sharp (1890), Regimbart (1903), Blunck (1912 , d'Orchymont (1925, 1928), Ochs (1930), Hickman (1931), Crowson (1955), Zimmerman (1960), Leech and Chandler (1968), Vazirani (1968, 1970, 1984), Tonapi and Ozarkar (1969), Arnett (1973), Roy (1982), White *et al.* (1984) etc.

The materials for the present study were collected during the period 1986-88 in three ecologically different wetlands of Calcutta Metropolitan District as mentioned earlier. Besides a large collection present in Zoological Survey of India have helped considerably to complete this study. The collections have been made from different habitats eg. surface water, column water, bottom mud, aquatic weeds and bank of water at regular intervals using different collecting equipments such as drag net, sweeping net, sieve, D frame aquatic net, Ekman grab, enamel trap and hand picking.

The number of species in each hauling was counted. A simple method was adopted to determine the relative abundance as follows :

Specimens		*Class*
100 +	=	Profusely abundant
∠ 100	=	Abundant
∠ 50	=	Common
∠ 20	=	Rare

It is realised that this system may not truely reflect the relative abundance of a species. But since qualitative aspect was the main consideration, the method was adopted for the study.

In the present survey 28 species of aquatic Coleoptera have been recorded belonging to five families, these are Dytiscidae, Hydrophilidae, Gyrinidae, Haliplidae and Spercheidae. Among them, the first two families are most common and abundant while the last three are less common in wetlands.

A brief introduction to the families is given below :

(i) The Dytiscidae or "predaceous diving beetles" are perhaps best adapted for aquatic life. The streamlined shape, flattened body and paddle like hind legs give them a characteristic appearance. The divided first visible abdominal sternite and short palpi distinguish them from Hydrophilidae which they resemble. and the single pair of eye separate them from Gyrinidae which are also streamlined.

The Dytiscidae are found in vascular hydrophytes both in flowing and stagnant water and they can live also in turbid water. They are active during daytime and attracted to light during night and sometimes cause nuisance to paddy fields. Dytiscidae are very good swimmer. Their hind legs are modified to a varying degree for swimming and provided with swimming devices like spines and swimming hairs. They can easily float, dive and swim up and return to the surface after a few seconds to fill the subelytral air chamber by breaking the surface film with elytray and abdomen. The swimming process is different from that of other aquatic beetles. Both hind legs are moved or kicked at the same time as opposed to the alternate swimming motions of other groups. In the males of certain genera e. g. *Hydrovatus*, *Laccophilus* etc. the first three segments of the fore tarsi are dilated to form highly efficient adhesive pads provided beneath with cup-like suckers, which secrete a glutinous secretion. According to Blunck (1912) the secretion helps in adhesion and sucker pads help to hold the female for long time. Dytiscidae are generally predator or engulfer and many are scavenger. Most species are carnivorous feeding on dragonfly and damselfly nymphs and other aquatic animals. Eggs are laid on plant on plant surface or within the plant tissues depending upon the structure of ovipositor.

The larvae are generally climber or swimmer. They are voraceous eater and predaceous and cannibalistic in nature. The common genera of Dytisciade found in the wetlands surveyed are *Laccophilus, Canthydurs, Hydrovatus, Guignotus, Hyphydrus, Uvarus, Clypcodytes, Hydaticus* and *Cybistcr.*

(ii) The Hydrophilidae are commonly known as "water scavenger beetle" is a fairly large family and second in abundance to Dytiscidae. d'Orchymont (1928) recorded 363 species from India. They may usually be recognized by the long maxilary palpi which exceeds the antennae in length and resembles antennae. The antennae are short, clavate and consealed.

The Hydrophilidae inhabit shallow water with emergent vegetation and vascular hydrophytes, grass growing water and also live upon decomposing vegetable matter. They are also good swimmer but not as active as many of the Dytiscidae. The adults swim by alternate movement of hind legs. Adults are active flyers and large numbers may be attracted to light. They renew their air supply by breaking the surface film with unwettable hairy club of antennae and side of the head ; this allows gas exchange along the plastron and air passage on the ventral surface of the thorax. Most adults are omnivorous consuming both living or dead material. Except a few genera larvae are not very common. The larvae are climber and poorer swimmer and generally found on soil near water edge. They are predaceous in nature. The common genera recorded from the wetlands surveyed are *Sternolophus, Amphiops, Berosus, Enochrus, Helochares, Regimbartia* and *Hydrophilus.*

(iii) The Gyrinidae is commonly known "as whirligig beetle", their broadly ovate and depressed body form, very flat and generally modified swimming legs and remarkable divided eyes serve to distinguish the family from the other beetles. Their habit of swimming in circles when alarmed has earned them their common name. This is a small family and Ochs (1930) catalogued nearly 130 species from India. The common genera in wetlands are *Dineutus* and *Orectochilus.* All the members of the Gyrinidae family glide or skate on the surface of the water and rarely dive. They cluster together and often swim rapidly in circles with their middle and hind legs, modified as fan like paddle for swimming. This is not only a normal mode of locmotion but is an alarming mechanism and when disturbed they scatter widely. Adults have divided eyes, lower portion remains completely submerged surveying aquatic habitat, the upper portion views the above water habitat. Divided vision and quick swimming movements allow them to avoid predators from above and below. For their respiration the air is stored in dorsal reservoir under tbe elytra. Gyrinidae are generally predator and predominantly surface film scavenger feeding on floating live or dead insects. Eggs are laid on stems just below the surface of water submerged

objects with their apical abdominal hook. They are predaceous in nature feeding on small aquatic organisms.

(iv) The Haliplidae is commonly known as "crawling water beetle". These peculiarly shaped water beetles cannot be mistaken for anything else once the extremely large hind coxal plates covering at least first two sternites are recognized.

The single genus common in wetlands is *Haliplus*. They are generally found at the edge crawling over mats of algae or similar vegetation. They are poorer swimmer, legs are not very helpful for swimming except few long hairs on middle and hind tarsi. Swimming is effected by alternate feeble movement of leg. Crawling is the most normal mode of locomotion. The air is stored in subelytral chamber and below the large hind coxal processes, they float up and break the surface film by tip of the abdomen (Hickman, 1931). Nothing is known about food, feeding habit and life history of any Indian species. But it is believed that there is only one generation in India.

(v) *Spercheidae* :

Sphercheus gibbus is the only representative of the family Spercheidae in the wetlands surveyed. According to Crowson (1955) this family perhaps forms a link between the Hydraenidae and the Hydrophilidae proper. Many authors gave it a subfamily status-Spercheinae. *Sphercheus* remains the only genus of this family.

List of the species of Coleoptera of wetlands of Calcutta and its surroundings

Family : HALIPLIDAE

1. *Haliplus angustifrons* Regimbart

Family : GYRINIDAE

Subfamily : ENHYDRINAE

2. *Dineutus unidentatus* (Aube)

Subfamily : ORECTOCHILINAE

3. *Orectochilus productus* Regimbart

Family : DYTISCIDAE

Subfamily : DYTISCINAE

4. *Cybister tripunctatus* Sharp
5. *Hydaticus ricinus* (Macley)

Subfamily : HYDROPORINAE

6. *Hyphydrus renardi* Severin
7. *Hydrovatus bonvouloiri* Sharp

8. *H. confertus* Sharp
9. *Clypeodytes orissaensis* Vazirani
10. *Uvarus quadrilineatus* (Zimmerman)
11. *Guignotus flammulatus* (Sharp)
12. *G. inconstants* (Regimbart)
13. *G. pendjabensis* Guignot
14. *Guignotus* sp.

Subfamily : Laccophilinae

15. *Laccophilus anticatus* Sharp
16. *L. parvulus* Aube

Subfamily : Noterinae

17. *Hydrocoptus subvittulus* Motschulsky
18. *Canthydrus laetabilis* (Walker)
19. *C. luctuosus* (Aube)

Family : Spercheidae
Subfamily : Spercheinae

20. *Spercheus gibbus* Champion

Family : Hydrophilidae
Subfamily : Hydrophilinae
Tribe : Hydrobiini

21. *Enochrus escuriens* (Walker)
22. *Helochares anchoralis* Sharp

Tribe : Hydrophilinae

23. *Sternolophus rufipes* Fabricius
24. *Hydrophilus* sp.

Tribe : Amphiopinae

25. *Amphiops mirabilis* Sharp
26. *Amphiops pedestris* Sharp

Tribe : Berosini

27. *Berosus indicus* Motschulsky
28. *Reqimbartia attenuata* (Fabricius)

Key to the families, genera and species of wetland-coleoptera

*1. Hind coxae produced into broad, flattened plates covering 2 or 3 abdominal sternites and consealing all but apices of hind femora ; pronotum with a notch on lateral sides, before posterior angles ... Haliplidae ... *Haliplus*
... *H. angustifrons* Regimbart

1.	Hind coxae not produced into such plates ...	2
2(1').	Hind coxae with medial portion extending posteriorly to divide 1st abdominal sternite into lateral sclerites ; prothorax with distinct notopleural sutures ...	3
2'.	Hind coxae not extending posteriorly to divide 1st abdominal sternite ; notopleural sutures almost always absent ...	20
3(2)	Eyes divided into dorsal and ventral parts ; antenna short and thick, 2nd segment with a process ... Gyrinidae	4
3'.	Eyes not divided ; antenna long, filiform or moniliform ... Dytiscidae	5
4(3)	Episternum of the mesothorax not touching the base of elytral epipleurae ; pronotum and elytra without pubescence ; scutellum invisible ; protarsi in male almost subparallel only slightly broader than female ; elytral striae indistinct or obsolete, elytral apex with one spine in continuation of epipleural angle ; length 6.0-7.2 mm ... *Dineutus*	*D. unidentatus* (Aubé)
4.	Episternum of the mesothorax touching the base of elytral epipleurae ; pronotum and elytra with pubescence ; scutellum visible at least in one of the sexes ; apical segment of protarsi less than one ond a half times longer than the preceeding segment ; pronotum and elytra pubescent-punctate on lateral sides only and glabrous in the middle, epipleural angle produced into a spine ; length 4.5-5.4 mm ... ... *Orectochilus*	*O. productus* Règimbart
5(3).	Scutellum visible	6
5'.	Scutellum not visible ...	7
6(5)	Hind margins of the four basal metatarsal segments not fringed with any ciliae and posterior claw equal ; elytra black with green metalic iridescence and with yellow	

	lateral stripes extending to and including the epipleurae, species without any sexual sculpture in the female ... *Cybister* ... *C. tripunctatus asiaticus* Sharp	
6.	Hind margins of the four basal metatarsal segments on both the anterior and posterior faces fringed with golden yellow ciliae overlapping the base of the next segment and posterior claw unequal ; elytra reddish yellow with black markings as figured (Fig. 5) and sutural margin black ... *Hydaticus*	... *H. ricinus* (Macley)
7(5'.)	4th segment of the pro and mesotarsi much reduced, hardly visible ; prosternal process arched and oblique ...	8
7'.	4th segment of pro and mesotarsi subequal to the 3rd tarsal segment, not reduced ; prosternal process straight, occasionally a a little depressed ...	16
8(7)	Claws of the hind tarsi mostly unequal ; prosternal process oblong ; puncturation on elytra double mixed with small and large punctures ...	*Hyphydrus renardi* Severin
8'.	Claws of hind tarsi equal ...	9
9'(8).	Prosternal process broadened at the apex ; sutural angles of the elytra acuminate ... *Hydrovatus*	10
9'.	Prosternal process not broadened at the apex ...	11
10(9).	Length 3 mm or more ; head reticulate and glabrous ... *H. bonvouloiri*	Sharp
10'.	Length less than 3.00 mm ; head finely punctate ... *H. confertus*	Sharp
11(9').	Clypeus distinctly thickened, semicircular in outline (with a transverse striae between the eyes) ; upper surface distinctly pubescent ; pronotal striae continued on elytra ... *Clypeodytes*	... *C. orissaensis* Vazirani

11'. Clypeus not thickened, almost cut straight ... 12

12(11'). Elytra with a sutural striae ... *Guignotus* 13

12'. Elytra without a sutural striae, or if present, only near apex ; elytra brownish yellow with 2 distinct longitudinal brown markings on each elytron ... *Uvarus* *U. quadrilineatus* (Zimmerman)

13(12). Laterobasal plica on pronotum not continued on elytra at all ; length 2.3-2.5 mm ... *G. flammulatus* (Sharp)

13'. Laterobasal plica on pronotum distinctly continued on elytra ... 14

14(13'). Elytra brownish yellow to grey with pale yellow markings ... *G. inconstans* (Règimbart)

14'. Elytra brownish yellow with dark markings ... 15

*15(14') Elytral markings constituting two parallel longitudinal lines, terminating in the form of a crochet ... *G. pendjabensis* Guignot

15'. Elytral markings different and its shape as figured (Fig. 14) ... *Guignotus* sp.

16(7'). Posterior legs with a single tarsal claw ; sides of the pronotum not rebodered ... *Laccophilus* ... 17

16'. Posterior legs with two tarsal claws of equal length ; sides of the pronotum rebordered ... 18

17(16). Length 3.0-3.2 mm ; elytry brownish black with 5 yellow fascia ... *L. anticatus* Sharp

17'. Length 3.50-3.70 mm ; elytra brownish yellow to reddish brown with zigzag double marking, generally thick and coalescent ... *L. parvulus* (Aube)

18(16'). Curved spur present on the apex of fore tibiae ... *Canthydrus* 19

18'. Curved spur not present on the apex of fore tibiae ; length 1.8-2.2 mm ; puncturation on elytra in distinct rows ... *Hydrocoptus* *H. sabvittulus* (Motschulsky)

19(18). Length 2.25-2.70 mm ; pronotum brownish with its front margin darker. ... *C. laetabills* (Walker)

19'. Length 3.0-3.25 mm ; pronotum black marging into orange-yellow on sides ... *C. luctuosus* (Aubé)

20(2'). Front coxal cavities apparently more or less evidently closed behind ; antenna with not more than 3 segments before cupula, 2nd segment and cupule pubescent, the latter appearing as part of the club ; tarsi with large pleurisetose empodium between the claws ; general form very convex dorsally, broad and tuberculate ... Spercheidae ... *Spercheus* ... *S. gibbus* Champion

20'. Front coxal cavities apparently open behind ; antenna usually with 5 well developed segments before cupula, antenna short, clavate and concealed, antennal club 3 segmented and pubescent, maxillary palpi long exceeding the length of antenna ... Hydrophilidae 21

21(20'). Scutellum no longer or not much longer than its width at basis ; antenna at most 9-segmented (6+3) ... 22

21'. Scutellum a long triangle ; antenna at most 8-segmented (5+3) ... 25

22.(21) Meso and metasternal carina not reunited intimately ... 23

22'. Meso and metasternal carina reunited and forming only one ridge ... 24

23(22). Curved pseudobasal segment (actual basal segment very small) of maxillary palpi covex anteriorly ; length 2.5 mm ... *Enochrus* *E. escuriens* (Walker)

23'. Curved pseudobasal segment of maxillary palpi convex posteriorly ; length 6 mm ... *Helochares* *H. anchoralis* Sharp

24(22'). Antenna with normal club ; prostital carina ridgelike with an anterior brush of long

setae ; claws simple ; shinny black insect ; length 13 mm ... *Sternolophus* ... *S. rufines* Fabricius

24'. Antennal club perfoliate and asymmetrical ; prostital carina without anterior brush of long setae ; claws of all tarsi dentate at base, usually unequal and of different shape ; blackish brown shinny specimens ; length 35 mm ... *Hydrophilus* sp.

25(21'). Eyes divided by a conspicuous and complete canthus which reaches the vertex behind ; posterior feet without swimming hairs ; body with rolling up power with lunulated pronotum ... *Amphiops* 26

25'. Eyes very convex and prominent without complete canthus ; posterior feet with long swimming hairs ... 27

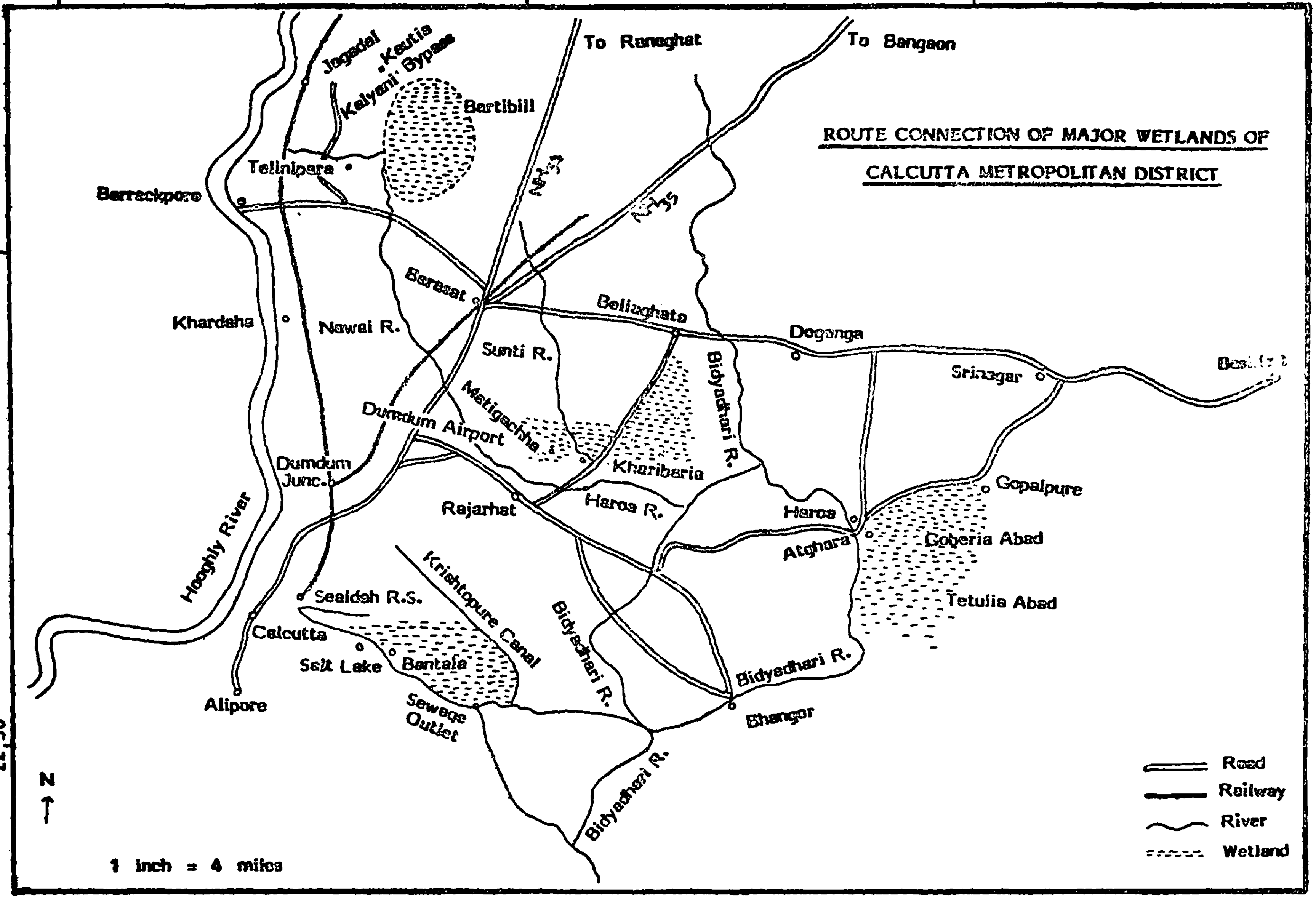
26(25), Blackish brown insect ; length 3.5 mm ; elytra with series of punctures and the interstitial punctures on sides are large and coarse, almost similar to serial punctures ...
Amphiops mirabilis Sharp

26'. Reddish brown insect ; length 3 mm ; elytra with series of coarse punctures, interstitial puncture large and distant
... *Amphiops pedestris* Sharp

27(25'). Five ventral not retracile segments ; antenna composed of 7 segment ; convex and elongate ; upper surface not black but brown to yellowish ... *Berosus* ... *B. indicus* Motschulsky

27'. Only four not retractile ventral segments, the first one invaded by the posterior coxal cavities ; antenna composed of 8 segments ; body strongly convex, elongated and compressed on sides ; upper surface uniform, deep and shinning black ... *Regimbartia*
... *R. attenuata* (Fabricius)

15


ROUTE CONNECTION OF MAJOR WETLANDS OF
CALCUTTA METROPOLITAN DISTRICT
88°15'
88°30'
88°45'
22°45'
22°30'
To Ranaghat
To Bangaon
Jogadal
Keutia
Kalyani Bypass
Bartibill
Tellnipara
Barrackpore
Baresat
Beliaghata
Deganga
Khardaha
Nawai R.
Sunti R.
Bidyadhari R.
Srinagar
Matigachha
Dumdum Airport
Kharibaria
Dumdum Junc.
Rajarhat
Haroa R.
Haroa
Gopalpure
Goberia Abad
Atghara
Hooghly River
Sealdah R.S.
Krishtopure Canal
Tetulia Abad
Calcutta
Salt Lake
Bantala
Bidyadhari R.
Bidyadhari R.
Bidyadhari R.
Alipore
Sewage Outlet
Bhangor
Bidyadhari R.
N
1 inch = 4 miles
Road
Railway
River
Wetland

Family : HALIPLIDAE

1. **Haliplus angustifrons** Régimbart

1892. *Haliplus angustifrons* Règimbart, *Ann. Soc. ent. Belg.*, **36** : 112.

1984. *Haliplus angustifrons*, Vazirani, *The Fauna of India* (*Coleoptera* : *Gyrinidae and Halplidae*) **2** : p. 122-124.

Diagnostic characters : General appearance (Fig. 1) broad, narrowed in front and more sharply so posteriorly. *Head* brownish yellow, vertex finely and sparsely punctured, puncturation larger and more dense towards base which is darker and eyes large. Antenna long, slender and brownish yellow. *Prothorax* brownish yellow with marginal parts darker, a notch present on lateral margin before posterior angle, puncturation dense, irregular and sparse on pronotal disc. *Elytra* brownish yellow with rusty red brown markings as figured (Fig. 1), sutural punctures marked and closely situated, strial punctures moderate and shallow and intetstitial punctures small and deep. *Legs* long, slender, brownish yellow and fringed with hairs, claws equal. *Ventral surface* brownish yellow.

Size : 2.9-3.8 mm in length.

Distribution : Bihar, Himachal Pradesh, Madhya Pradesh, Orissa, Punjab, Rajasthan and West Bengal.

Remarks : This species is found in shady places of wetlands among vascular hydrophytes and on edge of water. They are poor swimmer and climber in habit. They are very scarce in wetland and only two specimens have been collected from the freshwater of 'Bartibill'.

Family : GYRINIDAE

2. **Dineutus unidentatus** (Aubé)

1838. *Dineutus unidentatus* Aubé, *Spe´cies cole´opt`eres*, **6** : 788.

1984. *Dineutus unidentatus*, Vazirani, *The Fauna of India* (*Coleoptera* : *Gyrinidae and Haliplidae*), p. 20-22.

Diagnostic characters : General appearance (Fig. 2) elongate, slightly depressed posteriorly and black, with copper colour anteriorly and on sides, puncturation very fine, sparse and hardly visible and eyes large and divided by the sides of the head. Antenna very short, black with bronze colour shade. *Prothorax* black, copper colour on sides, lateral margin little arched and raised, puncturation sparse and little visible on disc. *Elytra* black, lateral margins slightly raised, striae of fine punctures hardly visible, epipleural angle extended into a strong spine and apex with fine denticles. *Legs* with front trasi simple armed with spines and spongy hairs, middle and hind legs short, paddle-like, flattened and tarsi folding fanwise. *Ventral surface* reddish brown.

Size : 6.0-7.2 mm in length.

Distribution : All over India.

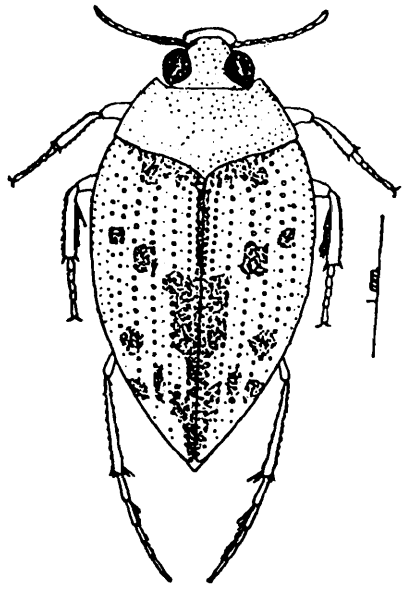


Fig. 1

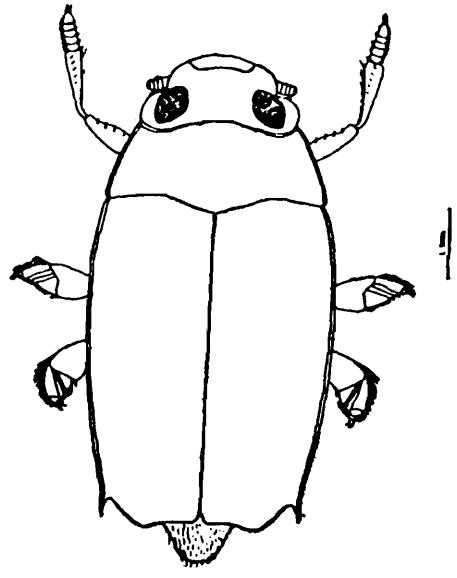


Fig. 2

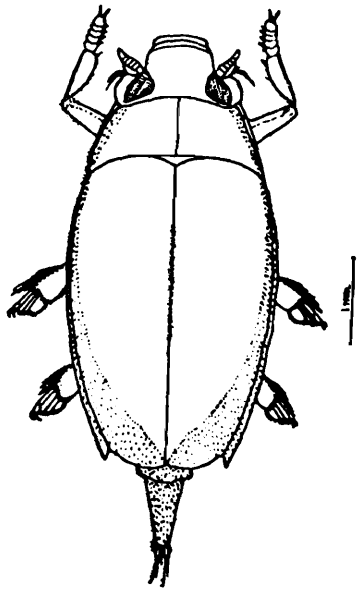


Fig. 3

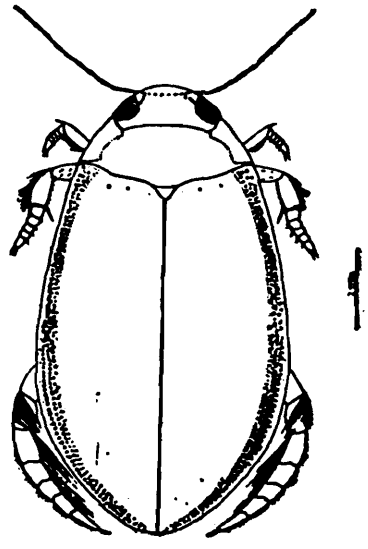


Fig. 4

Figs. 1-4 : *Haliplus angustifrons* Régimbart, dorsal view (1). *Dineutus unidentatus* (Aubé), dorsal view (2). *Orectochilus productus* Règimbart, dorsal view (3). *Cybister tripunctatus asiaticus* Sharp, dorsal view (4).

Remarks : These beetles prefer clear water and surface swimmer and diver in habit. They are found to gyrate on water surface. This species is not very common

and only a few specimens have been recorded from freshwater and brackishwater and none has been collected from sewage-fed water.

3. **Orectochilus productus** Régimbart

1883. *Orectochilus productus* Règimbart, *Ann. Soc. ent. Fr.*, (6) 5 : 422.
1984. *Orectochilus productus*, Vazirani, *The Fauna of India* (*Coleoptera* : *Gyrinidae and Haliplidae*), p. 51-52.

Diagnostic characters : General appearance (Fig. 3) narrowly elongate and black. *Head* black, puncturation indistinct, clypeus slightly raised anteriorly and eyes divided. Antenna very short and brownish black. *Prothorax* black and leteral margins yellow, puncturation on pronotum indistinct, pubescence on lateral sides projected posteriorly and as figured (Fig. 3) and faint depression of a median longitudinal line present. *Scutellum* short and markedly transverse. *Elytra* bronze-black and lateral margin yellow, puncturation indistinct, pubescence on lateral margin as figured (Fig. 3), epipleural angle extended into a small spine. Front *legs* simple and provided with spines, middle and hind legs short, paddle like, flattened and tarsi folded fanwise. *Ventral surface* bronze to black with legs and abdominal sternite paler.

Size : 4.5-5.4 mm in length.

Distribution : All over India.

Remarks : Like all other gyrinids this species is also surface swimmer. *Orectochilus* can be recognized in the field by its shape which is rather elongate with the last abdominal segment more or less lengthened like a tail. It is only recorded from freshwater wetland, none is found in sewage-fed and brackishwater.

Family : Dytiscidae

4. **Cybister tripunctatus asiaticus** Sharp

1882. *Cybister asiaticus* Sharp, *Sci. Trans. R. Dublin Soc.*, 2 : 731.
1899. *Cybister tripnnctatus* var. *asiaticus*, Règimbart, *Ann. Soc. ent. Fr.*, 68 : 351-352.
1968. *Cybister tripunctatus asiaticus*, Vazirani, *Orient. Ins.*, 2 (3-4) : 290-292.

Diagnostic characters : General appearance (Fig. 4) elongate-oval, narrower in front and moderately wider behind the middle. *Head* small, black with greenish metalic iridescence, apical portion yellowish red and eyes whitish. Antenna long, narrow and yellowish red. *Prothorax* concolorus with head and with reddish yellow lateral stripe and shape as figured (Fig. 4). *Scutellum* small, triangular and black. *Elytra* black with green metalic iridescence with reddish yellow lateral border distinctly punctured as figured (Fig. 4). *Legs* reddish yellow with tibiae and tarsi darker, and provided with spines and swimming hairs. *Ventral surface* reddish-brown to black.

Size : 27-30 mm in length.

Distribution : Andhra Pradesh, Assam, Andaman Islands, Bihar, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Remarks : This is the largest Dytiscidae among all the species so far collected from different wetlands. Being larger in size they tend to inhabit the larger and slightly deeper part of water. They occur scarcely in the freshwater but none has been collected from the other two types of water.

5. **Hydaticus ricinus** (Macley)

1833. *Hydaticus fabricii* Macley, *Annulosa Javanica*, Paris, p. 134.
1968. *Hydaticus fabricii*, Vazirani, *Orient. Ins.*, 2 (3-4) : 266-269.
1979. *Hydaticus ricinus*, Wewalka, *Koleopt. Rdsch.*, 54 : 119-139.

Diagnostic characters : General appearance (Fig. 5) oblong, oval and moderately depressed. *Head* rather small, reddish yellow and black marking along posterior margin and eyes normal. Antenna reddish yellow, long, slender and segments narrow. *Prothorax* reddish yellow and a transverse blackish marking present on basal margin, shape as figured (Fig. 5). *Scutellum* black. *Elytra* reddish yellow with black markings as figured (Fig. 5) and sutural margin black. *Legs* with spines and hairs, male with basal three segments of the front tarsi broadly dilated and provided with 'sucker pallettes', middle tarsi with 'sessile palletes', hind tarsi long and provided with spines and swimming hairs and posterior claw unequal. *Ventral surface* black or brownish black.

Size : 8.75-10.70 mm in length.

Distribution : Assam, Bihar, Himachal Pradesh, Maharastra, Manipur, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu and West Bengal.

Remarks : This is moderately large and colourful species. This species is scarcely found in wetlands. Only a few specimens have been collected from freshwater and brackishwater wetland and none is recorded from sewage-fed water.

6. **Hyphydrus renardi** Severin

1890. *Hyphydrus renardi* Severin, *Ann. Soc. ent. Belg.*, 34 : 191.
1968. *Hyphydrus renardi* Vazirani, *Orient. Ins.*, 2 (3-4) : 308-309.

Diagnostic characters : General appearance (Fig. 6) rather broad, oval and convex. *Head* brownish yellow, puncturation moderately large, irregular and denser on vertex and eyes large. Antenna brownish yellow, rather short & 4th segment distinctly short. *Prothorax* brownish yellow with anterior and posterior portion black as figured (Fig. 6), puncturation slightly larger than vertex of head and irregular. *Elytra* brownish with black markings as figured (Fig. 6), puncturation mixed with small

and large one, denser and closer than on pronotum. *Legs* with spines and hairs, first three segments of front and middle tarsi in male dilated and with ventral 'sucker

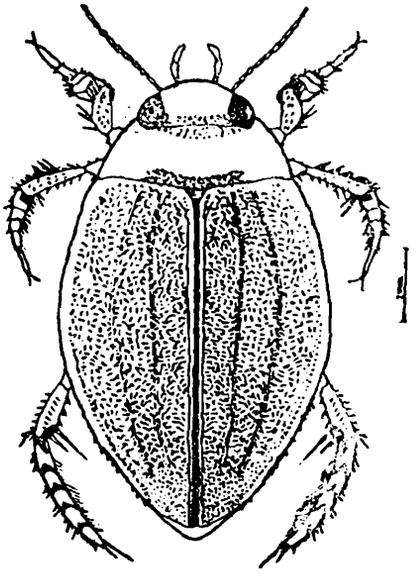


Fig. 5

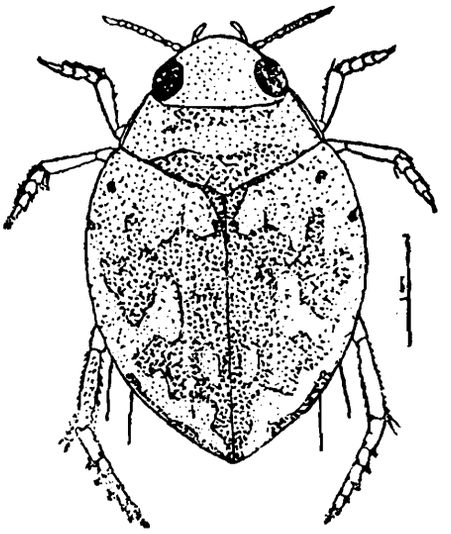


Fig. 6

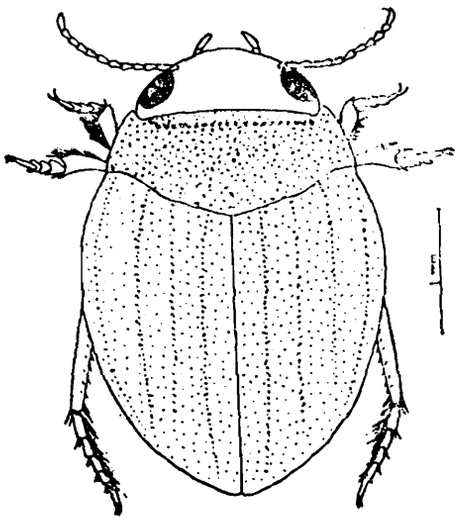


Fig. 7

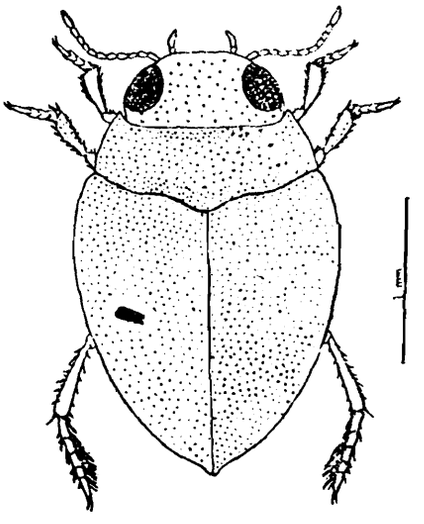


Fig. 8

Figs. 5-8. *Hydaticus ricini* (Macley), dorsal view (5). *Hyphydrus renardi* Severin, dorsal view (6). *Hydrovatus bonvouloiri* Sharp, dorsal view (7). *Hydrovatus confertus* Sharp, dorsal view (8).

pallettes' and 4th segment minute or obsolete, hind tarsi long with spines as figured (Fig. 6). *Ventral surface* reddish brown, puncturation on metasternum and hind coxae large and dense.

Size : 3.25-3.80 mm in length.

Distribution : Bihar, Madhya Pradesh, Rajasthan, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal.

Remarks : Their occurrence in wetlands is markedly few and only single specimen has been collected from brackishwater wetland.

7. **Hydrovatus bonvouloiri** Sharp

1882. *Hydrovatus bonvouloiri* Sharp, *Sci. Trans. R. Dublin Soc.*, 2 : 335 (India).
1970. *Hydrovatus bonvouloiri*, Vazirani, *Orient. Ins.*, 4 (1) : 99.

Diagnostic characters : General appearance (Fig. 7) moderately convex, oval and shinning. *Head* reddish brown and glabrous and eyes moderately large. Antenna brownish, long and slender. *Prothorax* reddish brown, its front margin dark and with a large and dark row of punctures, puncturation on pronotum fine and dense. *Elytra* reddish brown, uniformly and densely punctate, four rows of setiferous punctures often present which sometimes obsolete. *Legs* with front and middle tarsi broader and armed with spines and hairs, their first three segments a little dilated, 4th segment minute or obsolete, hind tarsi elongate, slender and with swimming hairs. *Ventral surface* brownish and puncturation on metasternum large and prominent.

Size : 3.50 mm in length.

Distribution : Bihar, Karnataka and West Bengal.

Remarks : General habit and habitat of this species is similar to *H. confertus*; but it can be easily distinguished from the former by its larger size and unlike *H. confertus* they are less common in wetland.

8. **Hydrovatus confertus** Sharp

1882. *Hydrovatus coufertus* Sharp, *Sci. Trans. R. Dublin Soc.*, 2 : 329 [Thailand (Siam)].
1970. *Hydrovatus coufertus*, Vazirani, *Orient. Ins.*, 4 (1) : 102-103.

Diagnostic characters : General appearance (Fig. 8) oval and moderately convex. *Head* reddish brown and puncturation very fine and eyes large. Antenna reddish brown, elongate and with median segments thickened in male. *Prothorax* reddish brown, puncturation irregular, fine and denser anteriorly and posteriorly. *Elytra* reddish brown, puncturation somewhat regular, moderate and slightly denser than on pronotum. *Legs* similar to *Hydrovatus bonvouloiri*. *Ventral surface* brownish yellow and puncturation sparser.

Size : 2.25-2.50 mm in length.

Distribution : Bihar, Kerala, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Remarks : This species is more or less common in all three ecologically different wetlands. They inhabit shallow water with aquatic vegetation and also in the water containing debris near the bank.

9. **Clypeodytes orissaensis** Vazirani

1968. *Clypeodytes orissaensis* Vazirani, *Orient. Ins.*, 2 (3-4) : 328-329.

Diagnostic characters : General appearance (Fig. 9) oblong-oval, moderately convex and pubescent. *Head* yellowish, puncturation fine and irregular and eyes large. Antenna slender and moderately long. *Prothorax* yellowish, puncturation distinct and irregular, pubescence fine, laterobasal plica oblique and slightly bent inwards. *Elytra* brownish with indistinct and irregular dark brown markings, which are more distinct between the discal plica, discal plica straight and long, puncturation moderately large and distinct. *Legs* simple with spines and hairs as figured (Fig.9), hind tarsi long, slender and with swimming hairs. *Ventral surface* reddish brown, punctate and pubescent.

Size : 1.90 mm in length.

Distribution : Orissa and present survey recorded it first time from West Bengal.

Remarks : This species has been collected from water weeds containing dead leaves, twigs, algae etc. along with the species of *Guignotus*. They scarcely occur in freshwater and brackishwater and none has been collected from sewage-fed water.

10. **Uvarus quadrilineatus** (Zimmermann)

1923. *Bidessus quadrilineatus* Zimmermann, *Ent. Blatt*, 19 : 34-48.
1968. *Uvarus quadrilineatus*, Vazirani, *Orient. Ins.*, 2 (3-4) : 331-352.

Diagnostic characters : General appearance (Fig. 10) sub-oblong, convex and finely pubescent. *Head* brownish yellow, puncturation fine, narrow and finely dark spots present in the interocular space and eyes large. Antenna brownish yellow and slender. *Prothorax* (Fig. 10) brownish yellow, anterior margin brown and darker in the middle, puncturation fine and not very dense, latero-basal plica angulate and reaching almost middle of the pronotum. *Elytra* brownish yellow with dark brown marking consisting of bands as figured (Fig. 10), puncturation fine and dense, pubescence short and fine, discal plica subequal to pronotal plica. *Legs* with spines and hairs, 1st three segments of front and middle tarsi dilated and 4th segment minute or obsolete, hind tarsi elongate, slender and with swimming hairs. *Ventral surface* brownish yellow, puncturation and pubescence fine.

Size : 1.5 mm in length.

Distribution : Bihar and West Bengal.

Remarks : This is the smallest species among all the Dytiscidae collected from the three different wetlands. They are adapted for living on vascular hydrophytes or

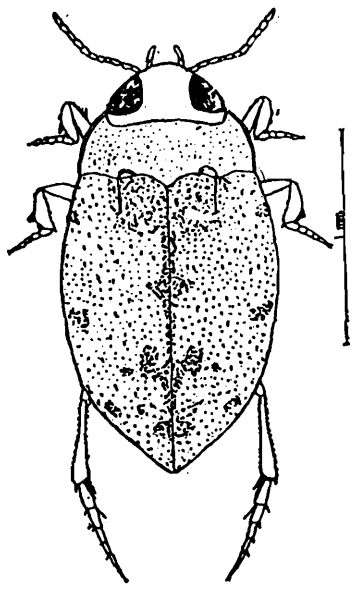


Fig. 9

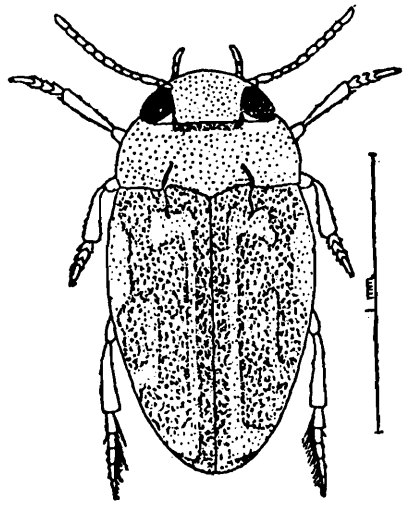


Fig. 10

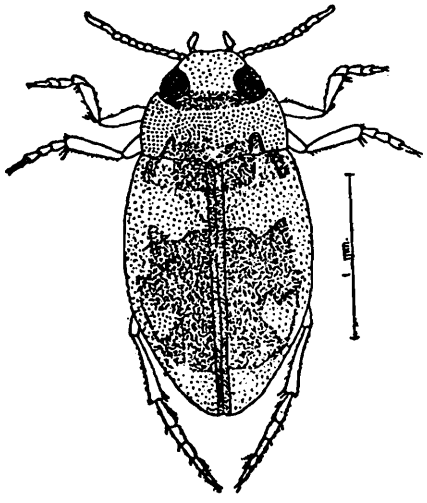


Fig. 11

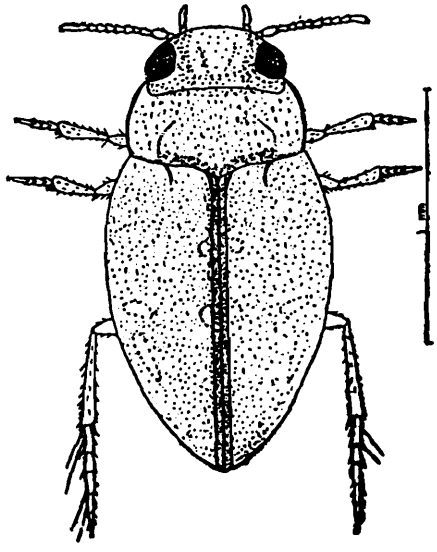


Fig. 12

Figs. 9-12 : *Clypeodytes orissaensis* Vazirani, dorsal view (9). *Uvarus quadrilineatus* (Zimmermann), dorsal view (10). *Guignotus flammulatus* (Sharp), dorsal view (11). *Guignotus inconstans* (Règimbart), dorsal view (12).

detrital debris e.g. branches, roots of vegetation etc. They are predator (piercer) in habit and very scarce in wetland.

11. **Guignotus flammulatus** (Sharp)

1882. *Bidessus flammulatus* Sharp, *Sci. Trans. R. Dublin Soc.*, 2 : 359.
1954. *Guignotus flammulatus*, Guignot, *Opusc. ent.*, 19 : 221.
1968. *Guignotus flammulatus*, Vazirani, *Orient. Ins.*, 2 (3-4) : 313-315.

Diagnostic characters : General appearance (Fig. 11) oblong-oval, moderately elongate and quite densely pubescent. *Head* brownish yellow with a basal transverse blackish marking, vertex finely punctate and eyes large. Antenna brownish, long and slender. *Prothorax* brownish yellow with black streak on anterior and posterior border, punctate and latero-basal plica inverted U shaped and not extended to elytra. *Elytra* brownish yellow with black markings as figured (Fig. 11) and covered with minute setiferous, somewhat dense puncturation. *Legs* with front and middle tarsi armed with spines and hairs and their 1st three segments dilated and 4th segment minute or obsolete, hind tarsi elongate, slender and with swimming hairs. *Ventral surface* blackish, punctate and pubescent.

Size : 2.3-2.5 mm in length.

Distribution : Bihar, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal.

Remarks : Among the four species of the genus *Guignotus* recorded here, this species is largest in size and most common but less so in sewage-fed water.

12. **Guignotus inconstants** (Regimbart)

1892. *Bidessus inconstans* Règimbart, *Ann. Soc. enn. Belg.*, 36 : 119.
1968. *Guignotus inconstans* Vazirani, *Orient. Ins.*, 2 (3-4) : 322-323

Diagnostic characters : General appearance (Fig. 12) oblong, oval, a little convex and pubescent. *Head* brownish yellow, puncturation fine and sparse and eyes large. Antenna brownish yellow, narrow and long. *Prothorax* brownish yellow with its anterior and prebasal portion darker, puncturation fine, latero-basal plica oblique and long. *Elytra* brownish yellow to grey, darker along suture and scutellar region, sometimes with small scattered pale yellowish spots, puncturation moderate, pubescence fine and sparse, discal plica short but sometimes long. *Legs* similar to *G. flammulatus*. *Ventral surface* dark, punctate and sparsely and finely pubescent.

Size : 1.80 mm in length.

Distribution : Bihar, Orissa, Rajasthan and present survey recorded it first time from West Bengal.

Remarks : The habitat of this species is similar to other species of *Guignotus* but unlike *G. flammulatus* they are small in size and rather scarce in wetlands of this area.

13. **Guignotus pendjabensis** Guignot

1954. *Guignotus pendjabensis* Guignot, *Opusc. ent.*, 19 : 221.
1968. *Guignotus pendjabensis*, Vazirani, *Orient. Ins.*, 2 (3-4) : 320-321.

Diagnostic characters : General appearance (Fig. 13) moderately elongate and oval. *Head* brownish yellow, puncturation very fine and sparse and eyes large. Antenna brownish yellow, elongate and slender. *Prothorax* brownish yellow with its anterior and prebasal portion darker and shape as figured (Fig. 13), puncturation moderate, latero-basal plica distinct, a little incurved and short. *Elytra* brownish yellow, punctate, finely pubescent and discal plica short, basal and stural margins dark brown and two longitudinal dark markings present on each elytron, which terminates apically, its shape as figured (Fig. 13). *Legs* with first three segments of front and middle tarsi dilated and 4th segment minute or obsolete, hind tarsi long and provided with swimming hairs. *Ventral surface* dark, punctate, finely and sparsely pubescent.

Size : 1.80 mm in length.

Distribution : Bihar, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, and present survey recorded it from West Bengal.

Remarks : These small *Guignotus* species are rather uncommon and a few specimens have been collected from fresh and brackish water and none has been found in sewage-fed water. They are recorded from pile of dead leaves and twigs mixed with algae.

14. **Guignotus** sp.

Diagnostic characters : General appearance (Fig. 14) oval, sub-depressed and finely pubescent. *Head* brownish yellow, puncturation fine and eyes large. Antenna brownish yellow, narrow and elongate. *Prothorax* brownish yellow, anterior border and prebasal portion darker and shape as figured (Fig. 14), puncturation fine, latero-basal plica slightly oblique and shape as figured (Fig. 14). *Elytra* brownish yellow with blackish markings, puncturation moderately dense and discal plica moderately long. *Legs* similar to *G. flammulatus*. *Ventral surface* brownish yellow with abdominal sternites slightly darker, punctate and pubescent.

These specimens are rather distinct and different from all other species described from India. They differ from *flammulatus*, *pradhani*, *orientalis*, *mysorensis* and *crassifrons* having the latero-basal plica on pronotum distinctly continued on elytra. Size 1.80 mm separate them from *angularis*, *pusillus* and *signatellus* and elytral marking is very distinct type as figured (Fig. 14) which separate them from *inconstans*, *pendjabensis* and *regimbarti*. No attempt has been made to establish them as a new species, which need further study of more specimens and detail study of male genital organ.

Size : 1.80 mm in length.

Remarks : The occurrence of this species is markedly few and recorded from freshwater and brackishwater along with other species of *Guignotus* and none has been recorded from sewage-fed water.

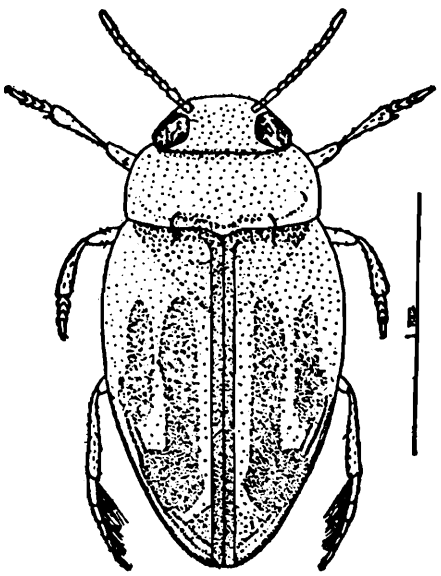


Fig. 13

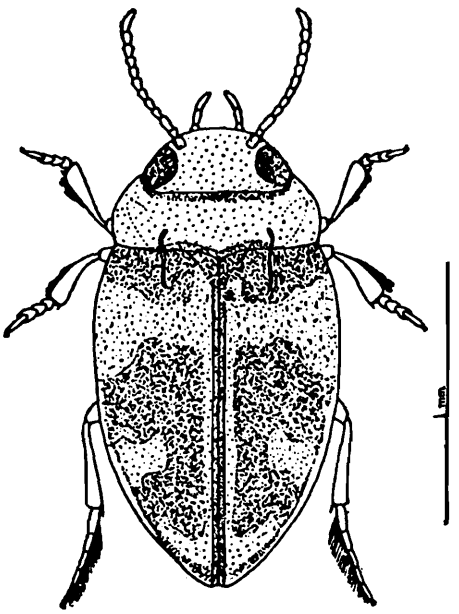


Fig. 14

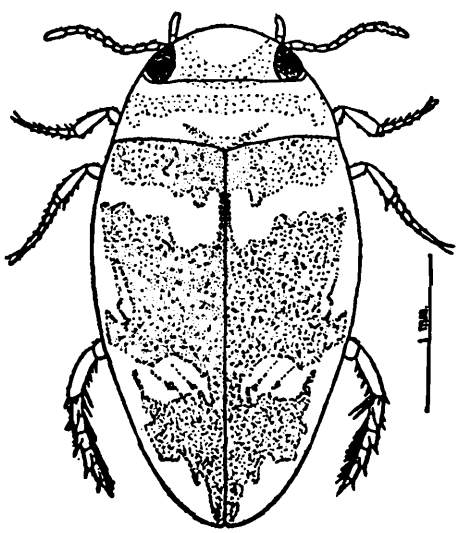


Fig. 15

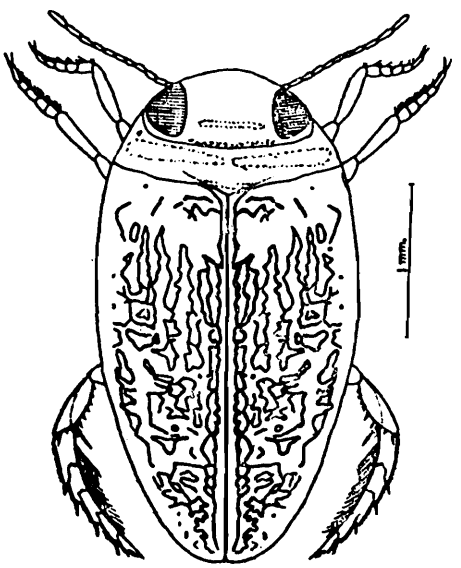


Fig. 16

Figs. 13-16 : *Guignotus pendjabensis* Guignot, dorsal view (13). *Gaignotus* sp. dorsal view (14). *Laccophilus anticatus* Sharp, dorsal view (15). *Laccophilus parvulus* Aubé, dorsal view (16).

15. **Laccophilus anticatus** Sharp

1890. *Laccophilus anticatus* Sharp, *Trans. ent. Soc. Lond.* p. 341.
1968. *Laccophilus*, Vazirani, *Orient. Ins.*, 2 (3-4) : 240-241.

Diagnostic characters : General appearance (Fig. 15) oval and subpressed. *Head* transverse, brownish yellow and often with faint brownish marking as figured (Fig. 15), puncturation not visible and eyes large. Antenna brownish yellow, narrow and long. *Prothorax* transverse and almost concolourous with head and a faint transverse margin often present as figured (Fig. 15), prebasal portion with transverse dark streak. *Elytra* brownish black with puncturation indistinct, yellow patches present on anterior half and a pair of small patches on posterior half, prominent punctures present on sutural margin along anterior one fourth of elytra. Legs in male with basal three segments of front and middle tarsi a little dilated and armed with 'sucker pallettes' underneath, hind tarsi with swimming hairs and a straight single claw. *Ventral surface* brownish yellow and abdominal sternites slightly darker.

Size : 3.0-3.20 mm in length.

Distribution : Assam, Bihar, Manipur, Orissa and West Bengal.

Remarks : These are another common species in all the three wetlands, slightly more abundant in freshwater and sewage-fed water. They usually live in the midst of aquatic weeds and often found crawling or running easily on the edge of wetland, on algal mat or on dry land. They are good swimmer, diver, climber and often seen jumping.

16. **Laccophilus parvulus** Aubé

1838. *Laccophilus parvulus* Aubé, *Dejean's spe'cies Coléopt`eres*, Paris, 6 : 429.
1968. *Laccophilus parvulus*, Vazirani, *Orient. Ins.*, 2 (3-4) : 247-249.

Diagnostic characters : General appearance (Fig. 16) elongate, oval and subdepressed. *Head* brownish yellow and puncturation indistinct and eyes large. Antenna brownish yellow, narrow and long. *Prothorax* transverse, brownish yellow and often with a narrow streak of black towards the middle of anterior and posterior margin, prebasal portion as figured (Fig. 16). *Elytra* brownish yellow to reddish brown with zigzag black lines as figured (Fig. 16), few hairs present on posterior lateral margin. *Legs* similar to *L. anticatus*. *Ventral surface* with metacoxal plate reddish brown to black, other parts paler, stirdulatory coxal file present.

Size : 3.50-3.70 mm in length.

Distribution : Andra Pradesh, Assam, Bihar, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu and West Bengal.

Remarks : This species is very similar to *L. anticatus* and live in the same habitat like *L. anticatus* but slightly larger in size and less common. They are

insignificantly scarce in sewage-fed water. Jhingran (1985) mentioned that this species heavily predates on fish spawn.

17. **Hydrocoptus subvittulus** Motschulsky

1860. *Hydrocoptus subvittulus* Motschulsky, *E'ltud Ent.*, 8 : 43.
1968. *Hydrocoptus subvittulus*, Vazirani, *Orient. Ins.*, 2 (3-4) : 223-224.

Diagnostic characters : General appearance (Fig. 17) oblong-oval and moderately convex. *Head* rusty red, exposed part of head somewhat transverse, puncturation obsolete and eyes large with fine rows of punctures on its inner side. Antenna pale yellow with the apices brownish. *Prothorax* concolourous with head, puncturation obsolete on disc, its front margin darker with two transverse rows of punctures, prebasal portion with some transverse blackish spots which are arranged as figured (Fig. 17). *Elytra* brownish with a reddish border on the lateral margin extending to the apex and with a median long reddish band, shape as figured (Fig. 17), puncturation small and arranged in distinct rows and interstitial punctures obsolete. *Legs* long, slender, rusty red and armed with spines, claws simple and equal. *Ventral surface* largely pale yellow.

Size : 1.8-2.1 mm in length.

Distribution : Assam, Bihar, Orissa and West Bengal.

Remarks : This species is very scarce in wetlands and only a few specimens have been collected from freshwater and brackishwater.

18. **Canthydrus laetabilis** (Walker)

1858. *Hydroporus laetabilis* Walker, *Ann. Mag. nat. Hist.*, (3) 2 : 205.
1882. *Canthydrus laetabilis*, Sharp, *Sci. Trans. R. Dublin Soc.*, 2 : 227.
1968. *Canthydrus laetabilis*, Vazirani, *Orient. Ins.*, 2 (3-4) : 229-231.

Diagnostic characters : General appearnce (Fig. 18) oblong-oval and moderately convex. *Head* brownish yellow and eyes large. Antenna brownish yellow, short and slender. *Prothorax* concolourous with head, its front margin darker and with dark punctures, prebasal portion with a median transverse dark streak and with a few dark punctures as figured (Fig. 18). *Elytra* streamlined, brownish black with two basal orange-yellow spots arranged transeversely and one transverse irregular spot situated post-medially. *Legs* with front tibiae short and its apical spur curved, first tarsal segment elongate and segment two to five narrowed gradually, hind tarsi with swimming hairs, claws simple. *Ventral surface* smooth, brownish yellow except last few abdominal segments which are darker.

Size : 2.25-2.70 mm in length.

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

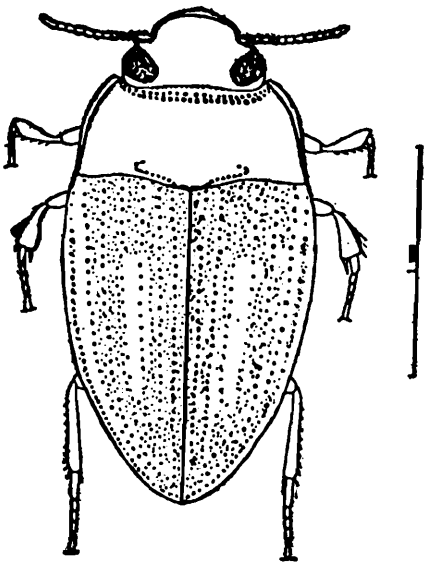


Fig. 17

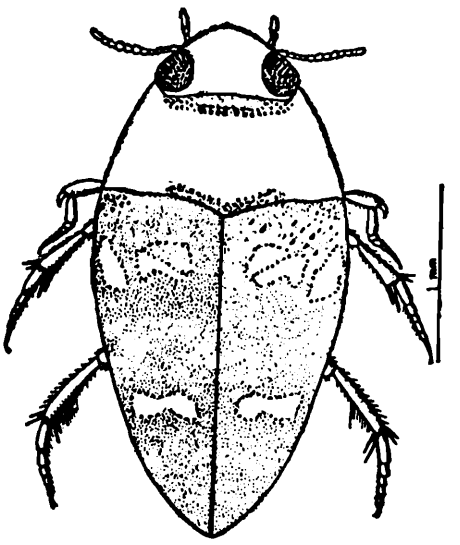


Fig. 18

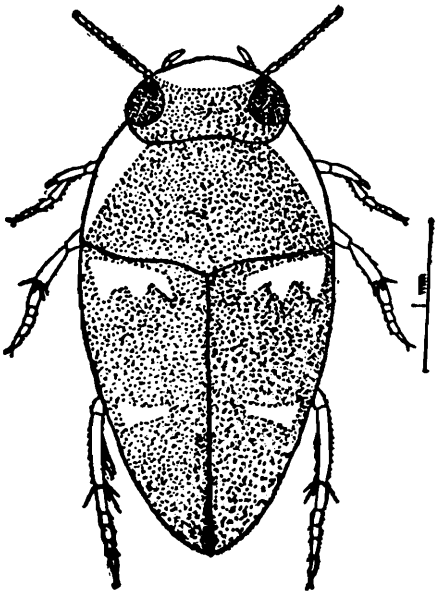


Fig. 19

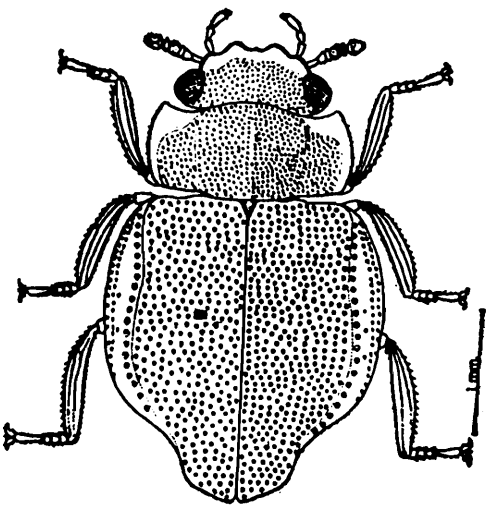


Fig. 20

Figs. 17-20 : *Hydrocoptus subvittulus* Motschulsky, dorsal view (17). *Canthydrus laetabilis* (Walker), dorsal view (18). *Canthydrus luctuosus* (Aubé) dorsal view (19). *Spercheus gibbus* champion, dorsal view (20).

Remarks : These are very common species occurring in all the three types of wetlands. They are abundant in freshwater and brackishwater, weeds, muddy water

on edge and found on algal mat. They are attracted to light during night. This species often predates on fish spawn and thus harmful to fish culture (Jhingran, 1985).

19. **Canthydrus luctuosus** (Aubé)

1838. *Hydrocanthus luctuosus* Aubé In *Dejean's spe'cies Cole'opt`eres*, 6 : 408.
1882. *Canthydrus luctuosus* Sharp, *Sci. Trans. R. Dublin Soc.*, 2 : 276.
1968. *Canthydrus luctuosvs*, Vazirani, *Orient. Ins.*, 2 (3-4) : 231-232.

Diagnostic characters : This species (Fig. 19) is closely allied to *C. laetabilis* but differs in having head brownish black with anterior portion yellowish, prothorax black merging into orange-yellow on sides, elytra black with the orange-yellow markings and ventral surface brown to black.

Size : 3.00-3.25 mm in length.

Distribution : Andhra Pradesh, Bihar, Karnataka, Kerala, Maharshtra, Orissa, Tamil Nadu and West Bengal.

Remarks : This species is very common and abundant in sewage-fed water and collected throughout the year in Bantala. They live in the similar habitat like *C. laetabilis* but unlike later they are less common in freshwater and brackishwater.

Family : Spercheidae

20. **Spercheus gibbus** Champion

1919. *Spercheus gibbus* Champion, *Ent. Mon. Mag.*, 55 : 238.
1928. *Spercheus gibbus*, d'Orchymont, *Catalogue of Indian Insects, Palpicornia*, pt. 14 : 30.

Diagnostic characters : General appearance (Fig. 20) dark brown, very convex dorsally, broad, tuberculate and densely punctured. *Head* transverse and eyes large and protruberent. Antenna with not more than three segments before cupula, 2nd segment and cupula pubescent, the latter appearing as part of the club. *Prothorax* strongly transverse, its lateral margin crenulated and with prominent stiff hairs. *Scutellum* small triangular and punctate. *Elytra* broad and abruptly narrowed posteriorly, shape as figured (Fig. 20), puncturation larger than on head and pronotum. *Legs* with tibiae flattened and armed with spines, tarsi fringed with hairs and with large pleurisetose empodium between the claws. *Ventral surface* dark brown.

Size : 4 mm in length.

Distribution : Bihar and West Bengal.

Remarks : This species is very scarce in wetlands and only two specimens have been collected from brackishwater. Both the adults and larvae of *Spercheus* are reported as normally living in an inverted position walking on the underside of the water surface film (Crowson, 1955). The peculiar empodia may likewise be adapted for walking on the surface film.

Family : Hydrophilidae

21. **Enochrus escuriens** (Walker)

1958. *Philhydrus escuriens* Walker, *Ann. Mag. nat. Hist.*, (3) 2 : 209.
1890. *Ohiydrus escuriens*, Sharp, *Trans. ent. Soc. Lond.*, p. 350,
1928. *Enochrus escuriens*, d'Orchymont, *Catalogue of Indian Insects, Palpicornia*, pt. 14 : 112.

Diagnostic characters : General appearance (Fig. 21) oval, slightly more broadly and widely rounded behind and reddish brown. *Head* black with yellow somewhat triangular spot in front of eyes. Eyes normal. Antenna yellowish, 9-segmented, clubs darker and densely pubescent. *Prothorax* reddish brown, rather densely and finely punctate. *Scutellum* triangular. *Elytra* concolorous with prothorax, interstitial punctures smaller than serial punctures. *Legs* simple, provided with hairs and spines, 1st segment of tarsi short and last segment longest and claws simple. *Ventral surface* black.

Size : 2.5 mm in length.

Distribution : Early records mentioned its distribution in 'India' only. In the present study it has been recorded from South 24 Parganas, West Bengal.

Remarks : This species is known to occur in littoral water. In the present survey these beetles have been collected from weedy shallow areas of water, damp places and muddy edges of water. They abundantly occur in brackishwater but less so in freshwater and sewage-fed water.

22. **Helochares anchoralis** Sharp

Helochares (*Hpdrobaticus*) *anchoralis* Sharp, *Trans. ent. Soc. Lond.* p. 352.
1928. *Helochares anchoralis*, d'Orchymont, *Catalogue of Indian Insects, Palpicornia*, pt. 14 : 105.

Diagnostic characters : General appearance (Fig. 22) elongate, moderately depressed and dark brown with blackish patches. *Head* small, densely punctate, dark posteriorly and with Y shaped frontal suture, maxillary palpi pale yellow and eyes normal. *Antenna* 9-segmented, last segment elongate and densely pubescent. *Prothorax* transverse and densely punctate. *Scutellnm* small. *Elytra* densely and evenly punctate, finely striate, the striae nearly obliterated at the base, deeper at the extremity. *Legs* simple with distinct claws and spines, 1st segment of the hind tarsi very short and the 2nd segment longer and claws with a basal swelling and a characteristic empodium. *Ventral surface* dark brown, punctate and finely pubescent.

Size : 6 mm in length.

Distribution : Early records mentioned its distribution in 'India' only. In the present study it has been recorded that they abundantly occur in South 24 Pgs., West Bengal.

Remarks : These beetles are found in weedy shallow and in marshy places and

also occur in the mud just above the water edge. The female of this species is easily recognized by the egg mass which is enclosed in a nearly transparent bag shaped case

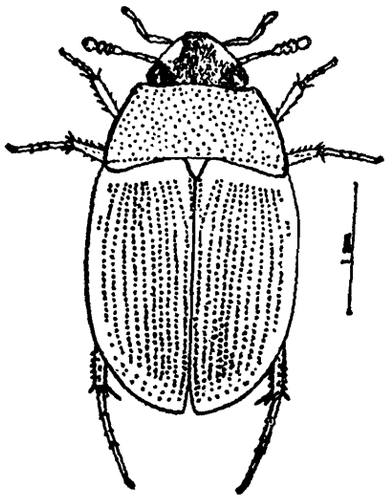


Fig. 21

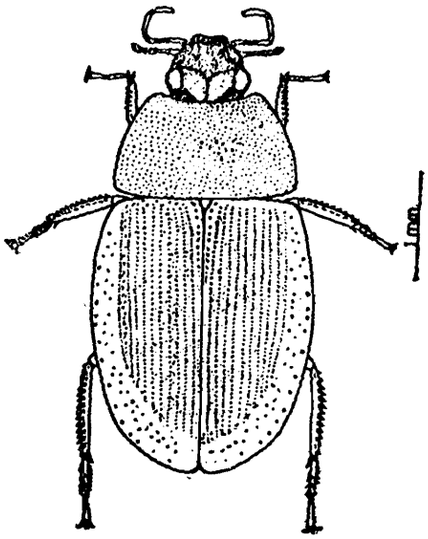


Fig. 22

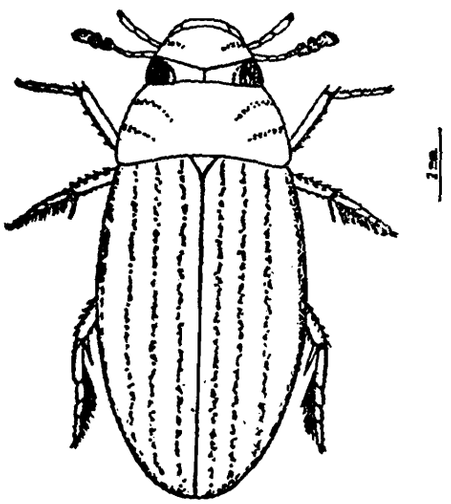


Fig. 23

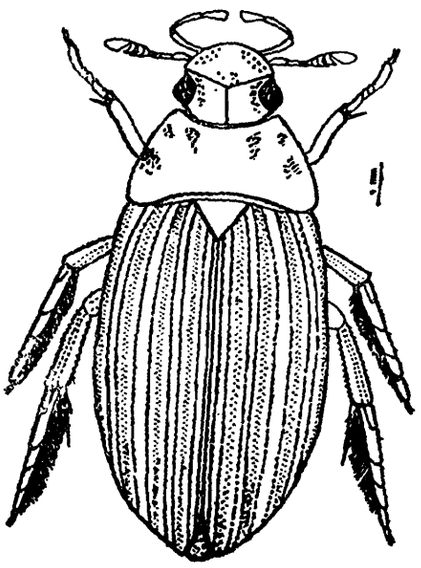


Fig. 24

Figs. 21-24 : *Enochrus escuriens* (Walker), dorsal view (57). *Helochares anchoralis* Shap, dorsal view (22). *Sternolophus rufipes* Fabricius, dorsal view (23). *Hydrophilus* sp. dorsal view (24).

beneath abdomen. These are quite common in brackishwater and less so in sewage-fed water.

23. **Sternolophus rufipes** Fabricius

1792. *Sternolophus rufipes* Fabricius, *Entom. Syst.*, **1** : 183.

1928. *Sternolophus rufipes*, d'Orchymont, *Catalogue of Indian Insects, Palpicornia*, pt. 14 : 121.

Diagnostic characters : General appearance (Fig. 23) broadly elongate, slightly convex, shinny black and very finely punctate. *Head* small, with Y shaped frontal suture, fine setiferous punctures present in interocular area in a depression and on both sides of clypeus, maxillary palpi reddish brown with its apical portion black. Antenna 9-segmented (6+3) and pale yellow, palp normal, brownish black and pubescent. *Prothorax* transverse and with 2 rows of setiferous punctures on lateral side of pronotum. *Scutellum* triangular. *Elytra* with rows of setiferous punctures. *Legs* clothed at base with silky and dense pubescence, first segment of tarsi short, middle and hind tarsi compressed and oarlike. *Ventral surface* black and pubescent, prostital carina ridge like with an anterior brush of long setae.

Size : 13 mm in length.

Distribution : Bihar, Kashmir, Maharashtra, Punjab, South India and West Bengal.

Remarks : These moderate sized black beetles are found in the area of vascular hydrophytes and grass growing regions of wetland. Their population is fairly common in brackishwater and less so in freshwater and less so in freshwater wetland.

24. **Hydrophilus** sp.

Diagnostic characters : General appearance (Fig. 24) elongate, blackish brown and shinny. *Head* small with Y shaped frontal suture, punctures are rather restricted on inner side of eyes and anterior side of head and eyes normal. Antenna brownish and 9-segmented, club perfoliate and asymmetrical. *Prothorax* transverse, narrowed in front and setiferous punctures rather scattered and restricted in patches on front and near lateral side of pronotum. *Scutellum* large and triangular. *Elytra* with rows of punctures alternately two rows of non-setiferous and one row of setiferous punctures. Middle and hind *legs* similar and provided with spines and long, stiff swimming hairs whereas front leg without any hair, claws unequal and dentate at base. *Ventral surface* blackish. This species is near to *H. rufocinctus* and have similar type of elytral puncturation but differ from the latter by its pronotal and elytral margin being blackish brown whereas in *H. rufocinctus* it is yellowish red.

Size : 35 mm in length.

Remarks : This species is markedly large, and probably the largest beetle so far collected from the wetlands of Calcutta region. They can swim, dive and climb. They usually remain submerged in relatively deep water. Their long antenna with

characteristic club help them to reach the fresh air. They are not very common in wetlands of Calcutta region and only a few specimens have been collected from brackishwater.

25. **Amphiops mirabilis** Sharp

1890. *Amphiops mirabili* Sharp, *Trans. ent. Soc. Lond.*, p. 355.
1928. *Amphiops mirabilif*, d'Orchymont, *Catalogue of Indian Insects, Palpicornia*, pt. 14 : 131.

Diagnostic characters : General appearance (Fig. 25) strongly convex, roundish, brown to blackish brown and puncturation large and dense. *Head* transverse (exposed part), puncturation mixed with large and small punctures, eyes divided by a conspicuous and complete canthus reaching the vertex. Antenna 8-segmented (5+3), last three segments pubescent, second segment of maxillary palpi markedly thickened. *Prothorax* transverse, puncturation on vertex of pronotum moderately dense mixed with small and large punctures, lateral sides comparatively more densely so. *Scutellum* long, triangular and punctate. *Elytra* with irregular rows of punctures, puncturation on interstices mixed with small and large punctures, that of near suture rather indistinct. *Legs* simple, armed with spines, posterior leg without swimming hairs, 1st tarsal segment short. *Ventral surface* blackish brown.

Size : 3.5 mm in length.

Distribution : Assam and West Bengal.

Remarks : This species is truely aquatic with the body which has rolling up power. They can be collected from the water with emergent vegetation. They are also found walking on algal mat during January to March when algae grows on water. They are rather common in all the three types of water.

26. **Amphiops pedestris** Sharp

1890. *Amphiops pedestris* Sharp, *Trans. ent. Soc. Lond.*, p. 354.
1928. *Amphiops pedestris*, d'Orchymont, *Catalogue of Indian Insects, Palpicornia*, pt. 14 : 131.

Diagnostic characters : General appearance (Fig. 26) strongly convex, somewhat rounded and punctate. *Head* reddish brown, transverse, puncturation moderately dense mixed with small and a few large punctures and eyes divided by a conspicuous and complete canthus reaching the vertex. *Prothorax* reddish brown with lateral margins rather short and rounded, puncturation moderately dense and with a few large, irregular, sparsely distributed punctures. *Scutellum* long, triangular and punctate. *Elytra* yellowish brown, shinning, with rows of punctures, interstices mixed with small and large punctures in addition to these rows of dark patches present on elytra

provided with a large, central, setiferous puncture. *Legs* similar to *A. mirabilis*. *Ventral surface* reddish brown.

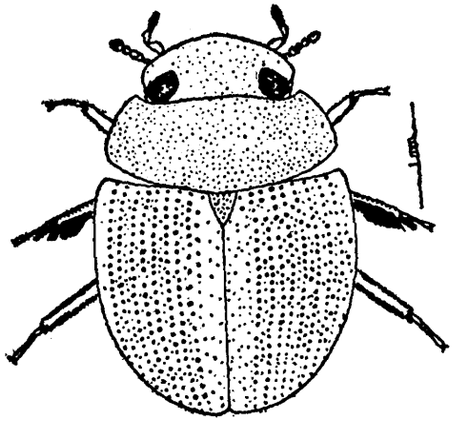


Fig. 25

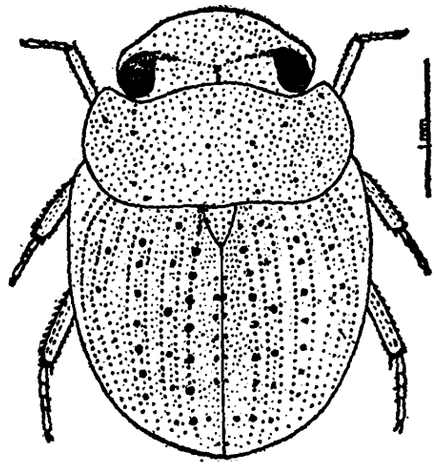


Fig. 26

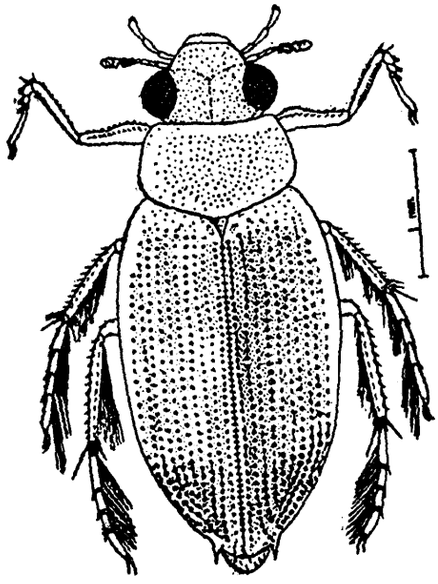


Fig. 27

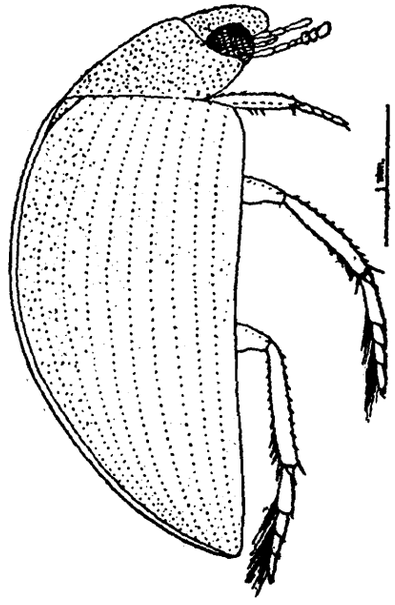


Fig. 28

Figs. 25-28 : *Amphiops mirabilis* Sharp, dorsal view (25). *Amphiops pedestris* Sharp, dorsal view (26). *Berosus indicus* Motschulsky, dorsal view (27). *Regimbartia attenuata* (Fabricius), lateral view (28).

Size : 3 mm in length.

Distribution : Bihar, Pondicherry, Tamil Nadu and West Bengal.

Remarks : The habitat is similar to that of *Amphiops mirabilis* but unlike *A. mirabilis* they are smaller in size and rather scarce in wetlands and represented only in freshwater and brackishwater.

27. **Berosus indicus** Motschulsky

1861. *Berosus indicus* Motschulsky, *Bull. Soc. Nat. Mosc.*, 34 (1) : 110.

1928. *Berosus indicus*, d'Orchymont, *Catalogue of Indian Insects, Palpicornia*, pt. 14 : 138.

Diagnostic characters : General appearance (Fig. 27) elongate, brown to yellowish and punctate. *Head* brownish with anterior portion yellowish, markedly deflexed often with a transverse groove, puncturation dense, larger on vertex and eyes prominent and protruberent. Antenna 7-segmented (4+3) and yellowish. *Prothorax* brownish yellow, not continuous with elytra in outline and with large, dense and prominent punctures specially on disc of pronotum. *Scutellum* a long triangle and punctate. *Elytra* usually highly patterned, brownish yellow, narrowed posteriorly and with ten rows of large and dark punctures with prominent intermediate punctures as figured (Fig. 27), epipleural angle extended into a strong spine. *Legs* with middle and hind tibiae fringed on inner side with long swimming hairs. *Ventral surface* dark brown and punctate.

Size : 2-6.0 mm in length and usually more than 3 mm.

Distribution : Assam, Bihar, Maharashtra and West Bengal.

Remarks : These littoral species are very strong swimmer with their long hairs on leg and able to rise forcefully enough to obtain air. They are also climber and diver in habit and able to dive from surface. They are fairly common in brackishwater and less so in the other two types of water.

28. **Regimbartia attenuata** (Fabricius)

1801. *Hydrophilus attenuata* Fabricius, *Syst. Eleut.*, 1 : 253.

1928. *Régimbartia attenuata*, d'Orchymont, *Catalogue of Indian Insects, Palpicornia*, pt. 14 : 138-139.

Diagnostic characters : General appearance (Fig. 28) strongly convev, elongate, compressed on sides, uniform deep and shinning black and punctate. *Head* small, rounded anteriorly and puncturation dense and distinct and eyes large, convey and prominent. Antenna 8-segmented (5+3). *Prothorax* narrowly applied within the emergination of anterior side of elytra and puncturation on pronotum dense. *Scutellum* elongate and triangled. *Elytra* strongly narrowed posteriorly, striate, punctate and pubescent, intermediate punctures slightly smaller than on rows. *Legs* simple with spines and swimming hairs, middle and hind tibiae with long swimming hairs on inner side, 1st tarsal segment short. *Ventral surface* black and pubescent.

Size : 5 mm in length.

Distribution : Bihar, Maharashtra and West Bengal.

Remarks : These are scarcely found on the banks of wetland among the growing mass of aquatic plants. This is represented only in brackishwater wetland.

Relative abundance of wetland-Coleoptera in three ecologically different wetlands.

	Species	Freshwater (Barrackpore)	Sewage-fed water (Bantala)	Brackishwater (Khariberia)
1.	*Haliplus angustifrons*	+	−	−
2.	*Dineutus unidentatus*	+	−	+
3,	*Orectochilus productus*	+	−	−
4.	*Cybister tripunctatus*	+	−	−
5.	*Hydaticas ricinus*	+	−	+
6.	*Hyphydrus renardi*	−	−	+
7.	*Hydrovatus bonvouloiri*	++	+	−
8.	*Hydrovatus confertus*	++	++	++
9.	*Clypeodytes orissaensis*	+	−	+
10.	*Uvarus quadrilineatus*	+	−	−
11.	*Guignotus flammulatus*	++	+	++
12.	*Guignotus inconstans*	+	+	−
13.	*Guignotus pendjabensis*	+	−	+
14.	*Guignotus* sp	+	−	+
15.	*Laccophilus anticatus*	+++	+++	++
16.	*Laccophilus parvulus*	++	+	++
17.	*Hydrocoptus subvittulus*	+	−	+
18.	*Canthydrus laetabilis*	+++	++	+++
19.	*Canthydrus luctuosus*	++	++++	++
20.	*Spercheus gibbus*	−	−	+
21.	*Enochrus escuriens*	+	+	+++
22.	*Helochares anchoralis*	−	+	++
23.	*Sternolophus rufipes*	+	−	++
24.	*Hydrophilus* sp.	−	−	+
25.	*Amphiops mirabilis*	++	++	++
26.	*Amphiops pedestris*	+	−	+
27.	*Berosus indicus*	+	+	++
28.	*Regimbartia attenuata*	−	−	+

++++ Profusely abundant
+++ Abundant
++ Common
+ Rare
− Nil

Discussion

The result obtained from the present survey of wetlands in and around Calcutta shows that there is a more or less distinct difference in beetle fauna both qualitatively and quantitatively in three different types of wetlands. Camparatively less manipulated wetland of Bartibill represents 23 species belonging to the 4 families. Out of 16 species of Dytiscidae 15 species except *Hyphydrus renardi* and 2 species of Gyrinidae are recorded here. The single species of Haliplidae *Haliplus angustifrons* has only been collected from the freshwater of Bartibill. Only 5 species of Hydrophilidae are recorded here which are poorly represented than brackishwater. The species *Laccophilus anticatus* and *Canthydrns laetabilis* are comparatively more abundant. Unlike sewage-fed wetland no species is markedly and profusely abundant. The species *Cybister tripuncatus, uvarus quadrilineatus, Haliplus angustifrons, Dineutus unidentatus* etc. are rather scarce in freshwater which are not recorded from other wetlands. The sewage-fed wetland of Bantala is highly manipulated for fish culture. It is treated with sewage and rich with organic nutrients and the aquatic weeds are regularly removed. It has been observed that the coleopteran fauna of sewage-fed wetland is very rich quantitatively but less so qualitatively. Unlike freshwater wetland only 12 species have been recorded of which the species *Canthydrus laetabilis* is markedly and profusely abundant than *Laccophilus anticatus* which is comparatively less. No Gyrinidae is collected from the sewage-fed wetland. The total number of species of sewage-fed wetland is significantly fewer than other two. The brackishwater wetland is a low saline wetland which becomes almost freshwater during monson being rainfed. The aquatic and semiaquatic vegetation is fewer than freshwater. This wetland represents 22 species of aquatic Coleoptera. As the Hydrophilidae has more affinity and attraction to saline water all the hydrophilid species so far recorded from Calcutta and its surroundings are well represented in this low saline wetland. The single species of Spercheidae, *Spercheus gibbus* is only represented by this brackishwater wetland.

It can be concluded that very few wetlands exist in natural and undisturbed condition in and around Calcutta. Most of the wetlands are converted into managed fishing impoundments. The freshwater of Bartibill appears to provide the most natural condition than the other two and is most productive and the fauna is rich and diverse. The sewage-fed and brackiswater wetlands are highly managed and the fauna in the former one is quantitatively rich and less diverse and in the latter one somewhat differnt due to salinity.

Summary

This is the first attempt to study on wetland-beetles of Calcutta and its surroundings for which extensive survey has been conducted during 1986-88 in three

ecologically different wetlands, freshwater wetland of 'Bartibill' near Barrackpur, sewage-fed wetland of Bantala of eastern Calcutta and brackishwater wetland of Khariberia of north east Calcutta. This paper deals with 28 species of Coleoptera belonging to the families, Haliplidae, Gyrinidae, Dytiscidae, Spercheidae and Hydrophilidae with 28 illustrations. A key of 28 species under 21 genera of 5 families has been provided. Important bioecological observations have been made on habit, habitats, adaptations etc. and a comparative chart of relative abundance of beetles in three ecologically different wetlands has been given.

Acknowledgements

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References

Arnett, R. H. 1973. *The Beetles of the United States (A Manual for identification), 4th edn.* The American Entomological Institute, Ann. Arbor, Michigun, U.S.A.

Blunck, H. 1912. Morphology and physiology of tarsus, ♂ *Dytiscus. Zs. wiss, Zool.*, **100** : 459-492.

Crowson, R. A. 1955, *The Natural Classification of the families of Coleoptera,* Nathaniel Lioyd & Co. Ltd. London, 187 pp.

d'Orchyment, A. 1925. Hydrophilidae of India (Col.). A list of the species in the collection of the Agriculture Research Institute at Pusa (Bihar). *Mem. Dept. Agr. India.* **8** : 1-12.

d'Orchymont, A., 1928. *Catalogue of Indian Insects, Part 14 : Palpicornia,* Govt. of India, Central Publication Branch, Calcutta, 146 pp.

Hickman, J. R. 1931. Contribution to the biology of the Haliplidae (Coleoptera). *Ann. ent. Soc. Am.*, **24** : 129-142.

Jhingran, V. G. 1985. In *Fish and Fisheries of India,* Hindustan Publishing Corporation (India), pp. 480-483, 501, 503-505, 508-511.

Leech, H. B. and Chandler, H. P. 1968. Aquatic Coleoptera. pp. 293-371. In R. L. Usinger (ed.) *Aquatic insects of California.* Univ. Calif. Press, Berkeley. 508 pp.

Ochs, G. 1930. *Catalogue of Indian Insects, Part 19 : Gyrinoidea,* Govt. of India, Central Publication Branch, Calcutta, 146 pp.

Regimbart, D. M. 1903. Contribution a la fauna indo-chinoise, Hydrophilidae, ***Ann. Soc. ent. Fr.***, **72** : 52-64.

Roy, S. P. 1982. Seasonal variations and species diversity of aquatic Coleoptera in a freshwater pond at Bhagalpur, India. *Orient. Ins.*, **16** (1) : 55-62.

Sharp, D. 1890. On some aquatic Coleoptera from Ceylon. *Trans. ent. Soc. Lond.*, p. 339-359.

Tonapi, G. T. and Ozarkar, V. A. 1969. A study on the aquatic Coleoptera of Poona (Maharashtra). *J. Bom. nat. Hist. Soc.*, **66** (3) : 533-538.

Vazirani, T. G. 1968. Contributions to the study of aquatic beetles. *Orient. Ins.*, **2** (2-4) : 221-341.

Vazirani, T. G. 1970. Contributions to the study of aquatic beetles (Coleoptera). A review of Hydroporinae : Dytiscidae (in part), from India, *Orient. Ins.*, **4**(1) : 93-129.

Vazirani, T. G. 1984. *The Fauna of India. Coleoptera, Family Gyrinidae and Haliplidae*, Zoological Survey of India, Calcutta, 108 pp.

White, D. S., Brigham, W. U. and Doyen, J. T. 1984. Aquatic Coleoptera. pp. 361-437. In R. W. Merrit and K. W. Cummins (ed.). *An introduction to the aquatic insects of North America.* Kendll/Hunt Publishing Co. Dubuque, Iowa. 722 pp.

Zimmerman, J. R. 1960. Seasonal population changes and habitat preferences in the genus *Laccophilus* (Coleoptera, Dytiscidae). *Ecology*, **41** (1) : 141-152.