
ORIGINAL ARTICLE

A Comparative Study of genital organs in sub-Fam- Hydrophilinae (Fam. Hydrophilidae: Coleop.) from Northern India

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ABSTRACT

Structure of genitalia constitute an important taxonomic feature among sub fam. Hydrophilinae. Female genitalia are more or less alike whereas male genitalia exhibit variations and have been described in five different species collected from three different regions of Northern India.

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INTRODUCTION

The family hydrophilidae which include water scavengers beetles is of great economic importance as vegetable scavengers. They exhibit extremely varying structures and habits. Their larvae have parasitic habits with peculiar and complicated life history. The characteristics of the adult principally the shape of claws, the structure of head, legs, antennae and their genitalia are striking features. The members of this family are widely distributed in oriental, palearctic and Nearctic regions.

This family comprises about 2000 species, which are numerous in the tropics. The adults are found on bank of rivers, ponds, lakes and streams. The adults are polyphagous in habits feeding on the decomposing matter, green vegetables, plants and are sometimes serious agricultural pests. A few species are known to be predaceous on insects water snails and probably on other aquatic animals. The land farms are mostly small and live along water, in damp, marshy places, under wet bark of trees and under plants debris, many in rotting cacti, dung and among fungi. The adult beetles exhibit remarkable variation in the structure of their genitalia.

The male genitalia are trilobed, penis and parameres are well developed, pars basalis small to large. Aedeagus is generally simple and primitive. It never the less provides several important distinguishing characters on the median lobe and on the parameres. These are sclerotized structures in the internal sac except for a fringe of hairs like spines at the distal opening.

Female genitalia have the proctiger, paraproct, valvifer, coxite and stylus. The 10th stannite is present. No attempt has ever been made to use the female genitalia as diagnostic character. They seem to look very much alike in all species. There are apparently no secondary sexual character present. The sex of the specimen, unless the genitalia protruded from the abdomen can be determined only by dissection.

MATERIAL AND METHODS

1-HABIT AND HABITAT:

The hydrophilidae is one of the most common components of all ponds, lakes and under the stones, where the green vegetable decomposing matter is available. They occur in great numbers in the paddy

crops and at the bank of river. But few species are also attracted towards the mercury tube light, petromax. The land forms are mostly small and live along water ways in damp marshy places under the wet bark of tree, and under plant debris, many littoral others in rotting cacti, dung and among fungi.

2-COLLECTED MATERIAL:

The present investigations are based on the material collected largely by the author, from various parts of the Uttar Pradesh, especially from kumaon, garhwal and Agra region. During the present work, the different types of species of the family hydrophilidae collected from various districts of U.P.

3-PROCESS OF COLLECTION:

Hydrophilidae beetles were collected by following process:

(a) By hand:

The hydrophilidae beetles were collected by hand in the day time or night time. In the day time early in the morning at the bank of rivers, lakes, and ponds, under the stones, dung, among fungi. In the night on the mercury tube lights and petromax.

(b)By nets:

The hydrophilidae beetles collected with the help of net, in the ponds, lakes, rivers and streams many species of beetles were collected using net.

(c)By the mercury tube light and petromax:

The hydrophilidae beetles collected with the help of mercury tube lights and petromax at the bank of ponds, lakes, streams and paddy fields. This process used in the night time, aquatic beetles were observed swarming and dancing on the petromax and mercury tube light. Many species of beetles were collected using mercury tube light and petromax.

METHODS OF PRESERVATION:

The material was collected largely by author. They were immediately kept in paradichloro benzene, sprite and 10% alcohol. All the chemical substances which are found to be a very good preservatives. After determinating the hydrophilid beetles were pinned and labelled as usually kept in the entomological boxes.

MOUNTING TECHNIQUE:

The insects were dissected are arranged on micro- slide under the binocular microscope in the laboratory. The slide preparation were prepared by standard mounting technique using Canada balsome as mountate. The following procedure was adopted for slide preparation.

1. Place 90% alcohol in a cavity block and transfer to it, the specimen to be mounted.
2. For males, separate the abdomen just a head of the genital segments.
3. Transfer the genitalia in to the 10% KOH solution is another cavity block and keep it for 6-8 hours or more till it becomes transparent.
4. Transfer the sist of the body to absolute alcohol from 90%. Alcohol and keep for 20 minutes, then to mixture of 1:1 absolute alcohol and xylene for 5 minutes.
5. Transfer it to xylene and keep for 10 minutes.
6. Place a drop of Canada balsam on a microscopic slide and transfer It to the specimen from the xylene.
7. Cut of wings and one of each pair of legs and arrange on the slide, cut of head with the help of dissecting needles and orient the face upwards, remove the antennal flagellum and arrange study.
8. Cut of the genitalia by the help of dissecting needles and arrange the study using 5% acetic acid. Wash it with distilled water and dehydrate it through 50%, 70% and 90% alcohol.
9. Stain with 1% acid fuschin and finally xylene stain with 1% acid fuschin, orient its dorsal side upwards on the some microscopic slide.
10. Finally place a cover glass on the slide, circular cover glasses of 18 mm dia meter most satisfactory.

METHODS OF MEASUREMENTS:

Measurements for various rations and length were taken with a calibrated ocular, micrometer or with the help of shide micrometer in a low power of microscope and binocular when available at last three specimen of each species were measured and the mean value calculated. A number in parentheses following the measurements given in this thesis denotes the number of specimens measured (n). The measurements used in this thesis are as follows:

1. Body length:

Male:

The length from the interior tip of the thorax to posterior tip of the gonoxite.

Female:

The length from the interior tip of the thorax to the posterior and of the last abdominal segment.

2. Elytra length:

For greater accuracy the elytra length has been taken, the distance from the arculus to the tip in lieu of the true base to tip.

3. Antennal ratio (A.R.):

The ratio of the last segment of the male antennal flagellum to the combined length of the rest of the flagellum segments.

4. Leg ratio (L.R.):

The ratio of the metatarsus (basitarsus) to the tibia. Unless otherwise stated this ratio applies to the fore legs only.

All the drawing were sketched with the help of camera Lucida and other suitable apparatus. The drawing of genitalia of each genus with very few exception are drawn, the same magnification in order to give an idea of relative size. The various scales used in making the drawings are given.

The types are being retained for the time being in the department of entomology, Agra College, Agra and in due course will be deposited in the national collection of hydrophilidae Agra College Agra and national pusa collection, New Delhi.

RESULT AND DISCUSSION

***Sternolophus rufipus* (Fabricus, 1762; 1801)**

Sternolophus rufipus. Fab, (1762). Entom. Syst. I: 183

Sternolophus rufipus. Fab, (1801). Syst. Eleuth. I: 251

Diagnostic characters:

Broadly, elongate, slightly, convex, shiny, black and very finely punctate. Head- small, with Y-shaped frontal suture, fine setiferous punctures present in inter ocular area in a depression and on both sides of clypeus, maxillary palpi reddish brown with its apical portion black, antennae 9 segmented (6+3) and pale yellow, palps 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 longer than 4th, 2nd and 3rd are equal and oar like. Ventral surface- black and pubescent, prostital carina ridge like with an anterior brush of long setae. Sternal spine long extending beyond the hind coxae. (Fig. 1)

Size:

13mm. in length

Genitalia:

Phallobase short, broadly, conical and narrowed at base, parameres long, slender apices rounded; aedeagus elongated and twisted. (Fig-1)

Distribution:

Etah, kasganj, Mathura, Aligarh, kethamjheel (Agra region) U.P.

Material examined holotype:

22 male, etah, kasganj, Mathura, Aligarh, kethamjheel (Agra region) U.P. 7. Vii. 1990, coll. Saroj. S.k.

***Sternolophus brachycanthus* (Regimbert, 1902; 1909)**

Sternolophus brachycanthus. Regimbert, (1902). Ann. Soc. ENT. Fr. 71: 472.

Sternolophus brachycanthus. Regimbert, (1909). Zaitzev. Burma. P. 229.

Diagnostic characters:

Oval somewhat convex, shining dark slightly metallic, legs brownish. Head- small with y- shaped fronted suture, fine setiferous punctures present in intraocular area in a depression and on both side of clypeus, maxillary palpi reddish brown with its apical portion black, antennae 9 segmented (6+3) hairy and reddish, palps normal, brownish, black and pubescent. Prothorax- transverse and with 2 rows of setiferous punchers on lateral side of pronotum. Scutellum- triangular. Elytra- with rows of setiferous strong punchers. Legs- clothed at base with silky and dense pubescence, first segment of tarsi short, 4th equal to 2nd and orelike, ventral surface- black and pubescent, protital carina cut at the right angle at the rear and anterior bursh of long setae. Sternal spine short not extending beyond hind coxae. (Fig-2).

Size:

8mm. in length

Genitalia:

Genitalia similar to *stenolophusrufipus* except, that the parameres abruptly rounded at their apices. (fig-2).

Distribution:

Kasganj, Etah, kethamjheel (Agra region) u.p.

Material required:

3 male, kasganj, Etah, kethamjheel (Agra region) U.P. 9. Viii. 1990. Coll. Saroj, S.K.

***Hydrophilus indicus* (Bedal, 1892; 1901)**

Hydrophilus indicus. Bedel, (1892). Rev. caem. 10: 310,316.

Hydrophilus indicus. Regimbart, (1901). Ann. Soc. Ent. Fr. 70: 194, 205.

Diagnostic characters:

Elongate, blackish brown and shiny. Head- small, y- shaped frontal suture, punctures are rather restricted on inner sides of eyes and anterior side of head and eyes normal. Antennae 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 lateral sides of pronotum. Scutellum- large and triangular. Elytra- with one row setiferous punctures. Middle and hind legs- similar and provided with spines and long, still swimming hairs, whereas front legs without any hairs, claws unequal and dentate at base ventral surface- blackish. (fig-3)

Size:

30 mm. in length.

Genitalia:

Phallobase conical, broad, base tapering abruptly, Parameres stout abruptly narrowed towards the bluntly rounded apices, aedeagus long, almost conical, apical third very narrow without any apical process. (Fig-3)

Distribution:

Agra, Etah, Mathura, kethamjheel (U.P.)

Material examined:

18 male, Agra, Etah, kethamjheel, Mathura (U.P.) 3. VII. 1990. COLL. Saroj. S.k.

***Hydrophilus olivaceus* (Fabricus, 1781; 1801)**

Hydrophilus olivaceus Fabricus, (1781). Spac. Ins. I: 289.

Hydrophilus olivaceus. Fabricus, (1801). Syst. Eleuth. I: 250.

Diagnostic characters:

Elongated, oval, broad, brownish, black smooth and shiny head- triangular without hairs, with prominent rounded brownish eyes. Antennae well developed, 9 segmented, hairy with narrow base broad apex. The base 5 segmented, the first two segments equal, very long, while the last 3 segments small. Prothorax – broad, smooth not continuous with elytra. Scutellum- triangular elytra- dark black, smooth with two long prominent long bristles. The last tarsal segment serrated. Ventral surface- black. (Fig- 4)

Size:

28 mm. in length

Genitalia:

The phallobase very elongate, narrow distally and broad, proximally, Parameres are very long, slender, and broad at the base narrower at the apices which are rounded. The aedeagus short nearly half the length of the Parameres, flask shaped with rounded apex and oval base there are two prominent hook-like structure present between the Parameres and phallobase. (Fig-4)

Distribution:

Etah, kasganj, Aligarh, (Agra region), U.P.

Material examined:

12 male, etah, Aligarh, kasganj, (U.P.) 3. Vii. 1990. COLL. Saroj, S.K.

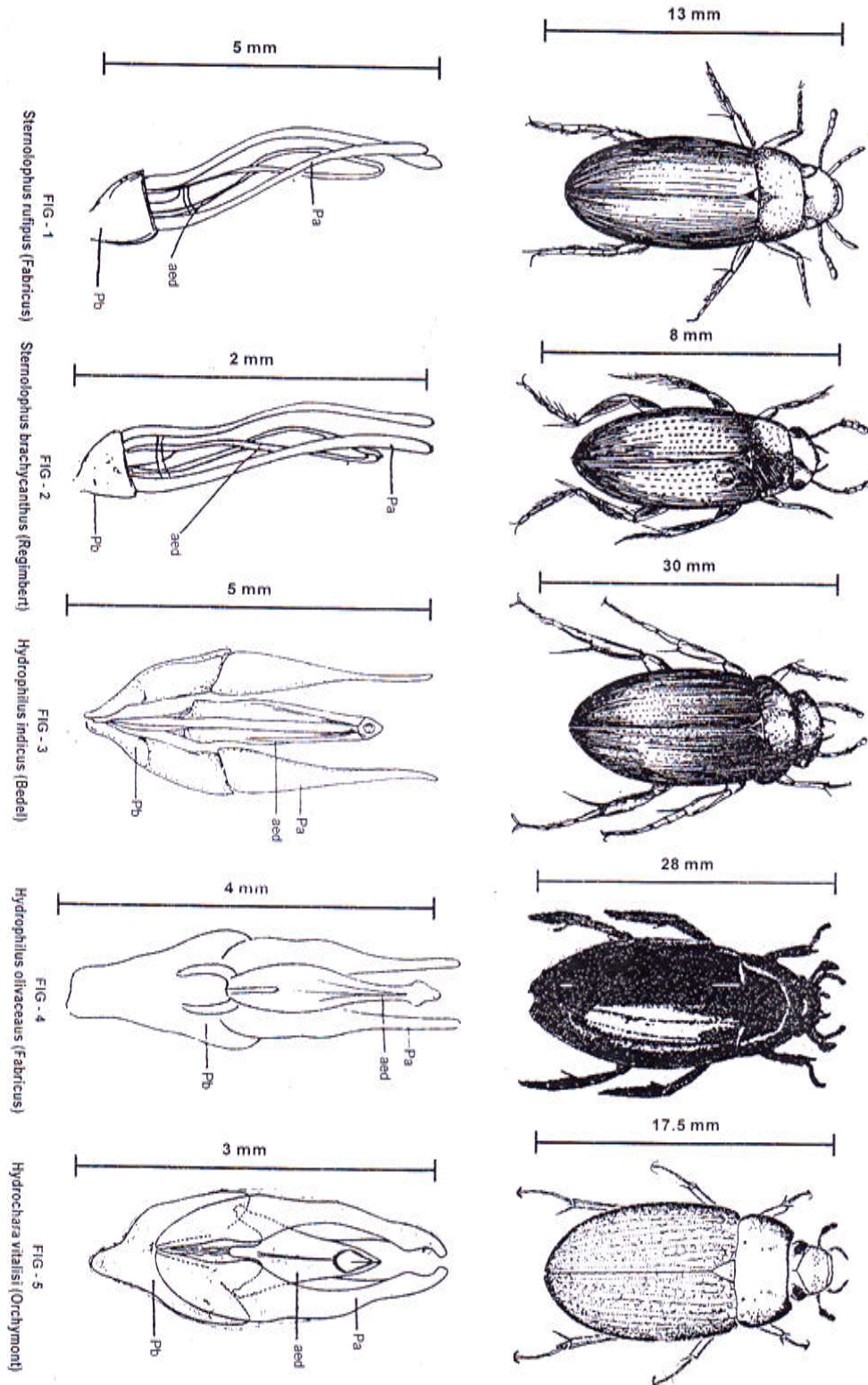
***Hydrochara vitalisi* (Orchymont, 1919)**

Hydrochara vitalisi. Orchymont (1919). Ann. Soc. Ent. Belg. 59:79, 81, 82.

Hydrochara vitalisi. Orchymont, (1923). Mem. Dep. Agric. India. 8: 10.

Diagnostic characters:

Elongate oval, more broadly and more convex, dorsal surface shiny, microsculpture on elytra. Head- with anterolateral punctures on clypeus moderately coarse, arranged into irregular. Antennae rufotestaceous



with feebly darkened. Maxillary palps long. Prothorax- moderately rounded, basal margin slightly, basinuate, front angles obtusely rounded to obtusely angulate. Scutellum- long and triangular punctate. Elytra- slightly narrowed, moderately distinct, diameters of serial punctures. Legs- similar and

provided with spines and long stiff swimming hairs whereas front legs without any hairs claws unequal and dentate at base ventral surface- smooth black and pubescent. (Fig- 5)

Size:

35 mm. in length.

Genitalia:

Aedeagus small and slender, parameres slender, each narrowed into slender, rod-like, apical portion with obtuse apex, median lobe rather short, moderately wide with rudimentary median longitudinal groove near base. (Fig- 5)

Distribution:

Dehradun (Garhwal region) U.P. 7. Vii. 1990. COLL. Saroj, S.K.

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