*Egyptian Journal of Natural History, Volume 2, 2000*

# Diving beetles (Coleoptera: Dytiscidae and Noteridae) of Egypt

**Samy Zalat, Rowaida Saleh, Robert Angus and Ahmed Kaschef**

**Contents**

Egyptian Journal of Natural History, Vol. 2, 2000, 1-107
© Printed in Egypt. El Harameen Press, Cairo, Egypt
Egyptian British Biological Society
(EBB Soc)

# Diving beetles (Coleoptera: Dytiscidae and Noteridae) of Egypt

**Samy Zalat[1], Rowaida Saleh[1], Robert Angus[2] & Ahmed Kaschef[3]**

1. Department of Zoology, Faculty of Science, Suez Canal University, Ismailia, Egypt
2. Division of Biology, Royal Holloway, University of London, Egham, Surrey, UK
3. Department of Entomology, Faculty of Science, Ain Shams University, Cairo, Egypt

## ABSTRACT

This work gives an account of the taxonomy and distribution of the Egyptian diving beetles. Sixty eight species belonging to thirty genera and seventeen tribes of family Dytiscidae and family Noteridae are known now from Egypt. Of which three tribes (Noterini, Aciliini and Dytiscini), four genera (*Synchortus*, *Bidessus, Rhantaticus* and *Dytiscus*) and eight species (*Synchortus imbricatus*, *Hyphydrus cycloides*, *Hyphydrus maculatus*, *Hygrotus pallidulus*, *Bidessus ovoideus*, *Hydaticus bivittatus, Rhantaticus congestus* and *Dytiscus circumfleuxus*) are new records to Egypt. *Nebrioporus insignis, Nebrioporus lanceolatus* and *Nebrioporus* walkeri together with *Scarodytes halensis* recorded from Africa for the first time, in addition to one new species to the world fauna ( *Copelatus ibrahimi* n. sp.). Neohydrocoptini is proposed as tribe for genus *Neohydrocoptus* since the earlier name Hydrocoptini is currently a synonym of Hydroporini. Three syn. nov. are presented: *Synchortus simplex* var. *echinatus* Régimbart, 1895 for *Synchortus imbricatus* (Klug, 1853); *Laccophilus poecilus* Klug, 1834 for *Laccophilus ponticus* Sharp, 1882 and *Nebrioporus princeps* Sharp, 1882 for *Nebrioporus insignis* Klug, 1834. Some misidentified records are corrected: *Neohydrocoptus seriatus* Sharp, 1882 to *Neohydrocoptus angolensis*, *Canthydrus notula* Erichson, 1843 to *Canthydrus diophthalmus* (Reiche & Saulcy 1855) and *Yola dohrni* Sharp, 1882 to *Yola enigmatica* Omer-Cooper 1954. Some species are confirmed in the Egyptian fauna: *Hydroglyphus angularis*, *Hydroglyphus pentagrammus*, *Copelatus pulchellus*. Six lectotypes have been designated for the following species: *Synchortus imbricatus*, *Synchortus simplex echinatus*, *Copelatus parallelipipedus, Nebrioporus walkeri*, *Colymbetes piceus* and *Hydaticus decorus*. *Copelatus ibrahimi* n. sp. comes close to *Copelatus parallelipipedus*. So we studied the type material of *Copelatus parallelipipedus* and designated the lectotype to clear the confusion. Distributional records are presented as a catalogue of provincial records (for Egyptian localities), several species known previously from only a few localities in Egypt, have been shown to have much wider distributions in the country.

## INTRODUCTION

The Dytiscidae and Noteridae are commonly called the diving beetles, their hind legs are usually highly modified for swimming. The family Dytiscidae includes more species than any other family of aquatic Coleoptera and is the best fitted for aquatic life, whereas family Noteridae is relatively small in number of species and these are not such good swimmers as the Dytiscidae. The two families are cosmopolitan in distribution, but in contrast to the noterids that occur primarily in tropical regions of the world (Spangler 1981), the dytiscids have their greatest abundance and diversity in the temperate regions (Young 1954; Larson 1975), with several predominantly tropical groups (Guignot 1959-1961; Spangler 1982). Both Dytiscidae and Noteridae are not particular in their choice of water bodies and occur in a wide variety of habitats (Galewski 1971; Zaitsev 1953), though individual species may prefer certain types of water bodies (Hosseinie 1978). The habitat preferences of many species are correlated with water chemistry, e.g. acidity or salinity (Cuppen 1986; Abo-Ghalia *et al.* 1992) and some species are regular inhabitants of brackish water or even of more saline coastal pools (Lindberg 1948). Dytiscidae are generally inhabitants of small, shallow water bodies or margins of large lakes and rivers and they occupy the zone of emergent vegetation or mats of plant debris or flooded terrestrial vegetation along the shore line (Furth 1983; Jach & Margalit 1987). On the other hand, Noteridae is common among roots of floating aquatic plants (Saleh *et al.* 1992; Richoux 1994). As far as is known, all dytiscid larvae, unlike the Noteridae, leave their aquatic habitat and pupate on land. So, Noteridae may be considered the only truly aquatic family of beetles presently known (Spangler 1982, 1986; Hilsenhoff 1992).

Both Dytiscidae and Noteridae breath atmospheric oxygen, obtaining it by rising to the surface of the water and protruding the tip of the abdomen through the surface film, thus renewing their supply of air, which is stored under the elytra. Therefore, dependence upon atmospheric oxygen is probably a prime factor restricting the diving beetles to shallow water (Larson 1975; Eyre *et al.* 1992). The food habits of noterids are poorly known. Wesenberg-lund (1912) assumed from the shape of the mandibles of the *Noterus* larva that it was entirely vegetarian. However, F. Balfour-Browne & J. Balfour-Browne (1940) observed that *Noterus* larvae feed readily on dead *Chironomus* larvae and dead individuals of their own kind; they also saw the larvae work their mandibles on the surface of roots without, however, appearing to get anything off. Consequently, they suggested that possibly the larvae flourish on a mixed diet. Most adult dytiscids are predators and sometimes at least partly, scavengers feeding upon dead or injured animals (Leech 1945; Johnson & Jakinovich 1970). Most larvae are voracious predators and they feed on a great variety of live aquatic organisms (Yano *et al.* 1983a; Bournaud *et al.* 1992).

Certain species may be of considerable economic importance in two main aspects. One is useful in that they act as some bio-control agents for mosquito-

larvae (James 1961, 1966; Zalom *et al.* 1980); as pest control for rice insect pests (Yano *et al.* 1983b) and as indicators of environmental conditions and water quality (Heus 1989; Abo-Ghalia *et al.* 1992). Yano *et al.* (1983b) reported that people of some areas feed on certain species of Dytiscidae. Also, many larvae of subfamily Dytiscinae attack small vertebrates. Drummond & Wolfe (1981) recorded a *Dytiscus dauricus* larva attacking and killing a garter snake, *Thanophis elegans* (Reptilia: Serpents: Colubridae). Unlike, the larvae, adults are attracted to dead prey and may feed on dead fish. So, they may act as scavengers for nursery ponds as mentioned by Deding (1988). Young (1967) mentioned that noterid larvae and adults feed on plant detritus and play a useful role in the recycling nutrients in their ecosystem. On the contrary certain species are harmful in feeding on fish eggs and therefore their presence is undesirable in nursery ponds as pointed out by Wilson (1923) and Fernado (1963). Also, species of genera *Cybister* and *Hydaticus* act as intermediate hosts for the trematode fish parasite *Lecithodendrium* sp. (Pujatti 1953).

The Dytiscidae along with Noteridae, Gyrinidae, Haliplidae, Amphizoidae, and the old world family Hygrobiidae, are aquatic representatives of the sub-order: Adephaga, order: Coleoptera. Because the members of these families inhabit aquatic habitats, they are referred to as Hydradephaga as opposed to the terrestrial adephagans, which are known as Geoadephaga (e.g. Carabidae).

The family Dytiscidae is often divided into four subfamilies: Laccophilinae, Hydroporinae, Colymbetinae and Dytiscinae (Ordish 1966; Vazarani 1969; Watts 1978). Due to the phylogenetic work of Ruhnau & Brancucci (1984), tribe Copelatini has been raised to a subfamily, Copelatinae. Omer-Cooper (1958c) and Zaitsev (1953) referred to the two tribes of Hydroporinae (Methlini and Vatellini) as subfamilies. Biström (1979) and Wolfe (1988) mentioned that this systematic position is still uncertain and treated vatellines and methlines as tribes of subfamily Hydroporinae. Further, Nilsson *et al.* (1989) in their review of the genus- and family- group names of the family Dytiscidae stated that the current classification of the family Dytiscidae is not based on any firm or uniformly applied criteria. In this respect, and according to Nilsson & Holmen (1995), genus *Coelambus* has been reclassified as subgenus of genus *Hygrotus* and together with the African and Oriental genera *Hroceras*, *Herophydrus*, *Hyphoporus* and *Pseudhydrovatus* have been moved from tribe Hydroporini into tribe Hygrotini. Generally, modification of the classification within this family has been in the form of promotion and re-valuation of existing minor categories rather than by redefinition.

The Egyptian Dytiscidae belong to the subfamilies Copelatinae, Hydroporinae, Colymbetinae, Laccophilinae, and Dytiscinae. Description and definition of tribes are restricted to those represented in the Egyptian fauna.

The Noteridae are most similar to the Dytiscidae and were originally included in that family. On the basis of adult morphology, Thomson (1860) first referred to the noterids as subtribe, Crotch (1873) raised them to tribal rank, Régimbart (1878)

designated them as a subfamily of the Dytiscidae, and a few years later, Bedel (1881) accorded them full familial rank. However, Meinert (1901) and Bertrand (1928), in their larval studies, treated the noterids as a dytiscid subfamily. Böving & Craighead (1931), basing their conclusions on comparative larval morphology, assigned family rank to the noterids.

The main problem which has been a subject of controversy between several authors (Seidlitz 1887; Régimbart 1895; Ganglbaur 1892; Zimmermann 1920; F. Balfour-Browne 1940; Guignot 1947b, 1959-1961; Vazarani 1969) was the morphological similarity of subfamily Laccophilinae and Noteridae, especially in the differences between the left and right parameres and the failure of the meta-episternum to reach the meso-coxal cavity. Most authors who accept noterids as family came to appreciate that the noterids and laccophilines differ from one another in many more characters than they agree. The basic differences in adult structure are reviewed by F. Balfour-Browne (1940) who stated that whereas the laccophilines' characters are mostly dytiscid, those of the noterines separate them from both the laccophilines and the dytiscines. Hatch (1953), Young (1954) and Crowson (1955) on the basis of both adult and larval characters, considered the noterids to be a valid family and attributed the superficial similarities of the adults of the Dytiscidae and Noteridae to convergence rather than indicating common ancestry. Most subsequent studies of Hydradephaga, such as Leech & Chandler (1956); J. Balfour-Brown (1961); Grosso (1977); Spangler (1981, 1982); Beutel & Roughley (1987); Holmen (1987); Friday (1988); Wewalka (1989); Nilsson & Person (1989); Hilsenhoff (1992) and Nilsson (1995) have continued to treat the noterids as a family.

The study of African diving beetles has received considerable attention from several authors all over the world resulting in the production of many revisions of some African genera (Biström 1979,1984, 1986a, 1988a,b; Wewalka 1980a; Nilsson 1991, 1992a,b) and studies of the faunas of various African countries (Omer-Cooper 1931 to 1979; Guignot 1943, 1947a, 1956; F. Balfour-Browne 1950b, 1951; Nilsson & Person 1993). Descriptions, taxonomic notes, data on the ecology and distribution of most Egyptian species are found scattered in the literature on the African fauna, and older works are often accessible only with considerable difficulty. The most important old publications dealing with this group and containing information on the Egyptian fauna are by Sharp (1882) who provided a detailed classification of the family Dytiscidae, definition of supra specific groups, and description of numerous new species from all parts of the world, including Egypt; Régimbart (1895) who gave a revision of African Dytiscidae and Gyrinidae; Zimmerman & Gschwendtner (1930-1939) who presented a revision of Palaearctic Dytiscidae and Guignot (1959-1961) who revised all African Hydradephaga except Gyrinidae.

Today many details of these works are out of date mainly due to the new species having been described (Biström 1983, 1986b; Wewalka & Nilsson 1990; Wewalka

1992) and various changes of the nomenclature (Biström 1982; Nilsson *et al.* 1989; Fery 1991; Nilsson 1992a,b; Wewalka 1992; Nilsson & Angus 1992; Balke & Fery 1993; Nilsson 1995; Nilsson & Holmen 1995). Since 1961, several experienced workers in the field of aquatic Coleoptera Wewalka (1975, 1977, 1980b, 1986, 1989); Biström (1979); Balke (1990); Fery (1992a & b); Nilsson & Person (1993) made contributions in the areas of nomenclature and classification as well as providing some information on the ecology and distribution of some Egyptian species during their studies of African and Palaearctic fauna. All previous studies have revealed the incomplete state of knowledge of the Egyptian fauna and it has been evident that revision of the Egyptian diving beetles is required to produce an accurate account of the fauna.

This study of the Egyptian diving beetles deals with taxonomy, distributions and very briefly, habitat preferences of the species. In the present review, various species have been revised with description of one new species and several species are recorded for first time in the Egyptian fauna, some representing genera or even tribes hitherto unknown in Egypt. Keys are given to the families, sub-families, tribes, genera and species based on morphological characters of the adult. The distribution and taxonomic affinities of various species are discussed. Several species known previously from only a few localities in Egypt, have been shown to have much wider distributions in the country.

## MATERIALS AND METHODS

Materials for taxonomic study consisted of a large number of the adult specimens collected from all zoogeographical zones of Egypt. Additional specimens were obtained from a number of institutions and private collections. The material collected is split between the collections of RS Ahmed, Dr. RB Angus and Alfieri collection (Al-Azhar University). The collections from which significant specimens were examined or distribution information were obtained are listed under the following abbreviations:

AAP: Plant protection Department, Faculty of Agriculture, Al-Azhar University (Alfieri Collection); ASUE: Entomology Department, Faculty of Science, Ain Shams University; BMNH: The Natural History Museum, London, England; CUE: Entomology Department, Faculty of Science, Cairo University; ESE: Entomological Society, Cairo, Egypt; MAE: Museum Ministry of Agriculture, Egypt; MNHN: Muséum National d'Histoire Naturelle, Paris, France; MZH: Museum Zoologicum, Helsingfors, Finland; ZMB: Museum für Naturkunde der Humboldt-Universität zu Berlin, (Zoologisches Museum Berlin); Cra: Coll. Dr. R. Angus, London; CMB: Coll. Dr. M. Balke, Berlin; COB: Coll. Prof. O. Biström, Finland; CHF: Coll. Dr. H. Fadel, Egypt; CHF: Coll. Dr. H. Fery, Berlin; CGW: Coll. Prof. G. Wewalka, Wien; CKM: Coll. Dr. K. Miller, Cyprus

Museums that mentioned in the text without direct contact are listed

under the following abbreviations:
RNHL: Rijksmuseum van Natuurlijke Histoire, Leiden, Netherlands; SAM: South African Museum (Natural History), Cape town, South Africa; ZMK: Universitetes Zoologiske Museum, Copenhagen, Denmark; ZSM: Zoologische Sammlung des Bayerischen Staates, Munich, FRG; HJIM: Zool. Mus., Hebrew Univ., Jerusalem (Israel); MCSN: Museo Civico di Storia Naturale, Genova, Italy; ZMM: Zool. Mus. of Moscow, State University.

**Collection and preservation of specimens:** Sweeping the water with a metal sieve or net was the most common method. Short sweeps through water of depth up to about 1 meter, with the rim of the sieve just grazing the bottom of the pond or stream, yields the best results with some species like those of *Laccophilus, Philodytes, Canthydrus* and *Synchortus*. Beetles inhabiting shallow and vegetated ponds like species of *Hydrovatus, Copelatus, Bidessus, Hydroglyphus, Yola* and *Yolina* are collected by disturbing the bottom with a net or foot and sweeping the net through the disturbed area to capture any specimens dislodged from the bottom. In small streams with coarse gravel or large rocks, beetles like *Hydrovatus villiersi* and *Hygrotus confluens* are observed swimming over rocks and clinging to them. They are captured by picking them off the rocks by forceps or with a small household strainer. In the summer, certain species, especially those of *Eretes* and *Hydaticus* often leave ponds in large flights at sunset and can be collected with an aerial net just after they have taken flight.

Almost any fresh water habitat harbours diving beetles (Spangler 1982) and most populations are in the zones of emergent vegetation, detritus or stones (Larson 1975) and Nilsson & Holmen (1995). Shallow and densely vegetated ponds of clay, sand, or gravel bottom, stagnant water pools (Nile valley & Delta and Northern Sinai); shallow gravel shore lines of mountain lakes (eastern Desert); temporary roadside ditches (Coastal strip); oasis (western Desert), wells with clear water and rocky bottom (southern Sinai) have been successful collecting localities. Usually large river margins, riffles and water of deep depth do not provide favourable habitat for diving beetles (Zimmerman 1970). Sorting can be performed wet or dry, in a flat white bowl. The net contents should first be spread out on a mesh screen placed over the bowl, to enable the beetles to separate from vegetation. The beetles are preserved most easily by placing them directly into 90 or 95% alcohol. After the collection is completed, the alcohol is renewed and again, after a day, it is replaced with 70% alcohol with few drops of glycerin if extended storage is required. Permanent storage is best effected by pinning the specimen with stainless steel pins of sufficient thickness, or if it is smaller than 7 or 8 mm. in length, by gluing it on to a paper point on a pin, then labelled and kept (for identification) in preservation boxes supplied with insect repellent to prevent damage. Specimens are best studied dry to observe fine microsculpture and punctation (Roughley 1990). Prior to pinning specimens should be washed thoroughly in water to remove particles of dirt and grease.

For the purpose of the ecological and distributional study detailed notes on all habitats in which collections were made. These notes taken in the field, always contain at least the following information: locality name, date, type of habitat, condition of water (turbid, stagnant, swiftly flowing), vegetation present, and collector. Many of these data are the source of the notes of habitat preferences included under each species.

**Dissection of male genitalia**: In many genera of diving beetles the male genitalia are of great importance in the identification of species as in *Hydroglyphus* (Biström 1986a). Therefore, all male specimens are dissected for extraction and examination of male genitalia. Fresh alcoholic specimens permit extraction with no further treatment, but dried ones must be softened. This can be done by gently boiling the beetles in water for a few minutes. Extraction is done under a binocular dissecting microscope by making an incision between third and fourth terga allowing the base of the aedeagus to be grasped with a pair of fine forceps. The penis is best separated from the parameres and then mounted either on a separate card or on the same card as the insect.

**Identification**: For many species the holotype has been examined and the identification of most species based on the study of type material together with the other available specimens. Throughout the text existing holotypes are simply referred to as "type". Certain types of species that are not found in BMNH were obtained on loan from other museums. For those species whose type was not seen, for many reasons, identification was based on the original description and Sharp type (*i.e.* that used by Sharp for his redescription of the species, 1882) in the Natural History Museum (BMNH), London. Many species have been identified by Dr. Angus through his private collection. This collection is useful as it includes many African species collected by J. Balfour Browne. Also, contact with some specialists in the field of diving beetles and professional in African fauna (Biström, Finland; Nilsson, Sweden; Fery, Berlin; Wewalka ,Wein; Brancucci, Switzerland;) to verify some identifications of special complexity.

**Measurements and illustration**: Adult specimens for each included species were measured for total length (TL) of the body using a micrometer eyepiece in a binocular microscope. Total length (TL) is a single measurement from the anterior margin of the clypeus to the apex of the elytron. Line drawings, prepared with the aid of a Camera Lucida fitted on a Wild microscope to illustrate taxonomic characters. Aedeagi were all illustrated in lateral and dorsal view. Species that have symmetrical parameres (the differences observed between the left and right parameres are practically non-existent) illustrated only from one side. Illustrations of homologous structures in related species are to the same scale and from the same aspect. Scanning electron microphotographs are presented to clarify description of microsculpture and some other structures of special taxonomic importance. These structures are mounted on stubs, onto which was placed two-sided tape, coated with gold and photographed with the aid of scanning electron

microscope, Cambridge stereoscan 100.

**Classification and nomenclature**: The checklist of Egyptian Noteridae and Dytiscidae seeks to list all species which have been recorded from Egypt or encountered in the present study, and bring the nomenclature used in older works on the Egyptian fauna into line with current practice. Classification and the nomenclature of genus-names largely follows Biström (1982, 1986a,b); Nilsson *et al.* (1989), and incorporates the most recently proposed changes as in Nilsson & Angus (1992); Nilsson (1995); Nilsson & Holmen (1995).. Species nomenclature is mostly based on the modern revisions of some genera like *Hyphydrus*, *Yola*, *Bidessus* (species group *B. sharpi*), *Hydroglyphus* (in Africa), *Clypeodytes*, *Hydrovatus*, *Platambus*, *Laccophilus*, *Hydaticus*, *Dytiscus* and *Heterhydrus* (in Africa) (Biström 1982, 1983, 1985, 1986a, 1988b; Brancucci 1983, 1988; Roughley & Pengelly 1981; Roughley 1990; Wewalka 1980a&b) and recent treatment of diving beetle fauna in some African countries like Botswana, Gabon and Ethiopia (Bilardo & Rocchi 1987, 1990; Nilsson & Person 1993). The sequence in which the taxa are introduced is mostly similar to that used by Nilsson & Person (1993) and Nilsson & Holmen (1995). Keys to the families, subfamilies, tribes, genera and species of adults are presented. Most of the keys have been written specifically for the taxa found in the Egyptian region and characters may not apply to the species from other regions. On the other hand, the diagnosis given for genera and higher taxa are based on the world fauna.

## RESULTS

### Key to genera of diving beetles (family Dytiscidae and Noteridae)

1- Metacoxal process very broad (together wider than long) with a W- shaped hind margin, and overhanging the rest of the body at the sides (plate 1.1) ..... **Noteridae** ..... **2**

- Metacoxal process longer than broad, and not overhanging the rest of the body ..... **Dytiscidae** ... **4**

---

2- Protibia with a strong terminal hooked spine (plate 1.2 ) ..... **3**

- Protibia without a strong terminal hooked spine ..... ..... ***Neohydrocoptini*** ..... ***Neohydrocoptus***

---

3- Posterior (inner) apical angle of the metafemora provided with isolated group of setae (plate 1.3) ..... **Hydrocanthini** ..... ***Canthydrus***

- Posterior (inner) apical angle of the metafemora without an isolated group of setae (plate 1.4) .....**Noterini** ..... ***Synchortus***

---

4- Small triangular plate (mesoscutellum) visible at the junction of the pronotum with elytra (plate 1.5)..... **5**

- Mesoscutellum not visible, concealed by posterior margin of pronotum

(plate 1.6) ..... **15**

5- Eye with anterior margin above base of antenna, emarginate (plate 1.7); male with segments 1-3 of protarsus widened but not forming an oval or circular adhesive disc (plate 1.8) .....**Colymbetinae** ..... **6**

- Eye with anterior margin not emarginate (plate 1.9 ); male with segments 1-3 of protarsus greatly broadened, together forming an oval or nearly round adhesive disc (plate 1.10) ..... **Dytiscinae** ..... **11**

6- Inferior face of the metafemora provided with a small group of stiff setae "comb" near the posterior apical angle (plate 1.11) ..... **Agabini** ..... **7**

- Inferior face of the metafemora without a group of stiff setae near the posterior apical angle ..... **8**

7- Epipleura remain broad almost to the tip of the abdomen (plate 1.12) ..... ***Platambus***

- Epipleura get much narrower at the level of first abdominal segment (plate 1.13) ..... ***Agabus***

8- Posterior claws equal ..... **Copelatinae** ..... **9**

- Posterior claws unequal ..... **Colymbetini** ..... **10**

9- Metacoxal line present (plate 1.15) ..... ***Copelatus***

- Metacoxal line absent ((plate 1.14) ..... ***Aglymbus***

10- Elytral reticulation strongly transverse, or absent (plate 1.16). ***Colymbetes***

- Elytral reticulation distinct, not strongly transverse (plate 1.17).. ***Rhantus***

11- Hind margins of the four basal metatarsal segments on both the anterior and posterior faces fringed with golden- yellow hairs overlapping the base of the next segment ..... **12**

- Hind margins of the four basal metatarsal segments not fringed with any hairs ..... **14**

12- Sides of pronotum bordered; lateral margins of the elytra serrate in the posterior half ..... **Eretini** ..... ***Eretes***

- Sides of pronotum not bordered; lateral margins of the elytra not serrate in the posterior half ..... **13**

13- Apical spines of the metatibia acuminate (plate 1.18); anterior outer margin of metasternal wing straight (plate 1.49) ..... **Hydaticini**.. ***Hydaticus***

- Apical spines of the metatibia bifid (plate 1.19); anterior outer margin of metasternal wing curved (plate 1.48) ..... **Aciliini** ..... ***Rhantaticus***

14- Metatibia almost as broad as long, outer tibial spurs strongly broadened (plate 1.20) ..... **Cybisterini** ..... ***Cybister***

- Metatibia clearly longer than broad, tibial spurs simple (plate 1.21) ..... .....**Dytiscini**.....***Dytiscus***

15- Segments of metatarsi broad with long lobes underneath (plate 1.22); pro and mesotarsi with 5 distinct segments (plate 1.23) .... **Laccophilinae** ..... **16**

- Segments of metatarsi narrow and simple; pro and mesotarsi with 4 or 5 segments, the 3rd deeply lobed (plate 1.24 ) ..... **Hydroporinae** ..... **17**

16- Metatibial spines bifid (plate 1.25) ..... ***Laccophilus***

- Metatibial spines acuminate (plate 1.26) ..... ***Philodytes***

17- Apex of the elytra (plate 1.27, 8.3) and last abdominal segment (plate 1.28, 8.4) produced into acute spine posteriorly and elytral epipleurs simple to base; pro and mesotarsi with 5 simple segments ..... **Methlini** ..... ***Methles***

- Apex of the elytra and last abdominal segment not produced into acute spine posteriorly, elytral epipleurs with humeral carina; pro and meso tarsi 4 visible segments, the 3rd deeply lobed and true 4th absent or concealed between lobes of 3rd ..... **18**

18- Elytral epipleuron limited by humeral carina at shoulder (plate 1.29) ... **19**

- Elytral epipleuron without carina at shoulder (plate 1. 30) ..... **24**

19- Claws of metatarsi very unequal, the external claw nearly invisible (plate 1.31; plate 8.2) ..... **Hyphydrini** ..... **20**

- Claws of metatarsi equal ..... **21**

20- Hind border of metacoxal process fused with the base of abdomen (plate 1.32); epipleura extremely narrow from the level of the first abdominal segment to the apex, last segment of the pro and mesotarsi shorter than the third ..... ***Hyphydrus***

- Hind border of metacoxal process not fused with the base of abdomen; epipleura extremely narrow to the hind end; last segment of the pro and meso-tarsi a little longer than the 3rd segment ..... ***Heterhydrus***

21- Apex of prosternal process broad, or spatulate; mesocoxae widely separated (plate 1.33); metacoxal process incised ..... **Hydrovatini** ..... ***Hydrovatus***

- Apex of prosternal process lanceolate or sublanceolate; mesocoxae less widely separated (plate 1.34); metacoxal process usually not incised ..... **Hygrotini** ..... **22**

22- Clypeus with a rim at the anterior margin (plate 1.35, plate 8.1) ..... **23**

- Clypeus without a rim at the anterior margin (plate 1.36) ..... ***Hygrotus*** ..... **(Subgenus:*Coelambus*)**

23- Inner margin of epipleural basal portion very prominent; epipleural pit broad; metacoxal cavities well separated (plate 1.37) ..... ***Herophydrus***

- Inner margin of epipleural basal portion obtuse; epipleural pit narrow; metacoxal cavities approximate (plate 1.38) ..... ***Hyphoporus***

24- Pronotum with longitudinal impressed lines (striae) 2/3 way from the mid- line to the lateral margin, these continued on to the elytra as striae or keels (plate 1.39) ..... **Bidessini** ..... **25**

- Pronotum without striae (plate 1.40) ..... **Hydroporini** ..... **29**

25- Elytra with sutural striae (plate 1.41) ..... **26**

- Elytra without sutural striae (plate 1.42) ..... **27**

26- Head with a fine cervical line joining the hind borders of the eye (plate 1.41) ..... ***Bidessus***

- Head without a fine cervical line joining the hind borders of the eye (plate 1.43) ..... ***Hydroglyphus***

27- Elytra with keels of which one pair continues the pronotal striae (plate 1.42) ..... **28**

- Elytra without keels ..... ***Clypeodytes***

28- Elytra with slight discal keel; rows of punctures between the suture and discal keels; metasternum with a distinct lateral keels ..... ***Yolina***

- Elytra always with a distinct discal keel; without rows of punctures between the suture and discal keel; metasternum without lateral keels ..... ***Yola***

29- Metafemur densely punctured over entire surface (plate 1.44); ventral surface with fine and dense punctation, giving rasp-like appearance; elytra sometimes with subapical denticle (weak in male, very strong in female (fig. 45.5,7) ..... ***Nebrioporus***

- Metafemur with a single longitudinal row of setiferous punctures on ventral surface, otherwise with only few scattered punctures (plate 1.45 ); ventral surface with much larger punctures, never rasp-like; elytra without denticles ..... **30**

30- Posterior margin of metacoxal processes incised at middle (plate 1.46); ventral surface shiny, with sparse, deep and large punctures; elytra usually vittate with distinctive pattern (fig. 41.4 ) ..... ***Scarodytes***

- Posterior margin of metacoxal processes conjointly truncate (plate 1.47); ventral surface usually mat, with fairly dense, shallow and slightly large punctures; elytral pattern weak or absent, never vittate, if present always maculate ..... ***Hydroporus***

## Family Noteridae Thomson

Noteridae Thomson, 1860: Skand. Col. 2: 34.

### Tribe Neohydrocoptini

*Hydrocoptus* Motschulsky is a synonym of *Hydroporus* Clairville, so the noterids placed in *Hydrocoptus* by Sharp (1882) are referred to the next available name *Neohydrocoptus* Satô (1972) (Nilsson *et al.* 1989). Neohydrocoptini is proposed by this study to be the available tribal name of the *Neohydrocoptus* Satô. This tribe is monobasic.

### Genus *Neohydrocoptus* Satô

*Neohydrocoptus* Satô, 1972: Annls Hist. Nat. Mus. nat. Hung. 64: 144.

Distribution: widespread in the tropical regions of the old world, including Australia, with the majority of the species occurring in Africa

#### *Neohydrocoptus angolensis* (Peschet) (Fig. 3)

*Hydrocoptus angolensis* Peschet 1925: Miss. Rohan-Chabot 1912-1914, 4(3): 28.

Type locality: Kilossa, März (Africa)

Type material: Holotype female, studied by J. Balfour-Browne(1961): Kilossa, März 12; type Samml. A. Zimmermann with pink Holotypus label of the Staatssammlung. Lectotypes females : D. O. Africa Usaramo 14; leg. Methner, type Samml. A. Zimmermann with pink paratypus label of the Staatssammlung. J. Balfour-Browne (1961) compared Sudan's male with the holotype and he stated

that they are conspecific.
Distribution (Africa): Angola, Sudan, Ethiopia, Congo, Tanganyika, Nyasaland, South Africa. According to Omer-Cooper (1965) the individuals never numerous.
Distribution (Egypt): Nile valley and Delta (Baltim, 29.III.1992); Sinai (El-Arish, 11.V.1993).
Habitat: Stagnant water with soft bottoms and dense vegetation. Fresh and brackish water.

**Tribe: Noterini Sharp**

Noterini Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 260, 919.
This tribe is new record to Egypt and represented by one genus, *Synchortus*.

**Genus *Synchortus* Sharp**

*Synchortus* Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 264, 835.
Type species: *Hydrocanthus asperatus* Fairmaire, 1869: Ann. Soc. Ent. France (4) 9: 188.
Distribution: tropical and subtropical regions of Africa
Eight species have been named from Africa (Omer-Cooper, 1972). Only one species has been recorded for the first time from Egypt *Synchortus imbricatus* (Klug).

***Synchortus imbricatus* (Klug) (Fig. 4)**

*Noterus imbricatus* Klug, 1853: Monatsber, Berl. Acad.: 249.
*Synchortus imbricatus* (Klug)-Sharp, 1882: Scient. Trans. R. Dublin Soc.2 (2): 823; Omer-Cooper, 1972: J. Ent. Soc. South. Afr. 35 (1): 36.
*Synchortus aequatorius* Guignot, 1936: Mission Scient. de l'Omo 4 (3): 38 syn. n. by Omer-Cooper, 1972 l.c.: 36.
*Synchortus simplex* Régimbart, 1895: Mém. Soc. Ent. Belg. 4: 120; Guignot, 1936 l.c.: 38; Guignot, 1961: Ann. Mus. Congo Belge Sér. 8 (Sci. Zool.) 78: 476 (nec Sharp, 1882: l.c.: 264 (misidentified).
*Synchortus simplex* var. *echinatus* Régimbart, 1895: l.c: 120 syn. n.
Type locality: Tété, Mozambique
Type material: *S. imbricatus* (Klug): Lectotype female, designated by present study; 10021 / Mozambique MNB Berlin. Paralectotypes: Same as type (2exx. in MNB). The designated Lectotype has been labelled by J. Balfour-Browne as selected by him in 1961 as lectotype. As this selection has never been published we here confirm the arrangement by designating the labelled specimen lectotype.
*Synchortus aequatorius* Guignot: Holotype male: Guignot det., Uganda; C. H. Alluaud coll. 1909 / labelled as a type by Guignot handwriting; MNHN Paris.
*Synchortus simplex* var. *echinatus* Régimbart: Lectotype female, designated by present study as subjective syn.; Loango inl. Ht. Quillou Mocquerys River / Congo Republic; coll. Maurice Régimbart 1908 MNHN Paris. Paralectotypes: Same as type (4exx in MNHN).
Synonymy: We have studied Régimbart's *S. simplex* var. *echinatus* and associated males. This material originally comprised 12 specimens mounted in groups of 3, on 4 cards. 2 specimens were already lost, and the remaining 10 were mouldy.

These specimens are as follows: 4 males and 3 females from 3 cards labelled "Loango int. Ht. Quillou" and "Museum Paris coll. Maurice Régimbart 1908"; and 1 male and 2 females from 1 card labelled "Ht. Quillou Mocquerys". 1 of the Loango cards, which originally held 1 male and 1 female, as well as a glue spot from which the beetle was lost, bears the additional labels "var. *echinatus* Reg." (in Régimbart's handwriting) and "Type" (a red printed label). Both beetles were floated from this card, and the female replaced after cleaning (removal of mould), and the male transferred (undissected) to a fresh card. Female Lectotype is designated and labelled. The remaining 4 females are paratypes, including the 2 labelled simply as "Ht. Quillou Mocquerys". Generally, the specimens are all in a rather fragile condition, having been mouldy, so only 2 males have been dissected. After comparing both male and female specimens of Egyptian materials with Régimbart's *S. simplex* var. *echinatus* materials and based on Omer-Cooper's concept of the *S. imbricatus* (Klug) in her study on the African species of the genus *Synchortus*, it is clear that *Synchortus simplex* var. *echinatus* Régimbart is a subjective synonym of *Synchortus imbricatus* (Klug). An Egyptian males studied have a normally arranged aedeogophores, whereas material from further South contains an increasing proportion of specimens with mirror- image aedeogophores
Distribution (Africa): Mozabique (type), Malawi, Congo, Guinea, Sudan, Uganda, South Africa (Natal), Ethiopia
Distribution (Egypt): Baharyia oasis (western desert), 4.IV.1989; Alexandria (Coastal strip), 2.VIII.1992; El-Giza, 3.II.1993,10$^{th}$ of Ramadan, 3.VII.1994, Asyut, 4.VIII.1993, Aswan, 25.I.1991 (Nile valley & Delta); Suez, 22.VI.1994, Ghardaga, 7.VIII.1993 (eastern desert) and El-Arish (Sinai) 11.V.1993.
Habitat: species collected from temporary pools with sandy bottoms and weedy edges, besides the Suez Canal; large pool with emergent vegetation; riverside swamps; sewage water pool with more or less bare gravel or with a reed swamp; fresh and brackish water.

**Hydrocanthini Sharp**

Hydrocanthini Sharp, 1882: Scient. Trans. R. Dublin Soc.2 (2): 268, 920.

**Genus *Canthydrus* Sharp**

*Canthydrus* Sharp, 1882: Scient. Trans. R. Dublin Soc.2 (2): 269, 838.
Type species: *Hydrocanthus guttula* Aubé, 1838: Spec. Col. 6: 410 (Guignot, 1946: Rev. Fr. Ent. 13: 116).
Distribution: chiefly a tropical genus found in the Neotropical, Afrotropical, Oriental and Australian regions.
This genus contains more than 80 species (Hilsenhoff 1992). Only one species occurs in Egypt, *C. diophthalmus.*

***Canthydrus diophthalmus* (Reiche & Saulcy) (Fig. 5)**

*Hydrocanthus diophthalmus* Reiche & Saulcy, 1855: Ann. Soc. Ent. France (3)3: 641.
*Hydrocanthus notula* Erichson-Sharp, 1882: Scient. Trans. R. Dublin Soc.2 (2): 275. Misidentified.

Type material of Reiche & Saulcy, 1855 was not available, Sharp's material of *Hydrocanthus notula* which is syn. of *Hydrocanthus diophthalmus* and collected from Egypt have been studied.
Distribution (Africa): Sudan, Ethiopia, Angola, Congo, Cameroon
Distribution (Egypt): all Egyptian zones except Gebel Elba (see table 1)
Months of abundance: all the year round
Habitat: stagnant water with a dense vegetation, frequently collected in gravel-pit ponds with sparse vegetation; sometimes found in brackish water.

## Family Dytiscidae Leach

Dytiscidae Leach, 1817: Zool. Misc. 3: 68 (emendation of Dyticidae Leach, Opinion 619, Bull. Zool. Nom. 18 (1961)).

### Subfamily Copelatinae Van den Branden

Copelatinae Van den Branden, 1885: Ann. Soc. Ent. Belg. 29: 82.
Tribe Copelatini has recently been raised to a subfamily Copelatinae, chiefly due to phylogenetic work of Ruhnau & Brancucci (1984). A mainly tropical subfamily with 4 genera Nilsson & Holmen (1995). Only two genera occur in Egypt, *Aglymbus* Sharp and *Copelatus* Erichson.

### Genus *Aglymbus* Sharp

*Aglymbus* Sharp, 1882: Sci. Trans. R. Dublin Soc. (2) 2: 562, 596: 180.
Type species: *Copelatus rufipes* Brullé in d'Orbigny, 1838: Voy. Amér. mér. 6 (2): 49-50, by subsequent designation of Guignot 1946: Revue Fr. Ent. 13: 116.
There are 25 species are recognized from this genus (Guéorguiev 1968, Wewalka 1982, Brancucci 1986 & Nilsson *et al.* 1989). Two species, *A. gestroi* Sharp and *A. brevicornis* Sharp are known from continental Africa. Only one species, *A. gestroi* recorded from Egypt.
Distribution: small genus found in South America, Africa and Madagascar

#### *Aglymbus gestroi* Sharp (Fig. 6)

*Aglymbus gestroi* Sharp, 1882: Scient. Trans. R. Dublin Soc. (2) 2: 597.
Type locality: Seiotel, Bogos, Eritrea.
Type material: Holotype, single female described by Sharp (1982); Seiotel, Bogos; collected by O. Beccari; MCSN Italy; *gestroi* Sharp n. sp.; Wewalka (1974) described the male.
Distribution (Africa): Ethiopia, Eritrea (type), Madagascar
Distribution (Egypt): Coastal strip, Sinai, western and eastern desert
Months of abundance: April, August and December.
Habitat: spring-fed streams with hard bottom (rocks and gravel) and sparse vegetation; fresh water.

### Genus *Copelatus* Erichson (Plate 7)

*Copelatus* Erichson, 1832: Gen. Dyt.: 18, 38.
Type species: *Dytiscus posticatus* Fabricius, 1801: Syst. Eleuth. 1: 268, by monotypy.
Distribution: almost worldwide genus with centre of diversity in South

America, Africa and Indo-Australia.
A large genus with about 400 described species (Nilsson & Holmen 1995). Only two species occur in Egyptian region, one has already been recorded from Sinai, *Copelatus pulchellus* (Klug) and the other is new species *Copelatus ibrahimi*..

**Key to species**

1- Elytra with 5 striae of weakly impressed, spaced punctures; most punctures of striae hairy posteriorly .....***Copelatus ibrahimi* n. sp.**
- Elytra with 6 striae of deeply incised punctures without any hairs (fig. 7.1) ..... ***C. pulchellus***

***Copelatus pulchellus* (Klug) (Fig. 7)**

*Agabus pulchellus* Klug, 1834: Symb. Phys. 4: t. 33 fig. 7.
Type locality: Sinai, Egypt.
Type material: *Copelatus pulchellus* (Klug): Holotype female, Aegypten / aquis montis Sinai; Ehrenberg 9928 /Typus /Zool.Mus. Berlin (MNB). The *pulchellus* of Sharp was based on a single specimen, a male labelled type 700, from Réunion, BMNH London. This specimen is dissected by J. Balfour-Browne (1950). He found that the shape of aedeagus is perfectly distinct from that of *pulchellus* and proposed *aldabricus* as a new name for it.
This species is very rare in Egypt. It was described from unique female collected from high altitude in Sinai vicinity and it seems the only Egyptian specimen of this species recorded up to current study. According to present study, one male collected from North Sinai (low altitude) and high salinity water. Length of female type: 4.8mm.; Colour mostly chestnut brown with sides more or less yellowish brown; pronotum not striolate at the sides; elytra with striae same in number and appearance as in male and without strioles.
Distribution (Africa): Ethiopia, Senegal, Congo, Mauritania, South Africa, Natal
Distribution (Egypt): South and North Sinai
Months of abundance: March
Habitat: temporary water pool, a short distance from the coast with hard bottom, sparse vegetation and high salinity.

***Copelatus ibrahimi* n. sp. (Fig. 8, Plate 7.1,3)**

**Type locality**: Suez, eastern Desert, Egypt.
**Type material**: Holotype male labels: Suez, eastern Desert, Egypt. 29.VII. 1991; collected by R. S. Ahmed; habitat: brackish water, under debris on bank of stream. Paratypes, 3 male & 6 female: 1 paratype male and 1 paratype female with same data as holotype. 2 paratypes male and 2 paratypes female from Ghardaga 5. VII. 1993; collected by R. S. Ahmed; habitat: sea shore lagoons with sparse vegetation, 1 from Tenth of Ramadan, Lower Egypt & Nile valley 3. IX. 1993; collected by R. S. Ahmed; habitat: brackish water, gravel-pit pond with sparse vegetation and 2 from Asyut, Upper Egypt & Nile valley 10 IX 1994; collected by Dr. H. Fadel (Ain Shams Univ.).
**Type deposity**: Holotype and 3 female paratypes in the Natural History Museum,

London, England (BMNH); 1male and 1female paratypes in Plant protection Department, Faculty of Agriculture, Al-Azhar University ( Alfieri collection), Egypt, (AAP ). 1male and 1 female paratypes in Coll. Dr. R. Angus, London (cRA). 1 male and 1female paratypes in Coll. R.S. Ahmed, Egypt

Type material of *Copelatus parallelipipedus* Régimbart, 1895: Lectotype male, designated by present study; Congo francais / Cap Lopez et Rembo N'Comi; Museum Paris coll. Maurice Régimbart 1908; MNHN Paris.

Additional material studied of *Copelatus parallelipipedus* Régimbart, 1895: Kenya, Chigr: Kisumu; M. W. service leg. 1.XII.1971 (male genitalia illustrated) (1 ex. cRA) J. Balfour-Browne det.; Uganda, Kampala; G. H. E. Hopkins leg. 12. VIII 1929 (1ex. cRA female) J. Balfour-Browne det.

**Description**: Length: 4.8-5mm. Body broadly oblong-oval, mostly flattened; colour reddish black with legs, epipleura, appendages and much of ventral side reddish-ferruginous. **Head**: With moderately dense, fine and evenly-distributed punctures which are more distinct on the disc; alongside each eye with a row of confluent punctures, some of which bear hairs and few additional beside these rows; frontally with two fairly deep transverse depressions. **Pronotum**: Sides little paler in colour; reticulation weakly impressed and irregular; punctation fine, dense and more distinct than on the head; anterior row of punctures not interrupted at middle, becoming close together and denser towards sides; lateral margins strongly bordered, with strong punctures along the groove; posterior row of punctures very broadly interrupted at middle and confluent over a small area sublaterally; punctures on the anterior, posterior and lateral edges are mostly hairy; lateral margins weakly rounded; posterior angle distinctly rounded; pronoto-elytral angle well-marked (fig. 8.10). **Elytra**: Reticulation very fine, punctures minute and fairly dense posteriorly, with 5 striae of weakly impressed, punctures (fig. 8.1); striae 1, 2, and 5 well-marked than striae 3, 4 which consist of isolated and scattered punctures; most punctures of striae hairy posteriorly; usually with an additional stria at the lateral margin which is very distinct in the posterior half. Epipleura as in (fig. 8.2). **Ventral side**: Punctures and reticulation weaker on the ventral side; prosternal process short, keeled, strongly margined, weakly and bluntly pointed (fig. 8.7); metacoxal process well separated; metacoxal lines close anteriorly, moderately divergent posteriorly (fig. 8.11); metacoxal plate with scattered short striae and sparse fine punctures; abdominal sternites with numerous, weakly impressed scratches at sides. Metasternal wing as in (fig. 8.6).

**Male**: Pro and mesotarsi with five segments (fig. 8.8), the basal three segments broadly expanded and fairly bilobed, ventrally with four transverse rows of adhesive discs; forth segment short and cylindrical, fifth segment elongate and gently curved; protibia enlarged towards apex, curved, basal part slender and little sinuate on the inside (fig. 8.12), with sparse punctures usually scattered around lateral margins ; metatarsal claws as in (fig. 8.9). Aedeagus as in fig.8.3, 4, 5; plate 7.1,3: penis slender, curved, slightly but uniformly narrowed from base to apex; asymmetrical from dorsal surface; parameres terminally spatulate.

**Female**: Posterior angle of pronotum and about apical 2/3 of the elytra with close, fine longitudinal short lines (strioles); each elytron with 5 well-marked or striae, additional postero-lateral stria usually indistinct and more reduced than in male. Three basal segments of pro and mesotarsi short and cylindrical; protibia with fairly strong punctures on the ventral surface.

**Affinities**: This species comes close to *C. parallelipipedus* Régimbart (fig. 9, plate 7.2,4), from which it can be distinguished by larger and more elongate aedeagus; the elytral punctures less dense and more fine; scratches on the abdominal sternites weaker; sterioles on the female pronotum and elytra more dense and impressed. Penis strongly curved, progressively narrowed from middle to the apex; acute but slightly rounded terminally.

Distribution (Africa): endemic to Egypt

Distribution (Egypt): Nile valley and Delta; eastern desert

Months of abundance: April, August and September

Habitat: occurs under debris on bank stream; in sea shore lagoons with sparse vegetation and collected from brackish water, gravel-pit pond with sparse vegetation.

## Subfamily Hydroporinae Aubé

Hydroporinae Aubé, 1836: Icon. Col. 5: 14, 217.

This is the largest subfamily with about 1,500 described species, and worldwide in distribution (Nilsson & Holmen 1995). 6 tribes are represented in the Egyptian fauna, Methlini, Hyphidrini, Bidessini, Hydrovatini, Hygrotini, Hydroporini.

### Tribe Methlini Van de Branden

Methlini Van de Branden, 1885: Ann. Soc. Ent. Belg. 29: 65.

The tribe includes two genera (Zaitsev 1953), one of which is represented in the Egyptian fauna.

### Genus *Methles* Sharp

*Methles* Sharp, 1882: Scient. Trans. R. Dublin Soc. 2(2): 489.

Type species: *Methles punctipennis* Sharp, 1882: l.c.: 490 [= *Hydroporus cribratellus* Fairmaire, 1880: Annls Soc. Ent. Fr. (5) 10: 248], by subsequent designation of Guignot, 1946: Revue Fr. Ent. 13: 113.

A small genus, Guignot (1959-1961) recognized four species in Africa. In Egypt there is only one species of this genus, *Methles spinosus*.

### *Methles spinosus* Sharp (Fig. 10, Plate 8.3,4)

*Methles spinosus* Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 489, 490.

Type locality: near Cairo, Egypt.

Type material: Type, Sharp determination; Egypt, neighbourhood of Cairo; collected by Dr. Millingen; Sharp coll., 1905- 313 type 603, *spinosus* Sharp n.sp. BMNH.

### Tribe Hydrovatini Sharp

Hydrovatini Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 489.

This tribe includes two genera; Queda Sharp with three species in Central and

South America (Biström 1990).

## Genus *Hydrovatus* Motschulsky (Plate 9)

*Hydrovatus* Motschulsky, 1853: Hydrocanth. Russ.: 4.

Type species: *Hyphydrus cuspidatus* Kunze, 1818: Neue Schrift. Nat. Ges. Halle 2 (4): 68, by monotypy. F. Balfour-Browne (1936: 28) attributed *Hydrovatus* to Motschulsky (1855) and designated *Hydrovatus castaneus* Motschulsky as type species. Nilsson et al. (1989) stated that this designation is invalid as only *H. cuspidatus* was mentioned in the original description (Motschulsky, 1853: l.c.: 4).

Distribution: tropical and subtropical regions

A large genus of 203 species, more than 100 species occur in Africa. Six species are recorded from Egypt, *H. aristidis*, *H. clypealis*, *H. cuspidatus*, *H. longicornis*, *H. sordidus*, *H. compactus*.

### Key to species

1- Size large; clypeus with a distinct wide, mostly uninterrupted border ..... ***H. compactus***

- Size small; clypeus with a narrow, sometimes interrupted at the middle border ..... **2**

2- Anterior margin of metacoxae with narrow transverse row of very short, parallel striations; antennae simple in male and female ..... **3**

- Anterior margin of metacoxae smooth without narrow transverse row of very short, parallel striations; antennae modified in male but simple female ..... **4**

3- Elytra testaceous without any markings; male antennae very long, each segment being longer than broad (fig. 12.4, plate 9.5)..... ***H. longicornis***

- Elytra dark brown; each elytron usually with 2 patches of different shape and lateral margin yellow, male antennal segments 3-7 greatly modified to mostly transverse broad segments (fig. 14.4, plate 9.6) ..... ***H. aristidis***

4- Striation on the anterior margin of metacoxa dense and distinct ..... **5**

- Striation on the anterior margin of metacoxa sparse and indistinct ..... ***H. sordidus***

5- Elytra mostly with 2 discal bands and lateral margin reddish-brown ..... ***H. cuspidatus***

- Elytra mostly without discal bands ..... ***H. clypealis***

### *Hydrovatus cuspidatus* (Kunze) (Fig. 11; Plate 9.1, 10.1)

*Hyphydrus cuspidatus* Kunze, 1818: Neue Schr. Naturf. Ges. Halle 2: 68.

Type locality: Halle, Germany

Type material: female, Cotype: Coll. Zool. Mus. Leipzig, übernahm 1971/ Mus. Dresden (Dresden).

Distribution (Africa): widespread in Palaearctic region; North Africa & Ethiopia

Distribution (Egypt): all zoogeographical regions (see table 1)

Months of abundance: March, May-October

Habitat: occurs in a wide variety of mainly stagnant water; vegetation is either absent or sparse; fresh and brackish water

***Hydrovatus longicornis* Sharp (Fig. 12; Plate 9.3,5, 10.4)**

*Hydrovatus longicornis* Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 323.
Type locality: Egypt but proper labelling of the types has been questioned.
Type material: Lectotype male: Egypt; collected by Dr. Millingen; Sharp coll.-1905-313; type 3; *longicornis* Sharp n. sp.; BMNH London.
Distribution (Africa): Ethiopia, Zair, Gabon
Distribution (Egypt): Coastal strip; Nile valley and Delta; eastern desert
Months of abundance: July-August
Habitat: shallow ponds with dense marginal vegetation; fresh and brackish water

***Hydrovatus sordidus* Sharp (Fig. 13; Plate 9.2, 10.2)**

*Hydrovatus sordidus* Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 327.
*Hydrovatus humilis* Sharp, 1882: L.c.: 327.
Type locality: Egypt
Type material: *Hydrovatus sordidus*: Holotype male, determined by Sharp (1982); Egypt, Sharp coll. 1905-313; type 8, *sordidus* Sharp n. sp.; BMNH.
*Hydrovatus humilis*: Lectotype designated by Biström (1989); Madagascar, Sharp coll. 1905-313; type 153, *humilis* Sharp n. sp. (BMNH).
There is some confusion on the identity of this species and the *H. sordidus* of Guignot (1959-1961) is another species (Omer-Cooper 1965). Wewalka (1989) treated *H. humilis* and *H. sordidus* as separate species and recorded both from Israel.
Distribution (Africa): Ethiopia, Uganda, Mauritania, Zair, Mozambique
Distribution (Egypt): Nile valley and Delta; eastern & western desert
Months of abundance: March, June, August, October-December
Habitat: stagnant water, most often with a dense vegetation; brackish water

***Hydrovatus aristidis* Leprieur (Fig. 14; Plate 9.4,6, 10.6)**

*Hydrovatus aristidis* Leprieur, 1879: Ann. Soc. Ent. Fr. Bull.: 82.
Type locality: Egypt
Type material: Holotype male: Egypt, Letourneux 1879; Museum Paris coll. Maurice Régimbart 1908/*aristidis* Lepr. MNHN Paris.
Distribution (Africa): Mauritania, Mali, Gambia, Ivory Coast, Chad, Sudan
Distribution (Egypt): Nile valley and Delta; eastern desert
Months of abundance: Feburary, September, December
Habitat: marshes and spring-fed pools with dense vegetation; fresh and brackish water

***Hydrovatus clypealis* Sharp (Fig. 15; Plate 10.5)**

*Hydrovatus clypealis* Sharp, 1876: Pet. Nouv. Ent. 2: 61.
Type locality: South of England, Portsmouth
**Type material**: Lectotype male: England / Sharp coll.-1905-313; type 1; *clypealis* Sharp n. sp. BMNH London.
Distribution (Africa): Morocco, Algeria, Tunisia, Libya
Distribution (Egypt): very rare species, collected from few localities in the coastal strip and eastern desert

Months of abundance: July-August
Habitat: marshes and spring-fed pools with dense vegetation; brackish water

***Hydrovatus compactus* Sharp (Fig. 16; Plate 10.3, 11.2)**

*Hydrovatus compactus* Sharp: Scient. Trans. R. Dublin Soc. 2 (2): 333.
Type locality: Gabon, Africa.
Type material: Holotype male; Gabon; coll. Sharp, 1905-313, type 20; *compactus* Sharp n. sp. BMNH London.
Distribution (Africa): Ethiopia, Senegal, Gabon, Sudan, Zair
Distribution (Egypt): Nile valley and Delta; western desert
Months of abundance: May-August, November
Habitat (Egypt): confined mainly to springs and small streams with slow running water and high vegetation; fresh and brackish water

**Tribe Bidessini Sharp**

Bidessini Sharp 1882: Scient. Trans. R. Dublin Soc. (2)2: 336, 925.
The tribe currently includes 30 genera (Biström 1988 c). Five genera are known from Egypt, of which one genus and its species *Bidessus ovoideus* is a new record for Egypt.

**Genus *Bidessus* Sharp**

*Bidessus* Sharp 1882: Scient. Trans. R. Dublin Soc. (2)2: 344, 852.
Type species: *Dytiscus unistriatus* Schrank 1781: Enum. Ins. Auatiae indig.: 205, by subsequent designation of F. Balfour-Browne 1936: Entomologist's Man. Mag. 72: 29.
Palaeractic and African genus with 48 species (Biström 1988; Fery 1991). This genus and its species *Bidessus ovoideus* is a new record for Egypt which belongs to the group *B. sharpi* that was revised by Biström (1985).

***Bidessus ovoideus* Régimbart (Fig. 17; Plate 12.5,6, 14.6,7)**

*Bidessus ovoideus* Régimbart 1895: Mém. Soc. Ent. Belg. 4: 81.
Type locality: Natal, South Africa.
Type material: Holotype female: female, Type, 324, *Bidessus ovoideus* Rég., type unique, J. Balfour Browne 1959. SAM Cape Town, South Africa.
Distribution (Africa): Ethiopia, Uganda, Kenya, Tanzania, Malawi, South Africa, Natal, Botswana, Swaziland, Zair, Madagascar
Distribution (Egypt): Nile valley and Delta; western desert; Gebel Elba
Months of abundance: January, September, December
Habitat (Egypt): in marshes, swamps and springs with dense vegetation; also, collected near the edge of permanent pools with muddy bottom; brackish water

**Genus *Clypeodytes* Régimbart**

*Clypeodytes* Régimbart 1894: Annls Soc. Ent. Fr. 63: 230.
Type species: *Hydroporus cribrosrs* Schaum 1864: Berl. Ent. Z. 8: 107, subsequently designated by Guignot 1946: Revue Fr. Ent.13: 112-118.
24 species are recognized in the genus *Clypeodytes* in Africa of which 12 are described as new species by Biström (1988b). Nilsson & Person (1993) stated that thirteen species occur in Asia and Australia. Only one species has been recorded

from Egypt, *Clypeodytes cribrosus*.
Distribution: this genus has many species in Africa, Australia and Asia (India)

***Clypeodytes cribrosus* (Schaum) (Fig. 18)**

*Hydroporus cribrosus* Schaum 1864: Berl. Ent. Z. 8: 106, 107.
Type locality: Egypt.
Type material: Cotype female: *Hydroporus cribrosus*; sent to BMNH by Kiesenwetter (J. Balfour-Browne, 1947); Sharp coll. 1905-313; *cribrosus* mihi Aegypté. BMNH London. Type specimen of Sharp (i.e. that used by Sharp for his redescription of the species): male, Cairo, Egypt; 98/Sharp coll. 1905-313. BMNH London.
Distribution (Africa): Ethiopia, Senegal, Mali, Niger, Ivory Coast, Burkina, Nigeria, Chad, Sudan, Gabon
Distribution (Egypt): Nile valley and Delta
Months of abundance: July-August
Habitat: collected from marshes and swamps; fresh water

**Genus *Hydroglyphus* Motschulsky**

*Hydroglyphus* Motschulsky 1853: Hydrocanth. Russ.: 5
Type species: *Dytiscus geminus* Fabricius 1792: Ent. Syst. 1: 199 (= *Dytiscus pusillus* (Fabricius) 1781: Spec. Ins. 1: 297), by subsequent designation of (Biström & Silfverberg 1981).
Type species: *Dytiscus geminus* Fabricius 1792: l.c.: 199 (= *Dytiscus pusillus* (Fabricius) 1781: l.c.: 297), by original monotypy.
Current status: Junior objective synonym of *Hydroglyphus* Motschulsky.
Distribution: A relatively large genus, it includes about 80 species (Biström 1988c), 40 species are recognized in Africa (Biström 1986a).
Distribution: predominantly tropical, and is confined to the Palaearctic, Afrotropical, Oriental and Australian regions.

**Key to species**

1-Elytral striae very short or absent (fig. 24.1) ..... ***H. signatellus***
- Elytral striae relatively long ..... **2**

2- Dark markings of elytra well-marked ..... **3**
-Dark markings of elytra greatly reduced to the apical part ..... ***H. angularis***

3- Angle between pronotum and elytra distinct; penis in dorsal view broad (fig. 21.2, plate 14.4); apical segment of paramere large (fig. 22.4, plate 14.5) ..... **4**
- Angle between pronotum and elytra indistinct; penis in dorsal view narrow (fig. 19.2, plate 14.1); apical segment of paramere small (fig. 20.4, plate 14.2) ..... **5**

4- Small species (1.9-2.3mm.); penis with long apical processes, distinctly curved inwards and close to each other (fig. 21.2,3; plate 14.4); apical segment of paramere longer than the medial segment (fig. 21.4, plate 14.4) ..... ***H. pentagrammus***
- Large species (3 -3.3mm.); penis without long apical processes but markedly sinuat (fig. 22.2,3; plate 14.5); apical and medial segment of paramere almost equally large (fig. 22.4, plate 21.5) ..... ***H. major***

5- Elytra fairly shiny; penis apically shallow sinuate (fig. 19. 2,3; plate 14.1); apical

segment of paramere truncate apically (fig. 19.4, plate 14.1) ..... ***H. pusillus***
-Elytra somewhat mat; penis apically blunt (fig. 20.2,3; plate 14.2); apical segment of paramere pyramidal, not truncate apically (fig. 20.4, plate 14.2) ..... ***H. confusus***

***Hydroglyphus pusillus* (Fabricius) (Fig. 19; Plate 12.1,3, 14.1)**

*Dytiscus pusillus* Fabricius 1781: Spec. Ins. 1: 297.
Type locality: Italy
Type material: *pusillus*, Zool. Mus. DK Copenhagen (ZMK)
Distribution (Africa): Morocco, Algeria, Tunisia, Libya
Distribution (Egypt): Coastal strip, eastern desert, Sinai
Months of abundance: April, August
Habitat: brackish and high salinity water with sandy or coarse gravel bottom like seashore lagoons and gravel-bit ponds. Also, collected from hot spring , spring-fed streams with sparse vegetation; brackish water

***Hydroglyphus confusus* (Klug) (Fig. 20; Plate 11.1, 12.2,4, 14.2)**

*Hydroporus confusus* Klug 1834: Symb. Phys. 4: t. 34, Fig. 4.
Type locality: Syria.
Type material: Lectotype male designated by Biström (1986)- 10230/ Syria Ehrenberg/Zool. Mus. Berlin (MNB).
Distribution (Africa): Tunisia, Mauritania, Mali, Niger, Chad, Sudan, Ethiopia, Gambia, Senegal, Guinea, Ivory Coast, Burkina, Nigeria, Cameroon, Somalia
Distribution (Egypt): Nile valley & Delta, western desert, Gebel Elba
Months of abundance: all the year round
Habitat: various sorts of stagnant water, including swamps, ponds, lakes, ditches, temporary water pools, road side pools crowded with decayed matters and some sparse vegetation; fresh and brackish water

***Hydroglyphus pentagrammus* (Schaum) (Fig. 21; Plate 14.4)**

*Hydroporus pentagrammus* Schaum 1864: Ent. Zeitschr. 8: 106, 108.
Type locality: Cairo, Egypt
Type material: Lectotype male designated by Brancucci (1981): 10226/*pentagrammus* Schaum/Cairo/Lectotype *Hydroporus pentagrammus* Schaum, des. Brancucci 81/Zool. Mus. Berlin (MNB).
Distribution (Africa): Mauritania , Sudan, Ethiopia, Senegal, Nigeria,
Distribution (Egypt): Nile valley & Delta, western desert
Months of abundance: April, June, August, and October
Habitat: brackish water in seashore lagoons with sparse vegetation and shallow water pool crowded with floating plants and close to small stream with dense vegetated margins

***Hydroglyphus major* (Sharp) (Fig. 22; Plate 14.5)**

*Bidessus major* Sharp 1882: Scient. Trans. R. Dublin Soc. (2)2: 354.
Type locality: Jedda, Saudi Arabia.
Type material: Lectotype male designated by Biström (1986a); Jedda, Arabia; Sharp coll. 1905-313; type 69; *Bidessus major* n. sp. BMNH London.

Distribution (Africa): Algeria, Nigr, Sudan, Ethiopia, Djiouti, Somalia, Chad
Distribution (Egypt): Nile valley & Delta, western & eastern desert, Sinai, Gebel Elba
Months of abundance: April-August
Habitat: occurs in springs, small streams, marshes, gravel-pit ponds; fresh and brackish water

***Hydroglyphus angularis* (Klug) (Fig. 23)**

*Hydroporus angularis* Klug 1834: Symb. Phys. 4: t. 34, Fig. 1, 2.
Type locality: Ambukohl, Sudan.
Type material: Lectotype male designated by (Biström 1986); Aegypten Ehrenberg 10228/Zool. Mus. Berlin (MNB).
Distribution (Africa): Algeria, Tunisia, Nigr, Sudan, Ethiopia,Chad, Mauritania, Mali, Djibouti, Gambia, Senegal, Burkina, Nigeria, Cameroon, Morocco, Central African Republic, Uganda and Zair
Distribution (Egypt): eastern desert, Gebel Elba
Months of abundance: August-November
Habitat: stagnant water with sparse vegetation and coarse bottom. One specimen collected from road side pool with decaying matters; brackish water

***Hydroglyphus signatellus* (Klug) (Fig. 24; Plate 14.3)**

*Hydroporus signatellus* Klug 1834: Symb. Phys. 4: t.34, Fig. 4.
*Hydroporus thermalis* Germar 1838: Fn. Ins. Eur. 20: tab.3.
Type locality: Dongola, Sudan.
Type material: Lectotype male designated by Biström (1986a)- 10227/ Aegypten Ehrenberg/Zool. Mus. Berlin (MNB). *H. thermalis*: Holotype male: 10236/*thermalis* Germ. (MNB).
Distribution (Africa): Algeria, Libya, Tunisia, Sudan, Ethiopia, Djiouti, Somalia, Senegal, Kenya Morocco, Cap Verde, Gambia
Distribution (Egypt): widespread with more occurrence on the North.
Months of abundance: all year round
Habitat: various standing water of permanent characters and spring-fed streams. It prefers shallow water and is more confined to the water body margins with rich vegetation; brackish water near seashore.

**Genus *Yolina* Guignot**

*Yolina* Guignot 1936: Mém. Mus. National Hist. Nat. Paris, 8: 25. (as subgenus of *Yola* Gozis).
Type species: *Hydroporus elegantulus* Boheman 1848: Ins. Caffr. 1(1): 249, by original designation.
Distribution: a small genus with nine species in Africa and Arabia that were revised by Biström (1983). Only one species occurs in Egypt (*Y. insignis*).

***Yolina insignis* (Sharp) (Fig. 25; Plate 14.8, 17.3, 18.3,6)**

*Bidessus insignis* Sharp 1882: Scient. Trans. R. Dublin Soc. (2)2: 348.
Type locality: Hedjaz, Saudi Arabia.

Type material: Lectotype male designated by Biström (1983); type, Sharp coll. 1905-313, Hedjaz, Millingen 113, *insignis* BMNH London. Mounted together with one paralectotype on the same label; lectotype to left.
Distribution (Africa): Ethiopia, Djibouti, Somalia, Sudan, Tanzania
Distribution (Egypt): eastern desert, Nile valley & Delta
Months of abundance: April, August
Habitat: shallow ponds with dense marginal vegetation; collected also from ditches close to paddy fields; some specimens collected from small water pool with gravel bed and sparse vegetation; fresh and brackish water

**Genus *Yola* Des Gozis**

*Yola* Des Gozis 1886: Rech. de l'esp. typ.: 8; 1913: Misc. Ent. Narbonne: 87.
Type species: *Dytiscus bicarinatus* Latereille, 1804: Hist. Nat. Ins. 8: 179, by monotypy.
*Anodocheilus Babington*, Ganglbauer 1892: Köf. Mittel. 1: 454 (as subgenus of *Bidessus* Sharp).
Type species : *Dytiscus bicarinatus* Latereille, 1804: l.c. 8: 179, by monotypy.
Current status: Junior objective synonym of *Yola* Des Gozis.
*Yolula* Guignot 1950: Rev. Fr. Ent. 17: 100,101 (as subgenus of *Yola* Gozis).
Type species: *Bidessus dohrni* Sharp 1882: Scient. Trans. R. Dubl. Soc. (2)2: 347, by original designation.
Current status: Junior subjective synonym of *Yola* Gozis.
Distribution: many species of this genus confined to Africa and Asia
The genus includes 39 species (Biström 1983), of which more than 30 species occur in Africa (Nilsson & Person 1993). According to this study 2 species are confirmed to the Egyptian fauna, *Y. porcata* and *Y. enigmatica*.

**Key to species**

1-Each elytron with one distinct keels (plate 13.2,4), dark longitudinal markings on the elytra ..... ***Y. enigmatica***
- Each elytron with two or three distinct keels (plate 13.1,3) ; markings between dark sutural area and discal keels always large and distinct ..... ***Y. porcata***

***Yola porcata* (Klug) (Fig. 26; Plate 13.1,3, 14.9)**

*Hydroporus porcatus* Klug 1834: Symb. Phys. 4: t. 34, f. 5.
Type locality: Egypt.
Type material: Lectotype male designated by Brancucci (1989): 10250, Typus Porcata Kl. des. M. Brancucci 80; Zool. Mus. Berlin (MNB).
Distribution (Africa): Sudan
Distribution (Egypt): few localities in Lower and Upper Egypt
Months of abundance: May, July, September
Habitat: often among vegetation in the marshes, ponds and pools with clean shallow water; fresh and brackish water

***Yola enigmatica* Omer-Cooper (Fig. 27; Plate 13.2,4)**

*Yola enigmatica* Omer-Cooper 1954: Ent. Month. Mag. 90:212.

Type locality: Djibouti.
Type material: Holotype mlae: Type, Fr. Somaliland, Djibouti 21.XII. 1926 J. Omer-Cooper, *Y. enigmatica* n. sp. det. Omer-Cooper. BMNH London.
Type material of *Y. dohrni* (Sharp): Holotype male: *Hydroporus dohrni* Wehncke Ind. auth.; type mihi D. S.; South West Africa; Sharp coll. 1905; type 127 *Hydroporus dohrni*, BMNH, London.
Distribution (Africa): Mauritania, Mali, Niger, Sudan, Ethiopia, Djibouti, Senegal, Gambia, Nigeria, Cameroon, Chad
Distribution (Egypt): collected all over the country especially in the northern half
Months of abundance: April, June, August, October
Habitat: confined chiefly to marshes and spring-fed streams; some specimens collected from brackish water in seashore lagoons with sparse vegetation.

**Tribe Hygrotini Portevin, 1929**

Hygrotini Portevin, 1929: Hist. Nat. des Col. de France
Three genera of this tribe occur in Egypt *Hygrotus, Hyphoporus, Herophydrus.* This group of genera was previously placed in the Hydroporini by most authors. Nilsson & Holmen (1995) stated that there are some important larval and adult characters which strongly suggest that it should be separated from Hydroporini.

**Genus *Hygrotus* Stephens**

*Hygrotus* Stephens, 1828: Ill. Brit. Ent. Mand. 2:46.
Type species: *Dytiscus inaequalis* Fabricius, 1777: Gen. Ins.: 239, by subequent designation of Curtis 1835: Brit. Ent. 12: 531.
Distribution: mostly confined to the Holarctic region and includes about 70 species (Nilsson & Holmen 1995). All Egyptian species are related to the Subgenus *Coelambus*.

**Subgenus *Coelambus* Thomson**

*Hygrotus* s.g. *Coelambus* Thomson, 1860: Skand. Col. 2: 13.
Type species: *Dytiscus confluens* Fabricius, 1787: Mantissa Ins. 1: 193, by subsequent designation of Zaitsev 1953: Fauna SSSR 58: 129. Brinck (1942) designated *Dytiscus impressopunctatus* Schaller, 1783: Abh Nat. Ges. Halle 1: 312 as type species of *Coelambus*. According to Nilsson & Holman (1995), this designation is invalid as Thomson (1860) did not mention this name.

**Key to species**

1- Lateral margin of the elytra rising to the shoulders in a sloping curve; basal half of the epipleura relatively broad; punctation of the elytra mostly coarse with sparse fine punctures ..... **2**
- Lateral margin of the elytra steeply rising to the shoulders; basal half of the epipleura narrow; punctation of the elytra usually fine with sparse coarse punctation, this sometimes lacking ..... **4**

2- Disc of pronotum with small rounded black spot; elytra with four longitudinal black lines, sometimes with traces of a 5$^{th}$ in the posterior half .....**3**
- Disc of pronotum without small rounded black spot; elytra distinctly with

black suture, a longitudinal stripe near it, and 2 spots on the disc, lateral to the strip ..... ***H. inscriptus***

3- Anterior third of elytra with fine punctation interspread with isolated coarse punctures ..... ***H. lernaeus***

- Anterior half of the elytra with distinct coarse punctation interspread with few fine punctation ..... ***H. saginatus***

4- Head with distinct black spots between the eyes; elytra between the rows of punctures with additional coarse punctures ..... ***H. confluens***

- Head without black spots; elytra between the rows of punctures without additional coarse punctures ..... ***H. pallidulus***

***Hygrotus (Coelambus) lernaeus* (Schaum) (Fig. 28; Plate 15.1)**

Hydroporus lernaeus Schaum, 1857: Berl. Ent. Zeitschr. 1: 153.

Type locality: Greece (Nauplia, Kiesenwetter).

Type material: Lectotype female, designated by Fery (1992 a); Kiesenwtt., type; Naunplia, Typ., Sammlung Cl. Müller. ZSM Munich. Type specimen of Sharp (i.e. that used by Sharp for his redescription of the species): male, Egypt; type 201; Sharp coll. 1905-313. BMNH London.

Distribution (Africa): Egypt

Distribution (Egypt): a very rare species, Nile valley & Delta, eastern & western desert

Months of abundance: April, July-August

Habitat: collected from margins of swamps and marshes of rich vegetation; fresh and brackish water

***Hygrotus* (*Coelambus*) *saginatus* (Schaum) (Fig. 29)**

*Hydroporus saginatus* Schaum, 1857: Berl. Entom. Zeitschr.1: 154.

*Coelambus elevatus* Sharp, 1882: Scient. Trans. R. Dublin Soc. (2) 2: 403.

Type locality: Greece (Nauplia, Kiesenwetter)

Type material: *Hydroporus saginatus*: Lectotype female, designated by Fery (1992b); Kiesenwetter, Zante, Schaum Type; Sammlung Cl. Müller. ZSM Munich. *Coelambus elevatus*: Holotype female, Egypt; collected by Dr. Millingen; Sharp coll. 1905-313; Type-1136; *elevatus* n. sp. MNHN London.

Distribution (Africa): Egypt and Libya

Distribution (Egypt): Nile valley & Delta, western desert

Months of abundance: May

Habitat: occurs in marshes and spring-fed pools with vegetation, fresh and brackish water

***Hygrotus* (*Coelambus*) *confluens* (Fabricius) (Fig. 30; Plate 15.3)**

*Dytiscus confluens* Fabricius, 1787: Mant. Ins. 1: 193.

Type: According to Nilsson & Holmen (1995), the type seems to be unavailable although Guignot (1959) stated that it is in Kiel Mus. They reported from Schaum (1848: Stettin. ent. Ztg 9: 53), this species is represented by a specimen of *Haliplus* in the Fabricius collection. Also, Erichson (1848: l.c.9: 142) noted that the

specimen must have been misplaced after his visit of 1834 to Fabricius coll., when a specimen of *Dytiscus reticulatus* Fabricius was present over the name *D. confluens*. Some concepts of this type are available in Olivier (1795) and Panzer (1795).
Distribution (Africa): North Africa, Madagascar
Distribution (Egypt): widespread in Egypt, isolated records from Arish, W. Isla
Months of abundance: July-September
Habitat: found in wide variety of stagnant water with a dense vegetation; often occurred in brackish water with dense vegetation; also collected from paddy fields

***Hygrotus* (*Coelambus*) *pallidulus* (Aubé) (Fig. 31; Plate 15.2)**

*Hydroporus pallidulus* Aubé, 1850: Ann. Soc. Ent. Fr. 8: 300.
Type locality: Sicile
Type material: According to Dr. H. Fery (personal communication, Germany), there are 2 *pallidulus* in Aubé coll. Both are prepared in the same manner, but only the first one has a label. This is a small round label with the only text "Sicile". He mentioned that both specimens should be syntypes of the species.
We had opportunity to study Sharp type: *H. pallidulus*, type *mihi*. D.S. Algeria.
This species is new record to Egypt.
Distribution (Africa): Morocco, Algeria, Tunisia, Libya and Guinea
Distribution (Egypt): eastern desert and Sinai
Months of abundance: August
Habitat: temporary water pools with sparse vegetation; brackish water

***Hygrotus* (*Coelambus*) *inscriptus* Sharp (Fig. 32)**

*Coelambus inscriptus* Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 404
Type locality: Persia, Mesopotamia.
Type material: Lectotype male, designated by M. Branccuci (label without date); Persia; collected by Dr. Millingen, type 203; Sharp coll. 1905-313; *inscriptus* n.sp. BMNH London. Paralectotype same as lectotype 1ex. BMNH London.
Distribution (Africa): Egypt
Distribution (Egypt): western desert and Coastal strip
Months of abundance: April, June, August
Habitat: shallow bay with sandy bottom and sparse vegetation; collected from gravel pit with clear water and free of any vegetation; brackish water

**Genus *Hyphoporus* Sharp**

*Hyphoporus* Sharp, 1882: Scient. Trans. R. Dublin (2)2: 389, 390.
Type species: *Hydroporus solieri* Aubé in Dejean, 1838: Spec. gén. Coléopt. 6: 554, by subsequent designation of Guignot 1946: Revue Fr. Ent. 13: 115.
*Hypophorus* Zaitsev, 1953: Fauna SSSR 58: 124, 129 is an incorrect subsequent spelling (Nilsson *et al.* 1989).
Distribution: a relatively small genus with few records from Africa
This genus includes 21 species (Vazarani 1969). Only one species, *Hyphoporus solieri* occurs in the Egyptian fauna.

### *Hyphoporus solieri* Aubé (Fig. 33)

*Hyphoporus solieri* Aubé, 1838: Spec. Col. 6: 554
*Hyphoporus solieri innesi* Reitter, 1909: Bull. Soc. Ent. Egypte, 2: 31.
*Hyphoporus solieri posticalis* Sahlberg, 1913: Ofv Finska F rh. 41: 246.
Type locality: Egypt
Type material: Holotype, MNHN, Paris.
Distribution (Africa): Egypt
Distribution (Egypt): all over the country
Months of abundance: February, March, May, July-September, November
Habitat: standing and slow-running water with rich vegetation; fresh and brackish water with more accumulation near the edge.

## Genus *Herophydrus* Sharp

*Herophydrus* Sharp, 1882: Sci. Trans. R. Dubl. Soc. (2) 2: 398, 392 + pl. 12: 144.
Type species: *Hyphydrus guineensis* Aubé in Dejean, 1838: Sec. gén. Coléopt. 6: 455, by subsequent designation of Guignot 1949: Bull. Soc. Ent. Fr. 54: 150.

### Key to species

1-Elytral colour pattern uniformly black without any markings ..... ***guineensis***
- Elytral colour pattern yellow with interrupted, longitudinal black lines ... ***musicus***

### *Herophydrus guineensis* (Aubé) (Fig. 34; Plate 16.1)

*Hyphydrus guineensis* Aubé, 1838: Spec, Col. 6: 455.
Type locality: Cancase.
Type material: Museum Paris (MNHN).
Distribution (Africa): Algeria, Sudan, Congo, Tanzania, Angola, Kenya
Distribution (Egypt): western & eastern desert, Nile valley, Coastal strip
Months of abundance: March, April, July, September, November
Habitat: in highly vegetated permanent ponds, temporary water pools on the road-side, usually under trees filled with decomposing matter; spring-fed pools with much vegetation; fresh and brackish water

### *Herophydrus musicus* (Klug) (Plate 8.1, 11.3, 16.2)

*Hydroporus musicus* Klug, 1833: Symb. Phys. 4: t. 33, fig. 12.
Type locality: Sinai
Type material: ZMB, Berlin.
Distribution (Africa): Morocco, Algeria, Libya
Distribution (Egypt): Nile valley & Delta, Sinai
Months of abundance: April, May, August, October
Habitat: swamps and marshes with high vegetation; brackish water with coarse bottom and sparse vegetation

## Tribe Hyphydrini Sharp

Hyphydrini Sharp, 1882: Scient. Trans. R. Dublin Soc. 2(2): 370.
The tribe includes 11 genera, of which 5 are endemic to South Africa (Nilsson 1995) and two are represented in the Egyptian region, *Heterhydrus* and *Hyphydrus*.

## Genus *Heterhydrus* Fairmaire

*Heterhydrus* Fairmaire, 1869: Annls Soc. Ent. Fr. (4) 9: 186.
Type species: *Heterhydrus agaboides* Fairmaire, 1869: l.c.: 186, by monotypy.
Distribution: a small genus with 5 species confined to Africa and Madagascar (Wewalka 1980a). Only one species has been found in Egypt, *Heterhydrus senegalensis.*

### *Heterhydrus senegalensis* (Aubé) (Fig. 35)

*Hyphydrus senegalensis* Aubé, 1838: Spec. Col. 6: 453,454.
Type locality: Senegale and Egypt
Type material: Type male, MNHN, Paris
Distribution (Africa): Senegal, Nigeria, Ghana, Chad, Tanzania, Congo, Gabon, Zair, Uganda, Zambia, Malawi, Mozambique, South Africa, Madagascar
Distribution (Egypt): Nile valley & Delta, eastern desert, Sinai
Months of abundance: July-August, October
Habitat: temporary water pools with gravel bottom and sparse vegetation; brackish water

## Genus *Hyphydrus* Illiger

*Hyphydrus* Illiger, 1802: Mag. Ins. 1: 299.
Type species: *Hydrachna gibba* Fabricius, 1801: Syst. Eleuth. 1: 256 [= *Dytiscus ovatus* Linnaeus, 1761: Faun. Suec. ed. 2: 547], by subsequent designation of Latreille 1810: Cons. Gén. Anim. Class. Crust. Arochn. Ins. :426.
*Hyphidrus* Stephens, 1828: Ill. Brit. Ent. Mand. 2:44 is an incorrect subsequent spelling.
*Hydrachna* Fabricius 1801: Syst. Eleuth. 1: 255 (nec *Hydrachna* Müller 1767- Acarina).
Type species: not designated.
*Pachytes* Montrouzier 1860: Ann. Soc. Ent. Fr. (3) 8: 244 (nec. *Pachytes* Defrance 1825- Mollusca)
Distribution: Europe, Asia, Africa, Australia
Type species: *Pachytes elegans* Montrouzier, 1860: l.c.: 245, by monotypy.
This genus includes about 100 species and was revised by Biström (1982). Of numerous African species only four occur in Egypt, two have been already recorded from Egypt (*H. grandis* and *H. pictus*) and two new record for the Egyptian fauna (*H. maculatus* and *H. cycloides*).

### Key to species

1- Elytral punctation uniform, of one kind; proleg with elongated, pointed trochanter (fig. 36.6); apex of penis with two long appendages (fig. 36.2,3) ..... ***H. grandis***
- Elytral punctation of two kinds; proleg with short, incised trochanter; apex of penis with a shallow incision (fig. 38.2,3) ..... **2**

2- Fore margin of the head distinctly bordered and rounded; Elytral punctation distinct ..... ***H. cycloides***

- Fore margin of the head faintly bordered, and medially straight; elytral punctation indistinct ..... 3

3- Very distinct depression on each side of the anterior margin of the head ..... ***H. pictus***

- Indistinct, shallow depression on each side of the anterior margin of the head ..... ***H. maculatus***

***Hyphydrus grandis* Laporte de Castelnau (Fig. 36, Plate 8.2)**

*Hyphydrus grandis* Laporte de Castelnau, 1935: Etud. Ent.: 107.

*Hyphydrus major* Sharp, 1882: Scient. Trans. R. Dublin Soc. (2) 2:375. Junior synonym by Biström (1982).

Type locality: Senegal.

Type material: *H. grandis*: Lectotype female, designated by Biström (1982); Senegal; coll. Maurice Réginbart 1908; type, *grandis* Cast. MNHN Paris. *H. major*: Lectotype male, designated by Biström (1982); Egypt; Sharp coll.-313; type 27, *major* Sharp n.sp. BMNH, London.

Distribution (Africa): Chad, Sudan, Ethiopia, Senegal, Gambia, Ivory Coast, Benin, Nigeria, Cameroon, Gabon, Zair, Mauritania, Mali

Distribution (Egypt): Nile valley & Delta, eastern desert, Sinai

Months of abundance: January, August, October

Habitat: temporary water pools with vegetation; brackish water

***Hyphydrus cycloides* Régimbart (Fig. 37)**

*Hyphydrus cycloides* Régimbart, 1889: Nat. Leyd. Mus. 11: 56.

Type locality: Humpata, Angola.

Type material: Lectotype male designated by Biström (1982); Humpata, Afr. tropic; P.J. vd Kellen, type *cycloides* Régimbart, (male genitalia illustrated). RNHL Netherland.

Distribution (Africa): Ethiopia, Guinea, Ivory Coast, Zair, Kenya, Uganda, Angola, Zimbabwe, South Africa, Madagascar, Congo

Distribution (Egypt): western & eastern desert

Months of abundance: May, July

Habitat: spring-fed stream with hard bottom with sparse vegetation; temporary water pool with sand bottom and free of vegetation; brackish water

***Hyphydrus pictus* Klug (Fig. 38)**

*Hyphydrus pictus* Klug 1834: Symb. Phys. 4: t.33, f. 9.

*Hyphydrus lugubris* de Borre 1870: Ann. Soc. Ent. Belg. 14: 10.

Type locality: Sinai, Egypt.

Type material: Lectotype female designated by Biström (1982); N. Sinai, Egypt; 10048, *pictus* LXVI 133-5, Type, MNB Berlin. *H. lugubris*: not located, type, unique female, Sinai. According to Borre (1870), the type specimen is in Crotch Coll., which is now deposited in Cambridge Museum. Biström (1982) dependant on the information from G.N. Foster (Balfour-Browne club, Scotland) stated that the type is not there, and it is apparently lost.

Therefore, Biström (1982) mentioned that *H. lugubris* may be considered a junior synonym of H. *pictus*, by original description.
Distribution (Africa): Ethiopia, Somalia, Sudan
Distribution (Egypt): Nile valley & Delta, western & eastern desert, Sinai
Months of abundance: May, July, September
Habitat: spring-fed streams; temporary water pools with gravel bottom and dense vegetation; brackish water near the sea shore.

***Hyphydrus maculatus* Babington (Fig. 39)**

*Hyphydrus maculatus* Babington, 1841: Trans. Entomol. Soc. London 3: 12.
Type locality: St. Yago, Cape Verde.
Type material: Lectotype female, designated by Biström (1982); St. Yago, Cape Verde; syntype, *maculatus* Babington n.sp. BMNH London.
Distribution (Africa): Ethiopia, Somalia, Sudan, Algeria, Mauritania, Cape Verde, Senegal, Gambia, Mali, Niger, Chad, Guinea, Cierra Leon, Ivory Coast, Benin, Nigeria, Cameroon, Zair, Kenya
Distribution (Egypt): Nile valley & Delta, Gebel Elba
Months of abundance: February, September
Habitat: muddy swift-flowing streams with gravel bottom, clear water and vegetated margins; fresh and brackish water

**Tribe: Hydroporini Aubé**

Hydroporini Aubé, 1936: Icon. Col.5: 26o (344).
Hydrocoptini Van den Branden, 1885: Annls. Soc. Ent. Belg. 29 (1): 13 (as tribe of Noteridae).

**Genus *Hydroporus* Clairville**

*Hydroporus* Clairville in Clairville & Schellenberg, 1806: Ins. Helvét. 2: 182.
Type species: *Hyphydrus pubescens* Gyllenhal, 1808, by subsequent designation of Guignot, 1946.
*Hydrocoptus* Motschulsky, 1853: Hydrocanth. Russ.:5 (as subgenus *Hydroporus* Clairville).
Type species: *Dytiscus tristis* Paykull, 1798: Faun, Suec. Ins. 1: 323, designated by Nilsson *et al.* (1989). Guignot (1946) designated *Hydrocoptus subvittulus* Motschulsky, 1859 as type. Nilsson et al. (1989) did not accept this invalid designation because this species was not mentioned by Motschulsky, 1853 (l.c.)
Distribution: mainly Holarctic, large genus contains more than 200 species (Nilsson & Holmen 1995). Two species are recognized from Egypt, *H. humilis* and *H. oasis.*

**Key to species**

1-Dorsal surface with fine, distinct microreticulation, best visible on the pronotum ..... ***H. humilis***
- Dorsal surface without any microreticulation ..... ***H. oasis***

***Hydroporus humilis* Klug (Fig. 40)**

*Hydroporus humilis* Klug, 1934: Symbolae Physicae t. 33.
*Hydroporus tessellatus sinaicus* Wewalka, 1984: Kleopt. Rundschau, 57: 133.

Type locality: Sinai, Egypt.
Type material: Lectotype male, designated by Balke & Fery (1993); Agyptën/ Ehrenberg 10159/ Typus/ MNB Berlin. *Hydroporus tessellatus sinaicus*: Holotype female, described by Wewalka (1984); Sinai, collected by Margalit 1979/ 10690/ Zool. Mus., Hebrew Univ., Jerusalem (Israel).
Distribution (Africa): Egypt and Mediterranean region
Distribution (Egypt): Nile valley & Delta, eastern desert, Sinai
Months of abundance: May, August, October
Habitat: spring-fed streams

***Hydroporus oasis* Wewalka**

*Hydroporus oasis* Wewalka, 1992: Koleop. Rundschau 62: 53.
Type locality: Baharein Oasis, Egypt.
Type material: Holotypus female, Oasis El Baharein, Wewalka n.sp. collected by Omer-Cooper 13.6.1935, Armstrong College Expedition (B.M. 1935-354) in coll. Nat. Hist. Mus. BMNH, London.
Distribution (Africa): endemic to Egypt
Distribution (Egypt): western desert
Months of abundance: May, August, October
Habitat: spring-fed streams

**Genus *Scarodytes* Gozis**

*Scarodytes* Gozis, 1914: Miscnea Ent. 21 (1913): 110 and 22: 147
Type species: *Dytiscus halensis* Fabricius, 1787: Mantissa Ins. 1: 192, by subsequent designation of Zimmermann, 1933: Koleopt. Rdsch. 19: 188. J. Balfour-Browne (1944) did not accept Zimmermann's type designation because it was stated in an indirect way and designated *Dytiscus lineatus* Fabricius as type species. Nilsson *et al.* (1989) mentioned that Zimmermann's designation must be accepted as valid name to support the stability of nomenclature.
According to Nilsson & Holmen (1995), eight species are recognized from this genus. Only one species occurs in Egypt, *Scarodytes halensis*.
Distribution: mainly West Palaearctic, most diverse in the Mediterranean region.

***Scarodytes halensis* (Fabricius) (Fig. 41; Plate 11.4, 15.4, 17.1)**

*Dytiscus halensis* Fabricius, 1787: Mant. Ins. 1: 192.
Type locality: Allemagne
Type material: Mus. Kiel
Distribution (Africa): Egypt ( new record to Africa)
Distribution (Egypt): 6 individuals collected from northern Sinai
Months of abundance: November
Habitat: temporary water pool with sparse vegetation and coarse bottom and spring-fed streams; brackish water.

**Genus *Nebrioporus* Régimbart**

*Nebrioporus* Régimbart, 1906: Annls Soc. Ent. Fr. 75: 237
Type species: *Hydroporus kilimandjarensis* Régimbart, 1906, by monotypy

Zimmermann, 1919: Arch. Naturgesch. 83 (1917): 184, 186 (as subgenus of *Deronectes* Sharp) (not Grouvelle, 1896).
Type species: *Dytiscus elegans* Panzar, 1795: Ent. Germ. 1: tav. 5 [=*Dytiscus deprssus* Fabricius, 1775: Syst. Ent.: 233], fixed under Article 67h of the Code.
*Potamonectes* Zimmermann, 1921: Ent. Bl. Biol. Syst. Käfer 17: 87, nomen novum for *Potamodytes* Zimmermann.
Type species: *Dytiscus elegans* Panzar, 1795: Ent. Germ. 1: tav. 5 [=*Dytiscus deprssus* Fabricius, 1775: Syst. Ent.: 233], by subsequent designation of Guignot 1941: Bull. Soc. Sci. Nat. Maroc 21: 60.
Distribution: Palaearctic, few species are known from the Nearctic, Oriental and Afrotropical regions. As defined by Nilsson & Angus (1992), this genus includes 44 species. Four species are known from Egypt; *N. cerisyi, N. insignis, N. lanceolatus, N. walkeri.*

**Key to species**

1- Lateral margin of the elytra with subapical denticle (male) or prolonged into a pointed, more or less marked angle (female); elytral pattern various, dark or with pale maculation, never simple dark lines on pale background ..... **2**
- Lateral margin of elytra uniformly rounded, without subapical denticle; elytral pattern of longitudinal dark lines on pale background ..... ***N. cerisyi***

2- Anterior face of metatibia extensively punctate, no puncture-row discerned; male protarsal claws short, more or less equal (fig. 45.4, plate 11.8). ***N. walkeri***
- Anterior face of metatibia with a single row of setigerous punctures plus at most additional large punctures at the base; male protarsal claws enlarged, unequal ..... **3**

3- Pronotal colour black. Male protarsal claws unequal; inner claw 1/2 as long as the outer claw (fig. 43.4, plate 11.6) ..... ***N. insignis***
- Pronotal colour reddish yellow with a dark border at the anterior and posterior margin and with two blackish transverse spots on the disc which are usually separated, rarely more or less fused; male protarsal claws unequal; inner claw 1/3 as long as the outer claw (fig. 44.4, plate 11.7) ..... ***N. lanceolatus***

***Nebrioporus cerisyi* (Aubé) (Fig. 42; Plate 11.5, 18.1,5)**

*Hydroporus cerisyi* Aubé, 1836: Icon. Col. 5: 26o (344).
Type locality: Sardinia.
Type material: male Lectotype to be designated by Dr H. Fery; MNHN Paris.
Distribution (Africa): North Africa, Canary islands, Madeira island
Distribution (Egypt): all zoogeographical zones of Egypt
Months of abundance: February, April, August, October
Habitat: dense vegetated water of permanent character, fresh & brackish water

***Nebrioporus insignis* (Klug) (Fig. 43; Plate 11.6, 15.5, 18.3,6)**

*Hydroporus insignis* Klug, 1834: Symb. Phys. 4, t.33, fig. 10.
*Hydroporus semiclusus* Walker, 1871: Walker List. Col. coll. Lord:10.
*Deronectes princeps* Sharp, 1882: Scient. Trans. R. Dublin Soc.: 428 (syn. nov.).

Type locality: Sinai, Egypt
Type material: *Hydroporus insignis*: Holotype, Sinai- Wadi Feiran; ZMB Berlin. Sharp type female; type mihi D.S. Sinai, type 253. *Hydroporus semiclusus*: type male, Sinai- Wadi Feiran; Sharp coll. 1905-313, BMNH London. Syn. nov. by F. Balfour-Browne (1951). *Deronectes princeps*: A note in the Sharp coll. BMNH London states that this type is in Bressels-Belgium (type 254; male, Sinai).
Synonym: *Hydroporus semiclusus*: This synonym was suspected by Zimmermann (1933: Kol. Rundsch., 19: 177). It was described from Sinai Peninsula. Balfour-Browne (1951) examined the type and cotype of Walker's species in the BMNH (London) and proposed it as syn. n. *Deronectes princeps*: It is described as n. sp. by Sharp (1882) from Sinai, the same locality of *H. insignis* type. The study of original description of *H. insignis* Klug (1834) and *Deronectes princeps* Sharp (1882) showed that the only difference is a fairly deep sutural striae on the elytra in *Deronectes princeps* which is not significant character to make them two different species. Consequently, *Deronectes princeps* Sharp is a syn. n. to *Nebrioporus insignis* (Klug).
Distribution (Africa): Saudi Arabia, Yemen (no record from Africa)
Distribution (Egypt): western & eastern desert, Coastal strip, North Sinai
Months of abundance: February, April, August, October
Habitat: spring-fed streams with sparse vegetation and coarse bottom.

***Nebrioporus lanceolatus* (Walker) (Fig. 44; Plate 11.7, 17.2, 18.2)**

*Hydroporus lanceolatus* Walker, 1871: List Col. coll. Lord: 11.
*Deronectes arabicus* Sharp, 1882: Scient. Trans. R. Dublin Soc. (2) 2: 429.
Type locality: Wadi Feiran, Sinai.
Type material: *Hydroporus lanceolatus*: Lectotype male, designated by Mario Teledo (1995) (Italy). Sinai- Wadi Feiran; Sharp coll. 1905-313, BMNH London. Paralectotypes same as lectotype (2 ex. female) Sharp coll. 1905-313, BMNH London. We have many material from the same locality of type. *Deronectes arabicus*: type male; Jidda, Hadjas; Sharp coll.-313, type 256. BMNH London. Balfour-Browne (1951) proposed this species as syn. n.
Distribution (Africa): Saudi Arabia, Yemen (no record from Africa)
Distribution (Egypt): western & eastern desert, Coastal strip, North Sinai
Months of abundance: February, April, August, October
Habitat: spring-fed streams with sparse vegetation and coarse bottom.

***Nebrioporus walkeri* (Van den Branden) (Fig. 45; Plate 11.8, 18.4,7)**

*Hydroporus walkeri* Van den Branden, 1885: Ann. Soc. Ent. Belg. 29: 49.
*Hydroporus moestus* Walker, 1871: List. Col. coll. Lord: 10. (nec Aubé, 1836).
*Potamonectes schweinfruthi* Zimmermann, 1921: Ent. Blätt. 17: 87.
Type locality: Wadi Feiran, Sinai, Egypt.
Type material: *Hydroporus walkeri*: It does not seem that authors have been able to recognize it since the original description based on a single male specimen from Wadi Feiran in Sinai. The name is mentioned by Sharp (1882: Trans. Sci. R. Dublin Soc. 2 (2): 801), Peyerimhoff (1907: L'Abeille 31: 10),

and Zimmermann (1933: Kol. Rundsch. 19: 179), only by transcript of the original description. F. Balfour-Brown (1951) suggested *Potamonectes schweinfruthi* as syn. n. *Hydroporus moestus*: Lectotype male, designated by present study to be available type of *N. walkeri*; Sinai- Wadi Feiran; Sharp coll. 1905-313, BMNH London.
Distribution (Africa): Saudi Arabia, Yemen (no record from Africa)
Distribution (Egypt): western & eastern desert, Coastal strip, North Sinai
Months of abundance: February, April, August, October
Habitat: spring-fed streams with sparse vegetation and coarse bottom.

**Subfamily Colymbetinae Erichson**

Colymbetinae Erichson, 1837: Käfer Mark Branding. 1: 149.
Egyptian Colymbetinae are represented by two tribes: Agabini and Colymbetini.

**Tribe Agabini Thomson**

Agabini Thomson, 1867: Skand. Col. 9: 84, 96.
This tribe contains 2 genera in Egypt, *Platambus* Thomson and *Agabus* Leach.

**Genus *Platambus* Thomson**

*Platambus* Thomson, 1859: Skand. Col. 1: 14.
Type species: *Dytiscus maculatus* Linnaeus, 1758, by original designation.
Distribution: Palaearctic and Oriental
Brancucci (1988) recognized 23 species of which only one is recorded from Egypt, *P. lunulatus*.

***Platambus lunulatus* (Steven) (Fig. 46)**

*Agabus lunulatus* Steven, 1829: Mus. Hist. Nat. Univ. Mosquens 2: 26.
*Platambus sinuatus* Aubé, 1836: Icon. Col. 5: 148. Brancucci (1988) studied 3ex. labelled Cairo, in MNHN, Paris.
Type locality: Caucase, USSR.
Type material: Holotype male (single specimen); determined by Steven (1829); Caucase; *lunulatus* Steven / labelled as type in Zaitsev's handwriting; Zool Mus. of Moscow ZMM.
Distribution (Africa): Egypt (new record to Africa)
Distribution (Egypt): Nile valley & Delta; very rare species; Brancucci (1988) revised this genus in the world, and studied 9 Egyptian specimens (1ex., OLM, Berlin), (4ex, ZSM, Munich), (3ex., MNHN, Paris) and (1ex., BMNH), all these records from Cairo vicinity.
Habitat: running and fresh water

**Genus *Agabus* Leach**

*Agabus* Leach, 1817: Zool. Misc. 3: 69, 72
Type species: *Agabus paykullii* Leach, 1817: l.c.: 72 [= *Dytiscus serricornis paykull*, 1799: *K. svenska* Vetensk Akad. Handl. 1: 99], by monotypy.
Distribution: Holarctic region; a large genus with some 200 species (Nilsson & Holmen 1995). Only three species are confirmed in the Egyptian fauna, *A. biguttatus, A. dilatatus, A. conspersus.*

**Key to species**

1- Anterior row of pronotal punctures broadly interrupted medially (sometimes a secondary row of punctures behind the interruption); ground colour of elytra uniform black or brown, with at most a pair of paler spots ..... **2**

- Anterior row of pronotal punctures complete; ground colour of elytra mottled ..... ***A. conspersus***

2- Posterior half of last anal sternite with distinct wrinkles; male with a sharp tooth on the inner claw of the front tarsus ..... ***A. biguttatus***

- Posterior half of last anal sternite with weak wrinkles; protarsal claws in both sexes without tooth ..... ***A. dilatatus***

***Agabus biguttatus* (Olivier) (Fig. 47; Plate 19.1)**

*Dytiscus biguttatus* Olivier, 1795: Ent. 3 (40): 26.
Type locality: Fréjus
Type material: It should be in MNHN, Paris but probably lost
Distribution (Africa): Canary islands, Morocco, Libya
Distribution (Egypt): eastern desert, Nile valley & Delta, Sinai
Months of abundance: February-April, August
Habitat: spring-fed streams with sparse vegetation and coarse bottom; brackish water

***Agabus dilatatus* (Brullé) (Fig. 48; Plate 19.2, 20.1)**

*Colymbetes dilatatus* Brullé, 1832: Expéd. Sc. Morée 3: 127. t. 34, f. 11.
Type locality: Morée
Type material: It should be in MNHN, Paris but probably lost
Distribution (Africa): Tunisia, Morocco
Distribution (Egypt): eastern desert, Sinai
Months of abundance: August
Habitat: spring-fed streams; brackish water

***Agabus conspersus* (Marsham) (Fig. 49; Plate 19.3)**

*Dytiscus conspersus* Marsham, 1802, Ent. Brit. 1: 427.
Type locality: England
Type material: (British Museum in coll. Stephens)
Distribution (Africa): Algeria, Tunisia, Morocco, Canary islands
Distribution (Egypt): western & eastern desert, Nile valley & Delta, Sinai
Months of abundance: March-April, August, December
Habitat: margins of stagnant water with dense vegetation; temporary water pools with growth of aquatic algae; fresh water

**Tribe Colymbetini Erichson**

Colymbetini Erichson, 1837: Käfer Mark Branding. 1: 149.
This tribe contains 8 genera (Nilsson & Holmen 1995), many of which are not Palaearctic. Only 2 genera are recorded from Egypt, *Rhantus* Dejean and *Colymbetes* Clairville.

## Genus *Rhantus* Dejean

*Rhantus* Dejean, 1833: Cat. Col. coll. Dejean, ed. 2: 54.
*Rantus* Dejean, 1833: l.c.: 54 is an incorrect original spelling; emendation to *Rhantus* in Opinion 289, 1954) (Nilsson *et al.* 1989).
Type species: *Colymbetes pulverosus* Stephens, 1828: Ill. Brit. Ins. Mand. 2: 69 + pl. 12: 2 [= *Colymbetes suturalis* Macleay, 1825: Annul. Jav. 1: 31], by subsequent designation of Hope 1839: Col. Man. 2: 131 (Opinion 289, 1954).
Distribution: A large genus with about 80 species, known from all the major zoogeographic regions of the world. 3 species are confirmed in the Egyptian fauna, *R. includens* (Walker), *R. suturalis* (Macleay), *R. consputus* (Sturm).

### Key to species

1- Pronotum with uniform colour and thick lateral borders; anal sternite with strong wrinkles posteriorly; inner claw of male protarsus distinctly broad (fig. 50.5, plate 19.6) ..... ***R. consputus***
- Pronotum with distinct discal mark and thin lateral borders; anal sternite with short, weakly marked wrinkles; outer claw of male protarsus simple (fig. 51.6, plate 19.5) ..... **2**

2- Pronotum with wide, transverse black marking on the disc, sometimes divided into two spots; male protarsal claws long, slender, slightly unequal (fig. 51.6, plat 19.5) ..... ***R. includens***
- Pronotum with wide, transverse dark band and obvious small, black spot at the middle; male protarsal claws distinctly unequal (fig. 52.6, plate 19.4) ..... ***R. suturalis***

### *Rhantus consputus* (Sturm) (Fig. 50; Plate 19.6, 20.2)

*Colymbetes consputus* Sturm, 1834: Deutschl. Ins. 8: 83.
Type material should be in Munich
Distribution (Africa): Egypt
Distribution (Egypt): very rare; western & eastern desert, Nile valley & Delta
Months of abundance: January, March, May, August
Habitat: permanent water with dense vegetation; fresh and brackish water

### *Rhantus includens* (Walker) (Fig. 51; Plate 19.5)

*Colymbetes includens* Walker, 1871: List of Col. Lord, : 11.
*Rhantus elevatus* Sharp, Scient. Trans. R. Dublin Soc. (2) 2: 609.
Type Locality: Sinai, Egypt.
Type material: Lectotype female, single specimen designated by Brancucci (1984); Egypt, Sinai; includes Walker. BMNH (London). *Rhantus elevatus*: Type female; Arabia, El Hedjaz; collected by Dr. Millingen; type 874, Sharp coll. 1905-313, *elevatus* Sharp. BMNH (London). Balfour-Browne (1951) studied the types and proposed *Rhantus elevatus* as syn. n.
Distribution (Africa): Sudan, Ethiopia
Distribution (Egypt): western desert, Coastal strip, Sinai
Months of abundance: March-April, August, and October
Habitat: spring-fed streams; stagnant water bodied shaded with trees and dense

algae; brackish water
Note: Brancucci (1984 a) mentioned that there is only single specimen (female) in the collection of the British Museum labelled Cotype, the other specimens of the type-series were supposed to have been deposited in the School of Medicine (Cairo) and were actually destroyed (Horn & Kahle 1935).

***Rhantus suturalis* (Macleay) (Fig. 52; Plate 19.4)**

*Colymbetes suturalis* Macleay, 1825: Annul. Javan. 1: 131.
*Rhantus pulverosus* Steph., 1828: Brit. Ent. Mandib. 3 (2): 69, t. 12, f. 2.
Type Locality: Java, Palestine
Type material: Lectotype male, with protarsus well preserved, designated by Balke (1989); Java, horsefield; type 62. BMNH London.
Distribution (Africa): Algeria, Tunisia, Morocco, Madagascar
Distribution (Egypt): western desert, Coastal strip, Nile valley & Delta, Sinai
Months of abundance: April, June, September, and November
Habitat: stagnant water with dense vegetation; paddy fields in Lower Egypt

**Genus *Colymbetes* Clairville**

*Colymbetes* Clairville in Clairville & Schellenberg, 1806: Ent. Helvétique 2: 188.
Type species: *Dytiscus striatus* Linnaeus, 1758: Syst. Nat. ed. 10, 1: 411 by subsequent designation of Curtis, 1828: Brit. Ent. 5: 207.
*Cymatopterus* Dejean, 1833: Cat. Col. coll. Dejean, ed. 2: 54.
Type species: *Dytiscus fuscus* Linnaeus, 1758: l.c.: 411 by subsequent designation of Thomson 1859: Skand. Col. 1: 13.
Distribution: Holearctic and eastern part of Palaearctic
A small genus with 21 species (Nilsson & Holmen 1995). Only two species are known to occur in Egypt, *C. fuscus* (Linnaeus) and *C. piceus* Klug.

**Key to species**

1- Elytra completely covered with transverse, undulate, weakly incised, thin reticulation (plate 20.3); interspaces in the meshes smooth in males but raised in form of ridges in the females ..... ***C. fuscus***
- Elytra without any transverse striae, but mottled with a strong yellow and black pattern ..... ***C. piceus***

***Colymbetes piceus* Klug (Fig. 53)**

*Colymbetes piceus* Klug, 1834: Symb. Phys. 4: t. 33, f. 6.
*Colymbetes simplex* Walker, 1871: List. Col. coll. Lord: 11 Syn. n. by F. Balfour-Browne (1951).
Type Locality: Sinai, Egypt.
Type material: Lectotype male, designated by present study, Sinai, ZMB Berlin.
Type material dissected and aedeagus identical as the aedeagi of the studied material. One specimen collected from Sinai and deposited in Sharp coll. in BMNH (London) intermediates in size between *Colymbetes piceus* and *Colymbetes substrigatus* Sharp and the aedeagus is identical to *Colymbetes substrigatus*. *Colymbetes substrigatus* described from Arabia and appears to be a geographical race of *piceus*.

Distribution (Africa): Egypt, Yemen, Persia
Distribution (Egypt): eastern desert, Sinai
Months of abundance: August-September
Habitat: small lakes and ponds of slowly running water and with dense marginal vegetation; fresh and brackish water

***Colymbetes fuscus* (Linnaeus) (Fig. 54; Plate 20.3)**

*Dytiscus fuscus* Linnaeus, 1758: Syst. Nat. (10) 1: 411.
Type Locality: Europe
Type material: Burlington House, London in Linnaeus coll.
Distribution (Africa): Algeria, Tunisia, Morocco
Distribution (Egypt): western desert, Coastal strip
Months of abundance: May-June, December
Habitat: clay-ponds of slowly running water and with more or less vegetation; frequently collected in fishponds; fresh and brackish water

**Subfamily Laccophilinae Gistel, 1856**

Laccophilinae Gistel, 1856:
This subfamily is worldwide in distribution and includes 11 genera (Brancucci 1983), with about 350 species (Nilsson & Holmen 1995). It contains one tribe, Laccophilini Bedel, 1881: Fn. Col. Bassin Seine 1: 256. Two genera are represented in the Egyptian fauna, *Laccophilus* and *Philodytes*.

**Genus *Laccophilus* Leach**

*Laccophilus* Leach, 1817: Zool. Misc. 3: 69.
Type species: *Dytiscus minutus* Linnaeus, 1758: Syst. Nat. ed. 10, 1: 412 (= *Dytiscus obscurus* Panzer, 1794: Ent. Germ. 1:77).
Distribution: large genus has a worldwide distribution with more occurrences in the tropics. Three species are recorded from Egypt, *L. pictipennis, L. ponticus*, and *L. sordidus*.

**Key to species**

1-Elytra with distinct row of minute impressed punctures along the sutural margins; prosternal process short and broad, its groove not reaching beyond the meso-coxa ..... ***L. sordidus***
- Elytra without such row but with distinct colour pattern; Prosternal process long, needle like, its groove reaching beyond the meso- coxae ..... **2**

2- Elytra always with markings consisting of more or less undulating longitudinal dark lines, these lines may be more or less interrupted transversely so as to leave pale bands, or may extend the whole length ..... ***L. ponticus***
- Elytra with or without markings, which if present are never formed by undulating longitudinal lines ..... ***L. pictipennis***

***Laccophilus ponticus* Sharp (Fig. 55)**

*Laccophilus ponticus* Sharp, 1882: Sci. Trans. R. Dublin Soc. (2) 2: 311.
*Laccophilus variegatus* Germar, 1812: Fn. Ins. Eur. 3: t. 6; precc., nec Geoffroy, 1785.

*Laccophilus poecilus* Klug, 1883:Symb. phys. 4: t.33, fig.8. Syn. n.
Type locality: Mesopotamia, Iran.
Type material: Lectotype male, designated by Brancucci (1983); Mesopotamia, Sharp coll. 1905-313; type 580, *ponticus* Sharp n. sp. BMNH. *Dytiscus variegatus*: Allemagne; ZMB Berlin. *Laccophilus poecilus*: Holotype, Egypt, determined by Klug. ZMB Berlin.
Synonymy: This species described from Egypt by Klug (1834) and figured in the Symbolae Physicae 4: fig. 8. Alfieri (1976) mentioned it in his list based on Klug's record and suspected it as a form of *Laccophilus variegatus* Germar. He reported that the species missing in all Egyptian collections and this is not true because we have found one specimen in the Entomological Society collection, Cairo labelled (female, det. L. Gschwendtner).
The comparing of the original description of *Laccophilus poecilus* with the holotype of *Laccophilus ponticus* in BNMH (London) showed that, there is not a significant difference. The Egyptian female of *Laccophilus poecilus* showed mostly reduced longitudinal lines on the elytra. Based on Zaitseve note (1953) that the Chinees *variegatus* has longitudinal lines hardly recognizable, it is obvious that this species is variable in the shape of the elytral markings character. So, The Egyptian *Laccophilus poecilus* may therefore be considered conspecific and fall within the range of variation of *Laccophilus ponticus* especially that both forms have collected from the same locality.
Distribution (Africa): Algeria, Tunisia, Libya
Distribution (Egypt): all over the country
Months of abundance: March, May, August, October, and December
Habitat: small marshes, at lake margins, temporary ponds with gravel bottom and sparse vegetation, fresh and brackish water

***Laccophilus pictipennis* Sharp (Fig. 56)**

*Laccophilus pictipennis* Sharp, 1882: Sci. Trans. R. Dublin Soc. (2) 2:305.
*Laccophilus restrictus* Sharp, l.c.: 315.
Type locality: El-Hedjaz. Saudi Arabia.
Type material: Lectotype male, designated by Brancucci (1883); El-Hedjaz; collected by Dr. Millingen; Sharp coll., 1905-313; type 566, *pictipennis* Sharp n. sp. BMNH. *Laccophilus restrictus*: Holotype male, determined by Sharp; Egypt; Sharp coll, 1905-313; type 588, *restrictus* Sharp n. sp. BMNH
Distribution (Africa): Mauritania, Ivory Coast, Sudan, Ethiopia, Congo, Tanzania
Distribution (Egypt): western & eastern desert, Nile valley & Delta
Months of abundance: March-May, July-August, and October
Habitat: shallow edges of small streams with a good deal of vegetation; temporary grassy pools; spring-fed streams; fresh and brackish water

***Laccophilus sordidus* Sharp (Fig. 57)**

*Laccophilus sordidus* Sharp, 1882: Sci. Trans. R. Dublin Soc. (2) 2:302.
Type locality: El-Hedjaz. Saudi Arabia.
Type material: Lectotype male, designated by Brancucci (1880); El-Hedjaz;

collected by Dr. Millingen; Sharp coll., 1905-313; type 1173, *sordidus* Sharp n. sp. BMNH.
Distribution (Africa): Libya
Distribution (Egypt): very rare species, collected only from eastern desert
Months of abundance: August
Habitat: shallow water pool with gravel bottom and sparse vegetation, fresh and brackish water

**Genus *Philodytes* J. Balfour-Browne**

*Philodytes* J. Balfour-Browne, 1939: J. Linn. Soc. Zool. 40:479 (as subgenus of *Laccophilus* Leach)
Type species: *Laccophilus umbrinus* Motschulsky, 1859: tud. Ent. 8: 83
Distribution: monobasic genus with wide distribution of sporadic occurrence in most parts of Africa

***Philodytes umbrinus* (Motschulksy) (Fig. 58)**

*Laccophilus umbrinus* Motschulsky, 1859: Ètud. Ent. 8: 83.
*Laccophilus luridus* Schaum, 1864: Berl. Ent. Ztschr. 8:107.
Type locality: Egypt (*umbrinus & luridus*)
Type material: It should be in Museum Paris.
Distribution (Africa): Mauritania, Senegal, Nigeria, Congo, Tanzania, S. Africa
Distribution (Egypt): all over the country
Months of abundance: all the year round
Habitat: stagnant water with dense vegetation whether fresh or brackish; paddy fields in Lower Egypt

**Subfamily Dytiscinae Leach**

Dytiscinae Leach, 1817: Zool. Miscell. 3: 69.

**Tribe Eretini Crotch**

Eretini Crotch, 1873: Trans. Am. Ent. Soc. 4: 386 (as tribe of Dytiscidae).
This tribe contains only one genus, *Eretes* Laporte de Cstelnau.

**Genus *Eretes* Laporte de Cstelnau**

*Eretes* Laporte de Cstelnau, 1833: Annls Soc. Ent.Fr. (1) 1 (1832): 397.
Type species: *Dytiscus griscus* Fabricius, 1781: Spec. Ins. 1: 293 [ =*Dytiscus sticticus* Linnaeus, 1767: Syst. Nat. ed. 12, 1: 666] by original designation.
Distribution: small genus with one species in Australia and one widespread species found in all other biogeographic regions; only one species of different two subspecies occurs in Egypt, *E. sticticus* var. *helvolus* Klug, *E. sticticus* var. *succinctus* Klug.

**key to subspecies**

1- Size large; elytra without a tranaverse black band or with only traces of it; pronotal angle markedly pointed ..... ***E. sticticus helvolus***
- Size small; elytra with well-marked transverse black band; pronotal angle more or less obtuse ..... ***E. sticticus succinctus***

***Eretes sticticus* (Linnaeus) (Fig. 59; Plate 21.9,10)**

*Dytiscus sticticus* Linnaeus: 1767: Syst. Nat. ed. 12 1 (2): 666.

Type Locality: Barbarie?
Type material: Burlington House, London; var. *helvolus* Haute-Egypte (Zoo. Mus. Univ. Berlin).
Distribution (Africa): Mauritania, Ethiopia, Congo, Tanzania, Algeria, Tunisia, Canary islands, Cape Verde islands, Senegal, Guniea, Kenya, Uganda, Zimbabwe, Natal, Tansvaal, Somalia, Mauritius
Distribution (Egypt): widespread all over the country
Months of abundance: April-August, October
Habitat: stagnant water, rarely occurs in streams or ponds with rich vegetation, fresh and brackish water

**Tribe Hydaticini Sharp**

Hydaticini Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 647, 939. The tribe is composed of two genera (Roughley & Pengelly 1981).
One genus recorded from Egypt, *Hydaticus* Leach.

**Genus *Hydaticus* Leach**

*Hydaticus* Leach, 1817: Zoo. Misc, 3: 69, 72.
Type species: *Dytiscus transversalis* Pontoppidan, 1763: Dansk. Atlas 1: 677, by subsequent designation of Curtis 1825: Brit. Ent. 2: 92
Distribution: large genus with about 150 species in the old world tropics (Nilsson *et al.* 1989). The genus is classified into 4 subgenera (Roughley & Pengelly 1981). Guignot (1959-1961) reviewed the 60 African species that all belong to the subgenus *Guignotitus* Brink. So far, 3 species are known from Egypt, *H. leander* (Rossi), *H. ponticus* Sharp, *H. decorus* Klug. According to this study one more species, *H. bivittatus* is added to Egyptian fauna.

**Key to species**

1- Elytra densely mottled with small, close and partly contiguous black irrorotations ..... **2**
- Elytra without any black irrorotations ..... **3**

2-Head with a transverse black band on the posterior border of vertex, pronotum similarly with a transverse, median black band along the posterior margin; penis without apical tuft of hairs ..... ***H. leander***
- Head and pronotum without any transverse black band; penis with small apical tuft of hairs ..... ***H. ponticus***

3- Elytra reddish brown with sutural and lateral longitudinal black stripes running from base to the apex ..... ***H. bivittatus***
- Elytra black with scattered yellow patches ..... ***H. decorus***

***Hydaticus leander* (Rossi) (Fig. 60; Plate 21.3,4)**

*Dytiscus leander* Rossi, 1790: Faun. Etrusc.: 202.
Type Locality: Toscane?
Type material: Museum Paris, probably lost (Nilsson, personal communication).
This species belongs to a complex of very similar species that have frequently been confused by many previous authors. The distribution of this species is not accurately known, but most North and West African records are more or less

accurate. Most older records from East Africa seemingly refer to other species.
Distribution (Africa): Morocco, Tunisia, Senegal, Cape Verde, Congo, Sudan, Ethiopia
Distribution (Egypt): Coastal strip, western desert, Nile valley & Delta, Sinai
Months of abundance: March, May-June, August, October
Habitat: permanent water with dense vegetation fresh water

***Hydaticus ponticus* Sharp (Fig. 61)**

*Hydaticus ponticus* Sharp, 1882: Scient. Trans. R. Dublin Soc. (2) 2: 375.
Type Locality: Mesopotamia, Iran.
Type material: Lectotype male, designated by Wewalka (1979); collected by Dr. Millingen, Sharp coll. 1905-313. BMNH London.
Distribution (Africa): Egypt. (reported from India, Pakistan, Iran, Iraq, Turkya)
Distribution (Egypt): western desert, Sinai
Months of abundance: March, June
Habitat: spring-fed streams, brackish water

***Hydaticus bivittatus* Laporte de Castelnau (Fig. 62)**

*Hydaticus bivittatus* Laporte de Castelnau, 1835: Et. Ent. (1934): 98.
Type Locality: Senegal
Type material: MNHN, Paris.
Distribution (Africa): widespread in Africa
Distribution (Egypt): Gebel Elba
Months of abundance: September
Habitat: collected by light trap near the spring-fed stream.

***Hydaticus decorus* Klug (Fig. 63; Plate 21.1,2)**

*Hydaticus decorus* Klug, 1834: Symb. Phys. 4: pl. 36, fig. 5.
Type Locality: Sinai, Egypt
Type material: Lectotype male, by present designation: Aegyptën, Hist. Col., Nr. 9767 Sinai, Ehrenberg; *decorus* Klug MNB Berlin. Paralectotype: Same as lectotype (2 (1male & 1 female) exx MNB).
Distribution (Africa): Sudan
Distribution (Egypt): eastern desert, Sinai
Months of abundance: April, August-September
Habitat: spring-fed pools; temporary small water pools free of any vegetation and with coarse gravel bottom; close to huge mountains lake with dense vegetation

**Tribe Aciliini Thomson**

Aciliini Thomson, 1867: Skand. Col. 9: 83-84 (as Acilliides, subtribe of Dytiscina).
Thermonectini Sharp 1882: Scient. Trans. R. Dublin Soc. 2(2):672.
A relatively small tribe which currently includes seven genera (Nilsson & Holmen 1995). This tribe is a new record for the Egyptian fauna and is represented by one genus, *Rhantaticus* Sharp.

**Genus *Rhantaticus* Sharp**

*Rhantaticus* Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 672, 691 + pl.

Type species: Laporte, 1835: Ètud. Ent. 2: 238 [ = *Hydaticus congestus* Klug, 1832: Ins. Madag.: 136], by monotypy.
Distribution: a monobasic genus (Nilsson & Person 1993), widespread in the old world tropics with single new record species in Egypt, *Hydaticus congestus*.

***Rhantaticus congestus* (Klug) (Fig. 64; Plate 21.5,6)**

*Hydaticus congestus* Klug, 1833: Ins. Madag. (1832): 136.
Type Locality: Madagascar
Type material: Type male, MZB, Berlin.
Distribution (Africa): Madagascar, Niger, Sudan, Ivory Coast, Ethiopia, Somalia, Tanzania, Uganda, Rwanda, Congo, S. Africa.
Distribution (Egypt): western desert, Nile valley & Delta
Months of abundance: March, June, and September
Habitat: marshes, swamps and springs with dense vegetation.

**Tribe Dytiscini (Leach)**

A small tribe with 28 species in two genera (Nilsson & Holmen 1995). This tribe is a new record for Egypt and represented by one species, *Dytiscus circumflexus*.

**Genus *Dytiscus* Linnaeus**

*Dytiscus* Linnaeus 1758: Syst. Nat., ed. 10, 1: 411.
Type species: *Dytiscus marginalis* Linnaeus 1758: Syst. Nat., ed. 10, 1: 411, by subsequent designation of Latreille 1810: Cons. gén. Anim. Class. Crust. Arach. Ins.: 426, attributing the species to Fabricius 1775: Sys. Entomol. 30: 230 (Opinion 619, Bull. Zool. Nomencl. 18: 369, 1961). Curtis 1826: Brit. Ent. 4: 99; Westwood 1838: Syn. gen. Brit. Ins.: 9; Crotch 1873: Trans. Amer. Ent. Soc. 4: 406; Guignot 1946: Rev. Fr. Ent. 13: 118; Leech 1948: Proc. Acad. Sc. Ser.4, 24: 413; Balfour-Brown 1960: Ent. Gaz. 11: 252; Guignot 1961: Ann. Mus. R. Congo Belge 90: 856 and Nilsson et al. 1989: Ent. Scand. 20: 294, cit *D. marginalis* as type species. Hope 1939: H. G. Bohn, Lond.: 131, 137; Duponchel 1845: C. d'Orbigny 5: 154; Jacquelin du val and Migneaux 1857: Gen. Col. d'Eur. 1: 77 and Thomson 1859: Skand. Col. 1:12; all have designated independently *Dytiscus latissimus* Linnaeus 1758: Syst. Nat., ed. 10, 1: 411 as type species.
*Dyticus* Müller 1776: Zool. Dan. Prodr.: 69. Incorrect emendation, was in Opinion 619, 1961, placed on the Official Index of Rejected and Invalid Generic Names in Zoology.
*Macrodytes* Thomson 1859: Skand. Col. 1: 12, 1860: Skand. Col. 2:41.
Type species: *Dytiscus marginalis* Linnaeus 1758: l.c.: 411, by original designation.
Current status: Junior objective synonym of *Dytiscus* Linnaeus (Roughley 1990).
*Leionotus* Kirby 1837: Faun. Bor. Amer. 4: 76 (as subgenus of *Dytiscus* Linnaeus).
Type species: *Dytiscus conformis* Kunz 1818: Neue Schrift. Nat. Ges. Halle 2(4): 58 (junior synonym of *D. marginalis* Linnaeus 1758: Syst. Nat. ed. 10, 1: 411), designated by Hope 1939: Col. Man. 2: 131, who attributed the species name to Stephens 1828: Ill. Brit. Ent. Mandib. 2: 87. Therefore *Leionotus* Kirby is a junior, subjective synonym of *Dytiscus* Linnaeus.

Current status: Junior subjective synonym of *Dytiscus* Linnaeus (Roughley 1990).
*Dyticopsis* Houlbert 1934: Faun. Ent. Arm. Hydr.:134.
Type species: not designated.
Current status: This name is not available because the original description was not accompanied by type fixation (ICZN 1985, Art. 13b) (Roughley 1990).
Distribution: Nearctic, Palaearctic and Holarctic
The genus contains 26 species and has been revised by Roughley (1990). *Dytiscus circumflexus* is the only species recorded from Africa and according to this study it is new record for Egypt. Type material probably lost.

***Dytiscus circumflexus* Fabricius (Fig. 65; Plate 21.7,8)**

*Dytiscus circumflexus* Fabricius 1801: Syst. Eleuth. 1:258;
Type locality: Tanger Fide? Guignot 1961: Ann. Mus. R. Congo Belge 90: 860, near Paris (France).
Distribution (Africa): Egypt (new record), Algeria, Tunisia
Distribution (Egypt): Coastal strip
Months of abundance: June-July
Habitat: brackish water in seashore lagoons with sparse vegetation and shallow water pool with gravel bottom and little vegetation

**Tribe Cybistrini Sharp**

Cybistrini Sharp, 1882: Scient. Trans. R. Dublin Soc. 2 (2): 700
A relatively large tribe, with about 135 species currently arranged in six genera (Watts 1978). There is only one genus, *Cybister* Curtis recorded from Egypt.

**Genus *Cybister* Curtis**

*Cybister* Curtis, 1827: Brit. Ent. 4: 151 + pl. 151, nomen novum for *Trogus* Leach, 1817: Zool. Misc. 3: 70, 73 (not Panzer, 1806).
Type species: *Dytiscus lateralis* Fabricius, 1798: Suppl. Ent. Syst.: 64 [= *Dytiscus tripunctatus* Olivier, 1795: Ent. Hist. Nat. Ins 3 (40): 14], fixed under Article 67$^{th}$ of the Code.
Current status: Genus of Cybistrini Sharp (Nilsson et al. 1989).
*Cybisteter* Bedel, 1881: Faun. Col. Bass Seine 1: 242, 255 (as unjustified emendation of *Cybister* Curtis).
Type species: *Dytiscus lateralis* Fabricius, 1798: Suppl. Ent. Syst.: 64 [= *Dytiscus tripunctatus* Olivier, 1795: Ent. Hist. Nat. Ins 3 (40): 14], fixed under Article 33b (iii) of the Code.
Current status: Junior objective synonym of *Cybister* Curtis (Nilsson *et al.* 1989).
*Trogus* Leach, 1817: Zool. Misc. 3: 70, 73 (not Panzer, 1806).
Type species: *Dytiscus lateralis* Fabricius, 1798: Suppl. Ent. Sys.: 64 [= *Dytiscus tripunctatus* Olivier, 1795: Ent. Hist. Nat. Ins. 3(40): 14], by monotypy.
Distribution: large genus chiefly confined to the Old World tropics.

**Key to species**

1- Both sexes with setal fringes on either side of the metatibia and metatarsus; metatrochanter bluntly pointed posteriorly; male mesotarsi without ventrobasal setal

tufts on the ventral side; undrside yellow ..... ***C. lateralimarginalis***
- Only male with ventral setal fringes of the metatibia and metatarsi; metatrochanter sharply pointed posteriorly; male mesotarsi with ventro-basal setal tufts on the ventral side; underside black ..... **2**

2- Elytra black with greenish-metalic iridescence and yellow lateral stripe extending to epipleura; species without any sexual sculpture in the female ..... ***C. tripunctatus africanus***
- Elytra black with two small, rounded pre-apical spots reddish-brown; species generally with sexual sculpture in the female in the form of short longitudinal scratches on the sides of pronotum and anterior half of the elytra ..... ***C. vulneratus***

***Cybister lateralimarginalis* (De Geer) (Fig. 66; Plate 22.1,2)**

*Dytiscus lateralimarginalis* De Geer, 1774: Mém. Hist. Ins. 4: 396.
Type Locality: Suéde
Type material: Riksmus, Stockholm
Distribution (Africa): Algeria, Morocco, Tunisia
Distribution (Egypt): western & eastern desert, Coastal strip
Months of abundance: March-April, August
Habitat: ponds and small lakes of slowly running water with dense vegetation

***Cybister tripunctatus* (olivier) subspecies: *africanus* Laporte de Castelnau (Fig. 67; Plate 22.4)**

*Dytiscus tripunctatus* Olivier, 1795: Ent. 3 (40): 14 subsp. *africanus* Laporte de Castelnau, 1835: Et. Ent. (1834): 99.
Type Locality: Afrique, du Cap à la Barbarie et à la Sicile.
Type material: MNHN, Paris
Distribution (Africa): Ethiopia, Sudan, Congo, Rwanda, Tanzania, South Africa, Cape Verde, Canary Islands
Distribution (Egypt): western & eastern desert, Coastal strip, Nile valley & Delta, Sinai
Months of abundance: February-March, August-September, November
Habitat: different kinds of water, mainly with dense marginal vegetation; collected from river lagoons near paddy fields.

***Cybister vulneratus* Klug (Fig. 68; Plate 22.3)**

*Cybister vulneratus* Klug, 1834: Smb. Phys. 4: tab. 33, fig. 1.
*Cybister binotatus* Klug, 1835: Erman's Reise: 28.
Type locality: Arabie déserte
Type material: *Cybister vulneratus*: Lectotype male, by present designation: Arab. dés., Hist. Col., Nr. 9695, Ehrenberg; type, *vulneratus* Klug MNB Berlin. Paralectotype: Same as lectotype (2 exx male MNB). *Cybister binotatus*: Ile du Prince MNB, Berlin.
Distribution (Africa): Morocco, Somalia, Tanzania, Senegal, Congo, Ethiopia, Madagascar, Mauritius
Distribution (Egypt): western & eastern desert

Months of abundance: April, August, and November
Habitat: marshes and spring-fed streams of dense vegetation.

Table 1: Provincial records and ecology of the Egyptian species of diving beetles (Noteridae and Dytiscidae). (Cs= Coastal strip; Wd= Western desert; Nv = Nile valley & Delta; Ed= Eastern desert; Si= Sinai; Ge= Gebel Elba; R= Running water; S= Standing water; F= Fresh water; B= Brackish water).

| Species | Distribution | | | | | | Ecology | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cs | Wd | Nv | Ed | Si | Ge | R | S | F | B |
| **Family: Noteridae** | | | | | | | | | | |
| *Neohydrocoptus angolensis* | | | + | | + | | | + | + | + |
| *Synchortus imbricatus*[*] | + | + | + | + | + | | | + | + | + |
| *Canthydrus diophthalmus* | + | + | + | + | + | | | + | + | + |
| **Family: Dytiscidae** | | | | | | | | | | |
| *Aglymbus gestroi* | + | + | | + | + | | + | | + | |
| *Copelatus pulchellus* | | | | | + | | | + | | + |
| *Copelatus ibrahimi* n. sp. [§] | | | + | + | | | | + | | + |
| *Methles spinosus* | | | + | + | + | | + | + | + | + |
| *Hydrovatus cuspidatus* | + | + | + | + | + | + | | + | + | + |
| *H. longicornis* | + | | + | + | | | | + | + | + |
| *H. sordidus* | | + | + | + | | | | + | | + |
| *H. aristidis* | | | + | + | | | | + | + | + |
| *H. clypealis* | + | | | | | | | + | | + |
| *H. compactus* | | + | + | | | | + | + | + | + |
| *Bidessus ovoideus*[*] | | + | + | | | + | | + | | + |
| *Clypeodytes cribrosus* | | | + | | | | | + | + | |
| *Hydroglyphus pusillus* | + | | | + | + | | + | + | | + |
| *H. confusus* | | + | + | | | + | | + | + | + |
| *H. pentagrammus* | + | | + | + | | | | + | | + |
| *H. major* | | + | + | + | + | + | + | + | + | + |
| *H. angularis* | | | | + | | + | | + | | + |
| *H. signatellus* | + | + | + | + | + | + | | + | + | + |
| *Yolina insignis* | | | + | + | | | | + | + | + |
| *Yola porcata* | | | + | | | | | + | + | + |
| *Y. enigmatica* | + | + | + | + | + | + | | + | + | + |
| *Hygrotus lernaeus* | | + | + | + | | | | + | + | + |
| *H. saginatus* | | + | + | | | | | + | + | + |
| *H. confluens* | + | + | + | + | + | + | + | + | + | + |
| *H. pallidulus*[*] | | | | + | + | | | + | | + |
| *H. inscriptus* | + | + | | | | | | + | | + |
| *Hyphoporus solieri* | + | + | + | + | + | + | + | + | + | + |
| *Herophydrus guineensis* | + | + | + | + | | | | + | + | + |
| *H. musicus* | | | + | | + | | | + | | + |
| *Heterhydrus senegalensis* | | | + | + | + | | | + | | + |
| *Hyphydrus grandis* | | | + | + | + | | | + | | + |
| *H. cycloides*[*] | | + | | + | | | + | + | | + |
| *H. pictus* | | | + | + | + | | + | + | | + |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *H. maculatus*[*] | | | + | | | + | + | | + | + |
| *Hydroporus humilis* | | + | + | + | + | | | + | | + |
| *H. oasis* | | + | | | | | | + | | + |
| *Scarodytes halensis* | | | | | + | | + | + | | + |
| *Nebrioporus cerisyi* | + | + | + | + | + | + | + | + | + | + |
| *N. insignis*[¥] | + | + | | + | + | | + | + | | + |
| *N. lanceolatus*[¥] | + | + | | + | + | | + | + | | + |
| *N. walkeri*[¥] | + | + | | + | + | | + | + | | + |
| *Platambus lunulatus* | | | + | | | | + | | + | |
| *Agabus biguttatus* | | | + | + | + | | + | + | | + |
| *A. dilatatus* | | | | + | + | | + | | | + |
| *A. conspersus* | | + | + | + | + | | | + | + | |
| *Rhantus consputus* | | + | + | + | | | + | | + | + |
| *R. includens* | + | + | | | + | | + | + | | + |
| *R. suturalis* | + | + | + | | + | | + | + | + | + |
| *Colymbetes piceus* | | | | + | + | | + | | + | + |
| *C. fuscus* | + | + | | | | | + | | + | + |
| *Laccophilus ponticus* | + | + | + | + | + | + | | + | + | + |
| *L. pictipennis* | + | + | + | | | | + | + | + | + |
| *L. sordidus* | | | | + | | | | + | + | + |
| *Philodytes umbrinus* | + | + | + | + | + | | | + | + | + |
| *Eretes stictcus* | + | + | + | + | + | + | + | + | + | + |
| *Hydaticus leander* | + | + | + | | + | | + | + | + | |
| *H. ponticus* | | + | | | + | | + | | | + |
| *H. decorus* | | | | + | + | | + | + | | + |
| *H. bivittatus*[*] | | | | | | + | | + | | + |
| *Rhantaticus congestus*[*] | | + | + | | | | | + | + | + |
| *Dytiscus circumflexus*[*] | + | | | | | | + | + | | + |
| *Cybister lateralimarginalis* | + | + | | + | | | + | | | + |
| *C. tripuctatus africanus* | + | + | + | + | + | | + | + | + | + |
| *C. vulneratus* | | + | | + | | | + | | | + |
| **Number of species** | 26 | 39 | 42 | 43 | 37 | 12 | | | | |
| **Percentage (%)** | 39 | 58 | 63 | 64 | 55 | 18 | | | | |

[§] New species to Science; [¥] New to African fauna; [*] New to Egyptian fauna

## DISCUSSION

The families Dytiscidae and Noteridae in Egypt are revised. All together, sixty eight species grouped into thirty genera and seventeen tribes are recognized. The introduced checklist of Egyptian diving beetles seeks to list all species which have been recorded from Egypt or encountered in the present study, and to bring the nomenclature used in older work on the Egyptian fauna into line with current practice.

**Family: Noteridae**: This is a small family of aquatic beetles whose members were separated from the Dytiscidae largely on the basis of differences in larval stages (Böving and Craighead 1931). The Egyptian noterids are arranged in 3 tribes:

Neohydrocoptini, Noterini and Hydrocanthini. The genera of Noteridae have been arranged in four tribes: Notomicrini, Hydrocanthini, Noterini and Suphisini (e.g. Franciscolo 1979). However, Beutel & Roughley (1987) showed that *Notomicrus* Sharp is more primitive than the other noterid genera but they indicate a sister-group relationship between this genus and the remaining noterid genera excluding *Phreatodytes*. According to the Beutel & Roughley's conclusion, *Notomicrus* can not be placed in the same tribe as *Hydrocoptus* and would have to go in separate subfamily in the family Noteridae.

The above phylogenetic study was centred on one peculiar member (*Notomicrus*) of the group (Noteridae) mainly to clarify its systematic position and to modify the previous classification of (e.g. Franciscolo 1979) as follows: *Notomicrus* to go to into another subfamily: Notomicrinae, with remaining the other genera (except *Phreatodytes* and *Hydrocoptus*) in the Noterinae. Hence, Beutel & Roughley's work means that the concept of tribe Notomicrini to include *Notomicrus* and *Hydrocoptus* (e.g. Franciscolo 1979) is invalid.

The genus *Hydrocoptus* was described for the Dytiscidae, but, is erroneously placed in the Noteridae (Nilsson *et al.* 1989). *Hydrocoptus* (Motschulsky 1853) was used for a subgenus of *Hydroporus* Clairville, under which 68 species (44 are available names) were listed. Sharp, 1882 wrongly applied the name to a group of mainly African Noteridae. Most of the original species of *Hydrocoptus* are currently in Hydroporini, and no species was mentioned that belong to the Noteridae. Nilsson *et al.* (1989) solved this problem and listed *Hydrocoptus* Motschulsky as junior subjective synonym of *Hydroporus* Clairville and designated *Dytiscus tristis* Paykull as the type species. At the same time, they reported Hydrocoptini Van den Branden, 1885 as junior subjective synonym of Hydroporini Erichson.

The noterid genus *Hydrocoptus* sensu Sharp, 1882, takes the new available name *Neohydrocoptus* Satô. As far as the Egyptian fauna is concerned, the simplest course is to modify Sharp's (1882) classification by recognising the tribe Neohydrocoptini for *Neohydrocoptus* and to retain Noterini for *Synchortus* and *Noterus* (*Noterus* is not known from Egypt), and Hydrocanthini for *Canthydrus*. Alfieri (1976) recorded Egyptian *Neohydrocoptus* as *Hydrocoptus seriatus* Sharp (c.f. Winkler's Catalogus Coleopteroum) and *Canthydrus* as *C. notula*. In Alfieri's collection (Cairo, Egypt) there is not any material of genus *Neohydrocoptus,* so, the record will be corrected to *Neohydrocoptus angolensis*. On the other hand, there is much materials of the genus *Canthydrus*, both in RS Ahmed collection and in Alfieri's collection and all of these materials belong to the species *C. diophthalmus*.

The tribe Noterini and its genus *Synchortus* is a new record for Egypt. Only one species is known now from Egypt, *S. imbricatus* (Klug). The identification of this species presented a considerable difficulty, mostly because all species of this genus are much alike and more or less variable (Omer-Cooper 1972). In this respect, the following types were examined: type series of *S.*

*imbricatus* (Klug) (MNB Berlin); *S. aequatorius* Guignot (MNHN Paris); *S. simplex* var. *echinatus* Régimbart (MNHN Paris); *S. simplex* Sharp, *S. sparsus* Sharp; *S. aciculatus* Sharp (BMNH London) mainly to put the Egyptian material into context, and to establish the identity of these types. The result of examination confirmed *S. aequatorius* (syn. n. by Omer-Cooper, 1972) as syn. of *S. imbricatus,* proposed *S. simplex* var. *echinatus* as a new synonym and established *S. sparsus* and *S. aciculatus* as synonyms of *S. simplex.*

**Family: Dytiscidae**: This is a large family of aquatic insects with a diversity of shape and varying degrees of adaptation to their environment (Hilsenhoff 1992). All known subfamilies of Dytiscidae (Copelatinae, Hydroporinae, Colymbetinae, Laccophilinae and Dytiscinae) are represented in the Egyptian fauna.

**Subfamily: Copelatinae**: Based on the phylogenetic work of Ruhnau & Brancucci (1984), the tribe Copelatini has recently been raised to a subfamily Copelatinae. It includes four genera (Nilsson *et al.* 1989), two of which occur in Egypt, *Aglymbus* and *Copelatus*. Genus *Aglymbus* was studied by a number of authors, Guéorguiev (1968), Wewalka (1982), Brancucci (1986) and Nilsson (1991). Brancucci (1986) suggested that *Aglymbus* plus *Copelatus* are closely related to each other due to the presence of a higher number of male pro- and mesotarsal adhesive discs. Depending on the absence of metacoxal lines character, Nilsson (1991) conflicted with above result and proposed a sister-group relationship between *Aglymbus* and Oriental genus *Lacconectus*. Although the reduction of metacoxal lines is sometimes incomplete (Wewalka 1982), this character differentiates both genera very well.

*Copelatus pulchellus* was described from a single female collected from Sinai, Egypt by Klug, 1834. The *Copelatus pulchellus* complex was revised by J. Balfour-Browne (1950) who had not the opportunity to study Klug's type and all his concepts depended on the original description (Klug 1834). He mentioned that most subsequent treatment of this species did not agree well with Klug's identity. As reported in this study, both male and female have been collected from North Sinai. The female is typical as type material of Klug (MNB Berlin) and male is described for the first time from Egypt.

The Egyptian new species of genus *Copelatus ibrahimi* n. sp. comes close to *C. parallelipipedus* Régimbart from which it can be distinguished by larger and more elongate aedeagus; the elytral punctures less dense and more fine; scratches on the abdominal sternites weaker; sterioles on the female pronotum and elytra more dense and impressed. Penis strongly curved, progressively narrowed from middle to the apex; acute but slightly rounded terminally. To confirm the identity of the new species, the original description (Régimbart, 1895) and the type material (from Gabon, MNHN Paris) have been studied.

**Subfamily: Hydroporinae**: The Egyptian members of the tribe Bidessini have been placed previously in the genus *Bidessus* Sharp. This genus has been subsequently subdivided, and all previous records of the Egyptian species can no longer be referred to it. This study has introduced one species of this genus, *B. ovoideus* from Lower Egypt as a new record for the Egyptian fauna.

*Bidessus* subdivisions were initially of subgeneric rank but gradually, they have been promoted to genera. Biström (1988c), the most recent revision of this tribe revealed that the recorded members of the Egyptian Bidessini have been attributed to the following genera: *Clypeodytes, Hydroglyphus, Yolina, Yola*. Alfieri (1976) listed *Bidessus* (*Yola*) *dohrni* in the Egyptian fauna and he attributed the Egyptian material to Peyerimhoff (1931) but his collection in the Ministry of Agriculture and all other Egyptian collections have not any material of this species. Also, the distribution of *Yola dohrni* (Biström 1983) gives a great doubt about the record of this species from Egypt.

At first, We thought that our material collected from Lower and Upper Egypt was *Y. dohrni*, but study of the original description (Sharp 1982) and Sharp's type at BMNH (London) revealed that the specimens are *Y. enigmatica*. It is closest to *Y. dohrni*, from which males of *Y. enigmatica* are separated by having a narrow penis and females by having the dorsal surface of body microsculptured and fairly mat. Consequently, the record of *Y. dohrni* must be corrected to *Y. enigmatica*. *Yolina* Guignot was originally established as a subgenus of *Yola* Guignot (1959). Recently, it raised to genus rank by Biström (1983). *Yolina insignis* has been collected from the eastern desert, and this confirm Alfieri's record which was doubted by Biström (1983).

*Hydroglyphus* Motschulsky was introduced as a subgenus of *Hydroporus*. Subsequent designation of a type species of *Hydroglyphus* made it synonymous with *Guignotus*, which was originally introduced as a subgenus of *Bidessus*. *Hydroglyphus* takes precedence of *Guignotus* because it is the older of the two names. The Australian species were revised by Watts (1978), the Indian species by Vazarani (1968) and the African species by Biström (1986a). The male genetalia of all Egyptian species are illustrated using a Scanning Electron microscope (plate 14). Plate (14.1,2) revealed the distinctive difference between male genitalia of *H. pusillus* and *H. confusus* which was unclear.

Nilsson & Holmen (1995) have treated genus *Coelambus* as a subgenus of *Hygrotus,* and transferred genus *Hyphoporus* and genus *Herophydrus* from tribe Hydroporini to tribe Hygrotini. So, all Egyptian species of *Coelambus* are described under genus *Hygrotus*. All previous records of genus *Coelambus* are confirmed. Fery (1992 a) proposed *C. elevatus* as a junior synonym of *C. saginatus*.

For genus *Hydroporus*, I accepted my record, as *H. humilis* and Wewalka's record of *H. oasis* (1992) as which is available for studying in BMNH (London). The species labelled *H. tessellatus* and *H. pubescens* in Alfieri's collection are *H. humilis*. We have not seen any Egyptian *H. memnonius* which was listed by Alfieri without support. The taxonomic history of *H. humilis* was confused with *H. tessellatus* and *H. pubescens*. Balke & Fery (1993) discussed the complex of this species and fixed its taxonomic status. They proposed *H. tessellatus sinaicus* which described from Sinai by Wewalka (1984) as a junior subjective synonym of *H. humilis*. All my material collected

from Sinai and mostly agrees with Wewalka's description.

The *Deronectes* group of genera in the Hydroporini were recently reclassified by Nilsson & Angus (1992). Consequently, *Potamonectes* Zimmermann is now a junior synonym of *Nebrioporus* Régimbart. *Nebrioporus princeps* (Sharp) proposed as syn. n. of *Nebrioporus insignis* (Klug). The original description of both species does not reveal any significant difference, as the only difference is a fairly deep sutural stria on the elytra and one locality (neighbourhood Alexandria) material of both *N. insignis* and *N. princeps* shows strong sutural striae. Further, the types of both species were described from the same locality, Sinai.

**Subfamily: Colymbetinae**: Genus *Platambus* has been studied by Brancucci (1982a, 1982b &1984b). Vazarani (1965) gave a partial review of the Oriental species. Brancucci (1988) revised the whole genus. Alfieri (1976) listed *P. lunulatus* from Egypt without support of material or even reference. Brancucci (1988) confirmed Alfieri's record by studying nine Egyptian specimens. Also, We have found one specimen among unsorted material in the collection of the Entomological Society, Cairo, Egypt labelled "Cairo, det. L. Gschwendtner".

Genus *Agabus* received much attention from many authors. Wewalka & Nilsson (1990) introduced a new species from the highlands of Ethiopia. Nilsson (1990) gave a revisional notes on selected East Palaearctic species, and (1992) revised the Afrotropical species. Nilsson (1994) discovered two new East Palaearctic species of the *adpressus*- and *confinis* groups. Larson (1991) studied the Nearctic species. We have confirmed three specimens to the Egyptian fauna, *A. biguttatus, A. diltatus, and A. conspersus*. The study of the Egyptian records in BMNH (London) shows that the previous record of *A. nebulosus* may be confused with *A. biguttatus*. Nilsson (1993) fixed the name *Dytiscus biguttatus* Olivier, 1795 which was threatened by the unused senior homonym *Dytiscus biguttatus* Gmelin, 1790 and proposed latter name as a junior synonym of *D. nebulosus* Förster, 1771.

J. Balfour-Browne (1951) introduced a proposal to replace generic name "*Rantus*" Dejean 1833 which is an incorrect original spelling to *Rhantus* (Opinion 289, 1954: International Commission on Zoological nomenclature 8: 76-88), selected *Colymbetes pulverosus* Stephens, 1828 [= *Colymbetes suturalis* Macleay, 1825] as a type species. *Rhantus pulverosus* was so named by Stephens (1828). F. Balfour-Browne (mentioned in J. Balfour-Browne, 1951) discovered that Macleay (1825) recorded the species from Java under the name *suturalis*, which by the rule of priority replaced the name given by Stephens.

**Subfamily: Laccophilinae**: Tribe Laccophilini is treated as a subfamily in Nilsson *et al.* (1989). Genus *Laccophilus* is revised in Africa by Guignot (1959-1961), in India by Vazirani (1969), in America by Zimmerman (1970), in East Palaearctic by Brancucci (1983). Three species are confirmed in Egypt

confirmed in Egypt with syn. n. proposed to *Laccophilus ponticus*. Nilsson (1985) gave arguments for the replacement of the name *Laccophilus variegatus* (Germar) with *L. obsoletus* Westhoff. Nilsson (1988) (depending on litt. from Mr. Schaeflein) mentioned that what Westhoff (1881) really described as *obsoletus* was a var. of *Haliplus variegatus* Sturm. It seems that Zimmermann (1920) made an error when he cited *L. obsoletus* Westhoff as a junior synonym of *L. variegatus*. Brancucci (1983) in his revision to East Palaearctic species proposed *L. ponticus* as syn. n. of *L. obsoletus*. He examined the types and designated a lectotype for *L. ponticus*. Nilsson (1988) accepted *L. ponticus* as a valid name.

**Subfamily: Dytiscinae**: Klug (1834) described two subspecies of *Eretes sticticus* from Egypt, *E. sticticus helvolus* and *E. sticticus succinctus*. In this study the record of two subspecies has been confirmed and key for the two subspecies introduced. Santiago (1991) redescribed *Eretes sticticus* from America. Zimmermann (1920) recorded 104 species of genus *Hydaticus* in his world catalogue, only three of which were recorded from Egypt. *Hydaticus bivittatus* introduced in this study as a new record for Egypt.

Tribe Aciliini is relatively small tribe with seven genera with about 70 species (Nilsson & Holmen 1995). It is considered a new record for Egypt and represented by one genus, *Rhantaticus* of one species, *R. congestus*.

Tribe: Dytiscini is small tribe with 28 species in 2 genera and recorded for the first time from Egypt. It is represented by one genus, *Dytiscus* of one species *D. circumflexus*. Genus *Dytiscus* revised by Roughley (1990). *Cybister* is a large genus with about 100 species, chiefly confined to the Old World tropics Nilsson *et al.* (1989). Three species are confirmed in Egypt. A Lectotype of *C. vulneratus* is designated and found in MNB (Berlin).

**Acknowledgment**

The authors would like to thank the British Council (Egypt) for the financial support, without the gracious help this book would never have been published. Special thanks to the Photographic Unit, Nottingham University (UK) for the technical support given to the first author to photograph the specimens. Sincere thanks and appreciation to Dr. Francis Gilbert, Nottingham University (UK) for his valuable comments on the manuscript.

Fig 1. Noteridae, habitus of generalized adult.1.1 Dorsal view, without appendages. -1.2 Ventral view. Figures denote the following structures: (1) clypeus, (2) head, (3) eye (4) pronotum, (5) elytron, (6) elytral striae, (7) suture, (8) maxillary palp, (9) antenna, (10) gula, (11) coxa, (12) profemur, (13) protibial spur, (14), metasternal keel or process, (15) metacoxal process, (16-20) abdominal segments or sternites, (21) metacoxal plate, (22) metasternum, (23) episternum, (24) mesosternum, (25) prosternum, (26) labrum.

Fig 2. Dytiscidae, habitus of generalized adult. 2.1 Dorsal view. -2.2 Ventral view. Figures denote the following structures: (1) head, (2) eye, (3) cervical line, (4) pronotum, (5) scutellum, (6) base, (7) elytron, (8) Suture, (9) Suture stria, (10) apex, (11) metatarsal claws, (12) metatarsus, (13) metatibia, (14) metafemur, (15) clypeus, (16) gena and (17) gula, (18) trochanter, (19-24) visible abdominal segments or sternites, (25) metacoxal process, (26) metacoxal plate, (27) metasternum, (28) epipleuron, (29) metasternal wing, (30) prosternal process, (31) prosternum.

Fig.3.*Neohydrocoptus angolensis*. (1) penis, dorsal view. (2) penis, lateral view. (3) right paramere. (4) left paramere. Scale 0.5 mm.

Fig. 4. *Synchortus imbricatus*.- (1) penis, dorsal view. (2) penis, lateral (left) view. (3) penis, lateral (right) view. (4) right paramere. (5) left paramere. (6) protibial spur. Scale 0.5 mm.

Fig. 5. *Canthydrus diophthalmus*. (1) penis, dorsal view. (2) penis, lateral view. (3) right paramere. (4) left paramere. Scale 0.5 mm.

Fig. 6. *Aglymbus gestroi*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) epipleura. (5) metasternal wing. (6) metacoxal processes. (7) protarsus. Upper scales 0.5 mm. Lower scales 1mm.

Fig. 7. *Copelatus pulchellus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) epipleura. Scale 0.5 mm.

Fig. 8. *Copelatus ibrahimi* n. sp. (1) elytron. (2) epipleura. (3) penis, dorsal view. (4) penis, lateral view. (5) paramere. (6) metasternal wing. (7) prosternal process. (8) Protarsus. (9) metatarsal claws. (10) pronoto-elytral angle. (11) metacoxal process. (12) protibia. Scales 1mm.

Fig. 9. *Copelatus parallelipipedus*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. Scale 1 mm.

Fig. 10. *Methles spinosus*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) antenna. (5) metasternal wing. (6) prosternal process. (7) metacoxal processes. (8) elytral apex. (9) anal sternite. Scales 0.5 mm.

Fig. 11. *Hydrovatus cuspidatus*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) antenna. Scale 0.5 mm.

Fig. 12. *Hydrovatus longicornis*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) antenna. Scale 0.5 mm.

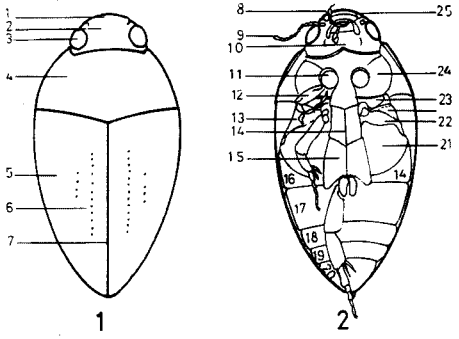



Fig.1

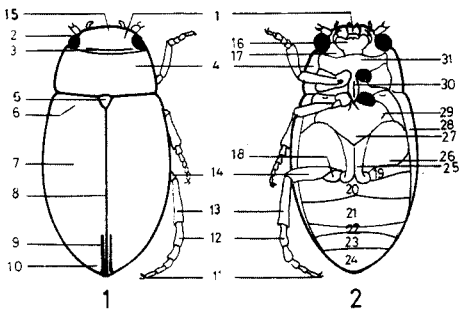



Fig. 2

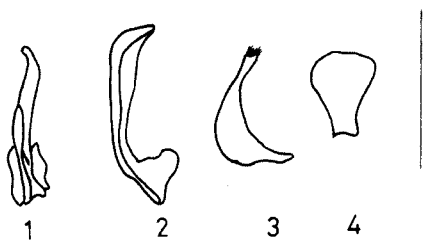



Fig. 3

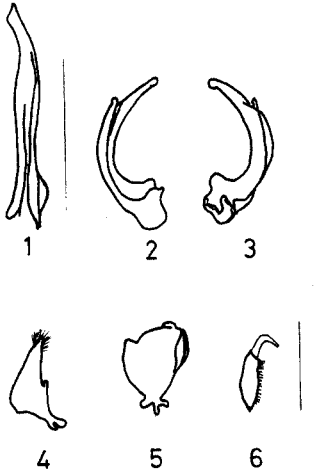



Fig. 4

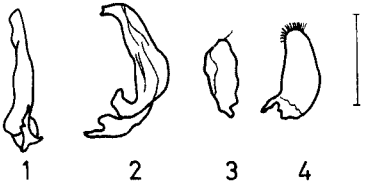



Fig. 5

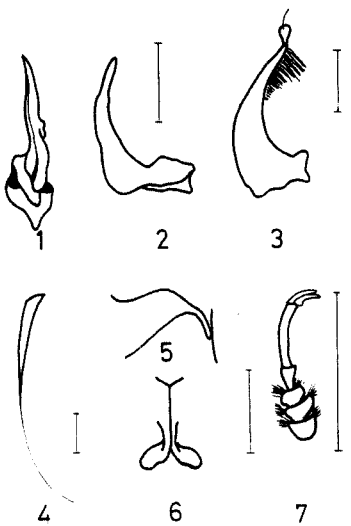



Fig. 6

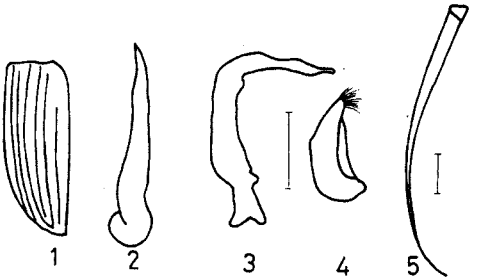



Fig. 7

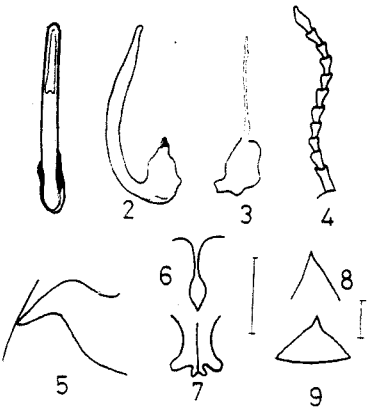
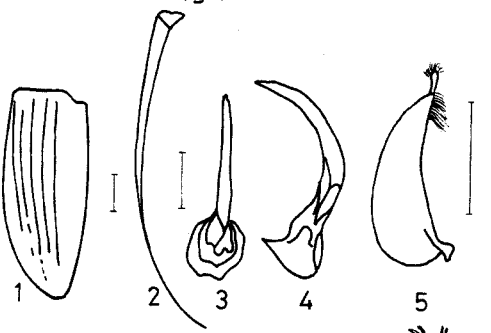



Fig. 10



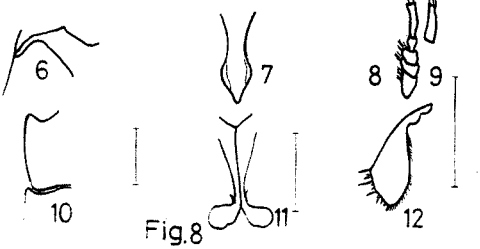




Fig. 8

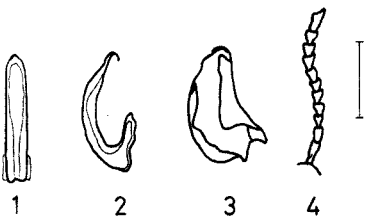



Fig. 11

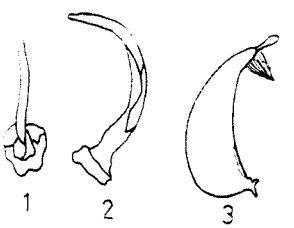



Fig. 9

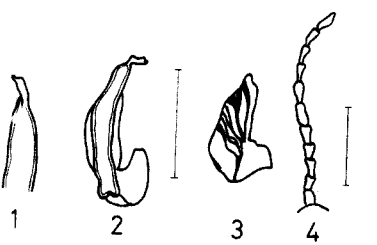



Fig. 12

Fig. 13. *Hydrovatus sordidus*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) antenna. Scale 0.5 mm.

Fig. 14. *Hydrovatus aristidis*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) antenna. Scale 0.5 mm.

Fig. 15. *Hydrovatus clypealis*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) antenna. Scale 0.5 mm.

Fig. 16. *Hydrovatus compactus*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) antenna. Scale 0.5 mm.

Fig. 17. *Bidessus ovoideus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.25mm.

Fig. 18. *Clypeodytes cribrosus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.2mm.

Fig. 19. *Hydroglyphus pusillus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.25mm.

Fig. 20. *Hydroglyphus confusus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.25mm.

Fig. 21. *Hydroglyphus pentagrammus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.25mm.

Fig. 22. *Hydroglyphus major*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.5mm.

Fig. 23. *Hydroglyphus angularis*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.25mm.

Fig. 24. *Hydroglyphus signatellus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.25mm.

Fig. 25. *Yolina insignis*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.25mm

Fig. 26. *Yola porcata*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.5mm.

Fig. 27. *Yola enigmatica*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.25mm.

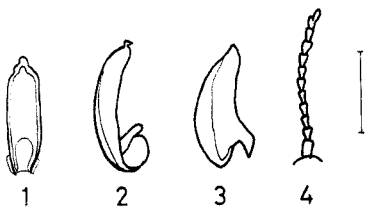



Fig.13

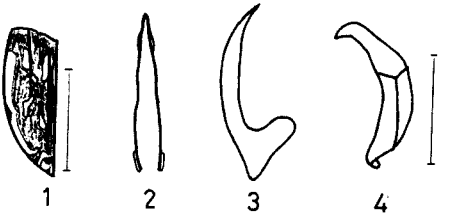



Fig.17


Fig.14

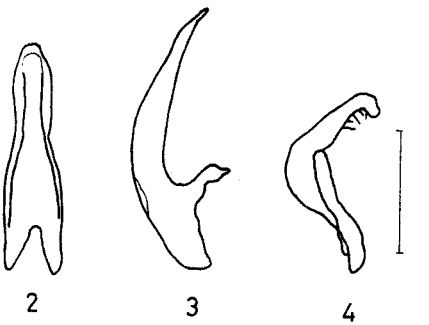



Fig.18

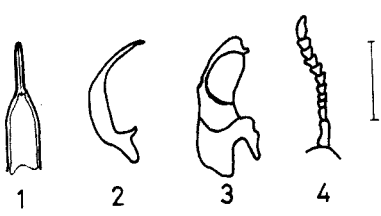



Fig.15

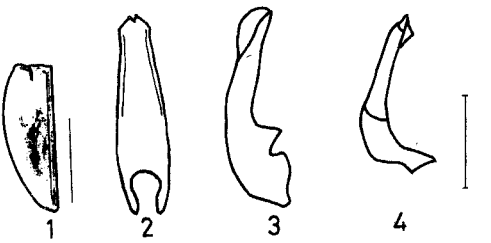



Fig.19

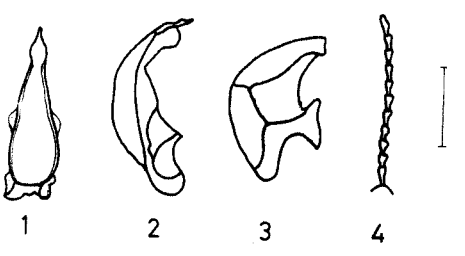



Fig.16

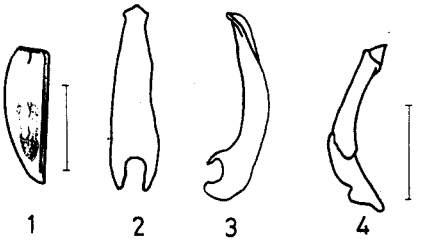



Fig. 20

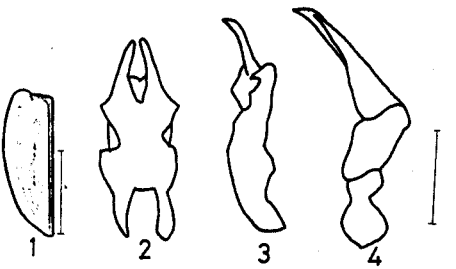



Fig. 21

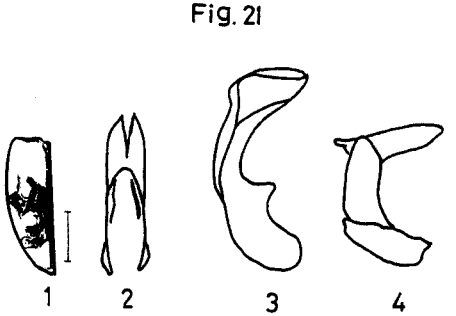



Fig. 22

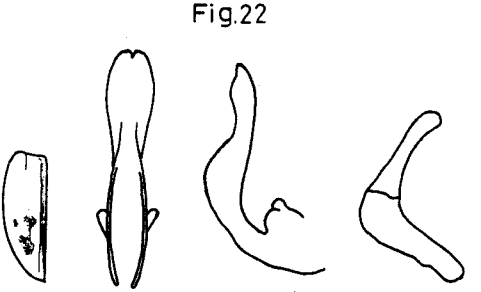



Fig. 23

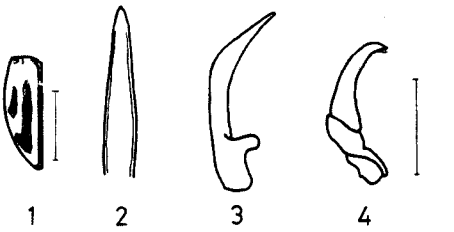



Fig. 24

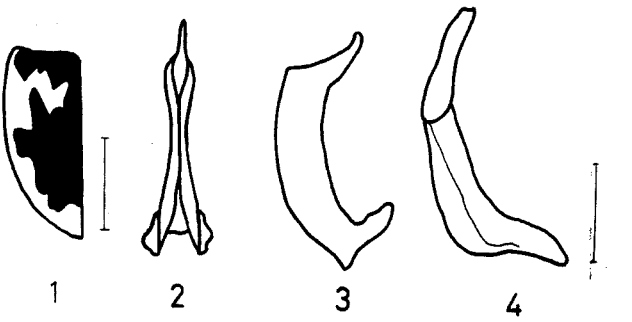



Fig. 25

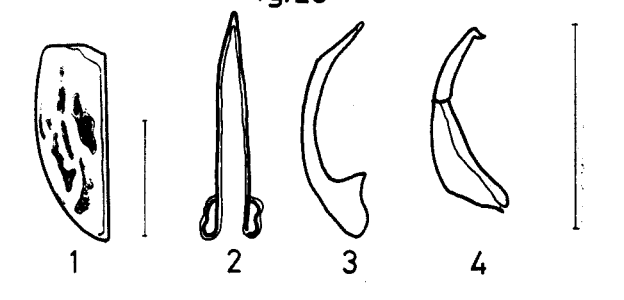



Fig. 26




Fig. 27

Fig. 28. *Hygrotus lernaeus*. (1) elytron. (2) penis, lateral view. (3) penis, dorsal view. (4) paramere. Left scale 1 mm, right scale 0.5mm.

Fig. 29. *Hygrotus saginatus*. (1) elytron of female type (BMNH London). (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. 2, 3, 4 after Fery (1992): 357, 358. Scales 1 mm.

Fig. 30. *Hygrotus confluens*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.5mm.

Fig. 31. *Hygrotus pallidulus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.5mm.

Fig. 32. *Hygrotus inscriptus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1 mm, right scale 0.5mm.

Fig. 33. *Hyphoporus solieri*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) protarsus. (5) elytron. (6) epipleuron. (7) metasternal wing with metacoxal process, ventral aspect. Scales 1mm.

Fig. 34. *Herophydrus guineensis*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) protarsus. (5) epipleuron. (7) metasternal wing with metacoxal process, ventral aspect. Upper scale 1mm. Lower scales 0.5mm.

Fig. 35. *Heterhydrus senegalensis*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. Scale 1mm.

Fig. 36. *Hyphydrus grandis*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) protarsus. (6) protrochanter. Scales 1mm.

Fig. 37. *Hyphydrus cycloides*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) protarsus. (6) protrochanter. Scales 1mm.

Fig. 38. *Hyphydrus pictus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) protarsus. (6) protrochanter. Scales 1mm.

Fig. 39. *Hyphydrus maculatus*. (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) protarsus. (6) protrochanter. Scales 1mm.

Fig. 40. *Hydroporus humilis*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. Scale 0.5mm.

Fig. 41. *Scarodytes halensis*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) elytron. (5) protarsus. (6) metasternal wing with metacoxal process, ventral aspect. Punctation shown only for restricted area. Upper scale 0.3mm. Lower scales 1mm.

Fig. 42. *Nebrioporus cerisyi*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) protarsus. (5) elytron. (6) epipleuron. (7) apex of female elytron. (8) metasternal wing with metacoxal process, ventral aspect. Punctation shown only for restricted area. Upper =0.5mm. Lower =1mm.

Fig. 43. *Nebrioporus insignis*. (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) protarsus. (5) elytron. (6) epipleuron. (7) apex of female elytron. (8) metasternal wing with metacoxal process. Scales 1mm.

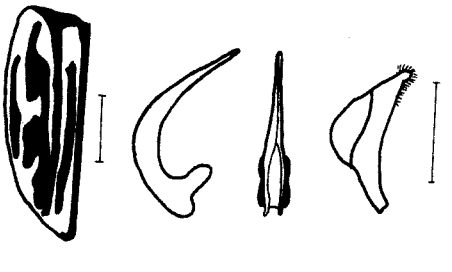



Fig.28

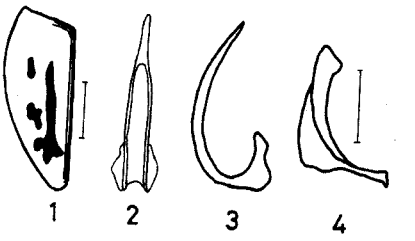



Fig.32

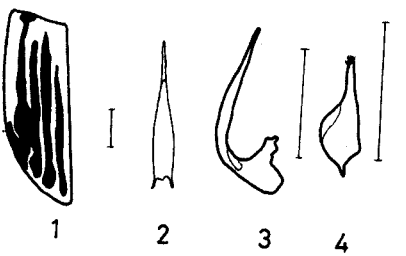
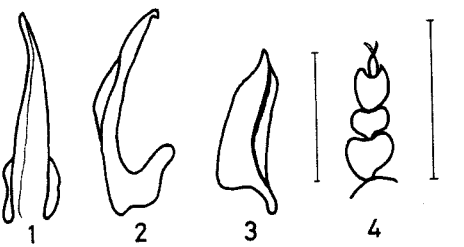



Fig.29



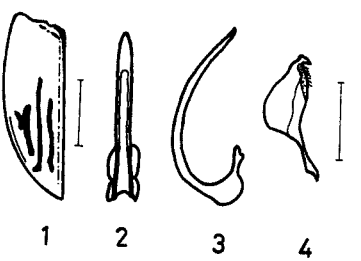




Fig.30

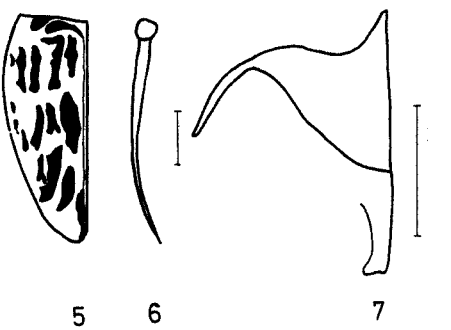



Fig.33

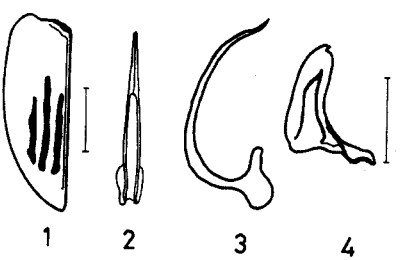



Fig.31

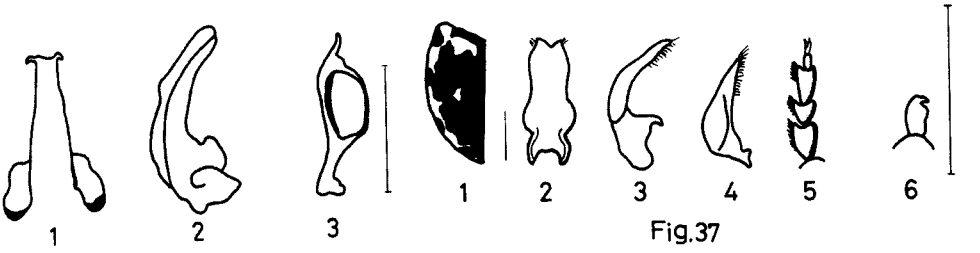



Fig.37

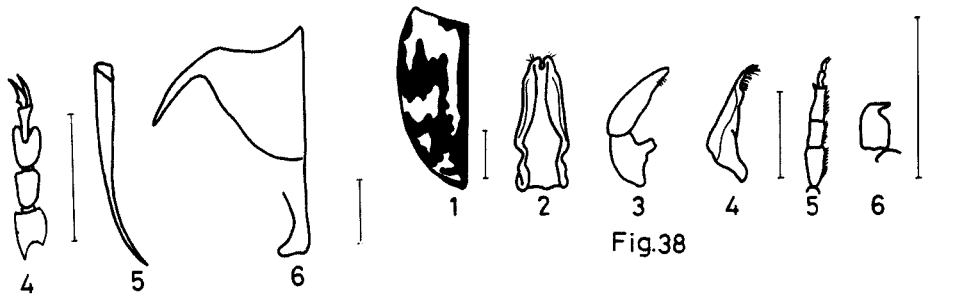



Fig.38

Fig.34

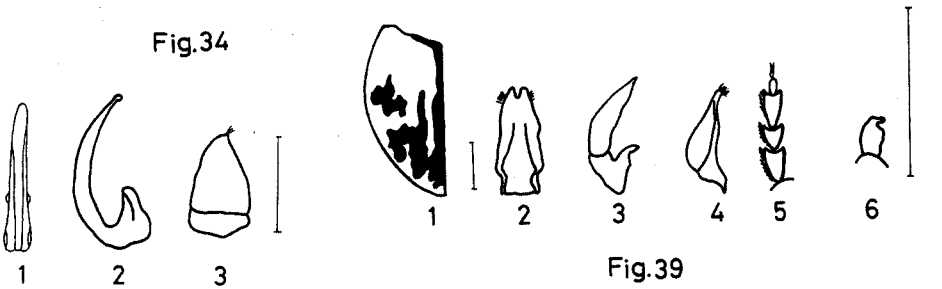



Fig.39

Fig.35

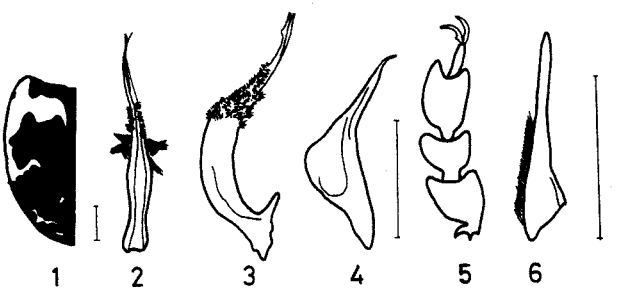



Fig.36

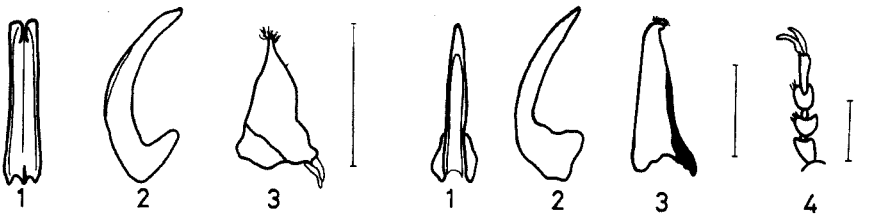



Fig.40

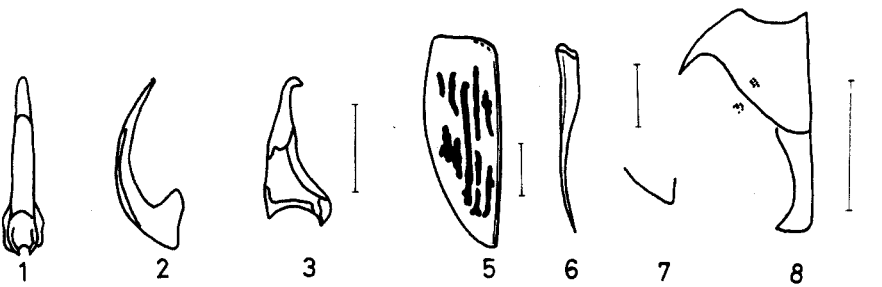



Fig.42

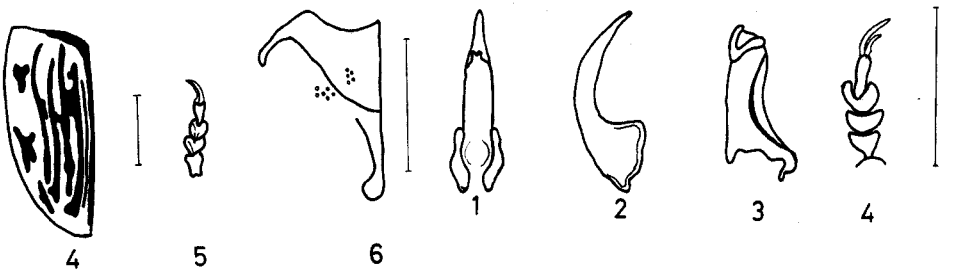



Fig.41

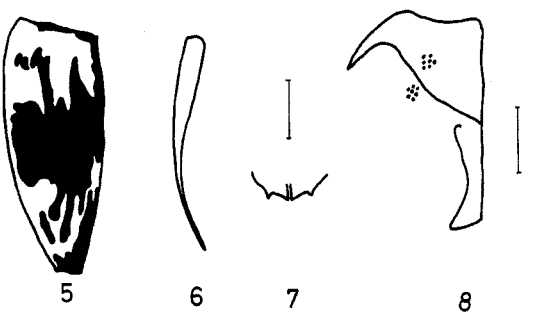



Fig.43

Fig. 44. *Nebrioporus lanceolatus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) protarsus. (5) elytron. (6) epipleuron. (7) apex of female elytron. (8) metasternal wing with metacoxal process, ventral aspect. Punctation shown only for restricted area. scales 1mm.

Fig. 45. *Nebrioporus walkeri.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) protarsus. (5) elytron. (6) epipleuron. (7) apex of female elytron. (8) metasternal wing with metacoxal process, ventral aspect. Punctation shown only for restricted area. scales 1mm.

Fig.46. *Platambus lunulatus.* (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Left scale 1mm. Right scale 0.5mm.

Fig. 47. *Agabus biguttatus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) elytro-pronotal angle. (5) metasternal wing and metacoxa. (6) protarsus. Upper scale 0.5mm. Lower scale 1mm.

Fig. 48. *Agabus dilatatus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) elytro-pronotal angle. (5) metasternal wing and metacoxa. (6) male protarsal claws. Upper scale 0.5mm. Lower scale 1mm.

Fig. 49. *Agabus conspersus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) elytro-pronotal angle. (5) metasternal wing and metacoxa. (6) male protarsal claws. Upper scale 0.5mm. Lower scale 1mm.

Fig. 50. *Rhantus consputus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) metasternal wing. (5) male protarsal claws. (6) male, female metatarsal claws. (7) male, female prosternal process. Scales 0.1mm.

Fig. 51. *Rhantus includens.* (1) colour pattern of head and pronotum (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) metasternal wing. (6) male protarsal claws. (7) male, female metatarsal claws. (8) male, female prosternal process. Scales 1mm.

Fig. 52. *Rhantus suturalis.* (1) colour pattern of head and pronotum (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) metasternal wing. (6) male protarsal claws. (7) male, female metatarsal claws. (8) male, female prosternal process. Upper scales 1mm. Lower scales 0.5mm

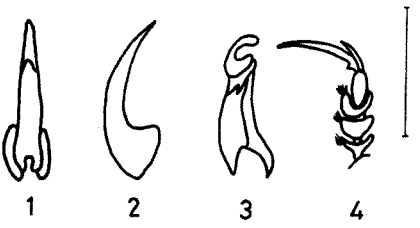
Fig. 53. *Colymbetes piceus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. Scale 1mm.

Fig. 54. *Colymbetes fuscus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. Scale 1mm.

Fig. 55. *Laccophilus ponticus.* (1) penis, dorsal view. (2) penis, lateral view. (3) parameres. (4) male anal sternite. (5) female anal sternite. 0.5mm.

Fig. 56. *Laccophilus pictipennis.* (1) penis, dorsal view. (2) penis, lateral view. (3) parameres. (4) male anal sternite. (5) female anal sternite. 0.5mm.

Fig. 57. *Laccophilus sordidus.* (1) penis, dorsal view. (2) penis, lateral view. (3) parameres. Scale 0.5mm.



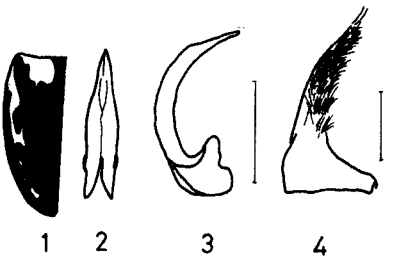




Fig.46

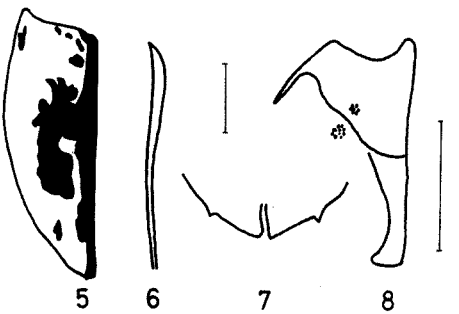



Fig.44

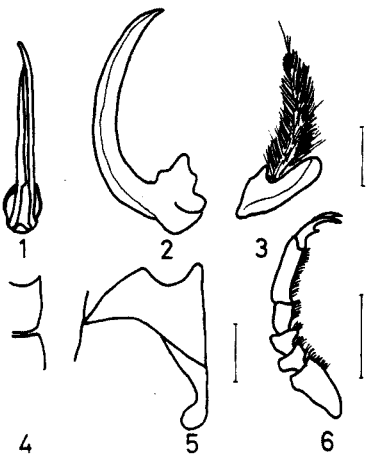
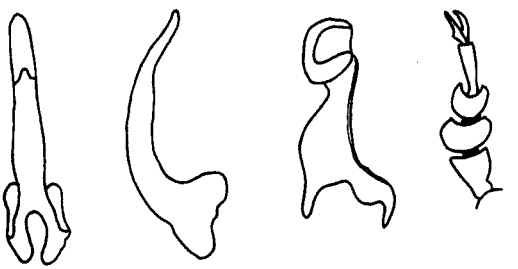



Fig.47



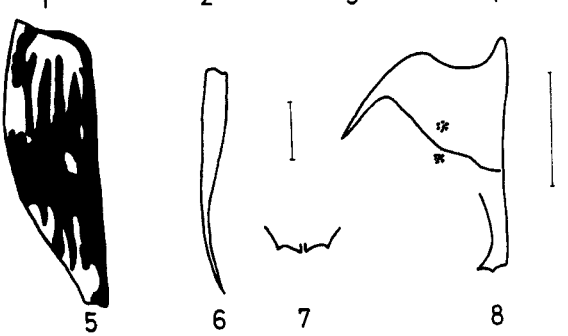




Fig.45

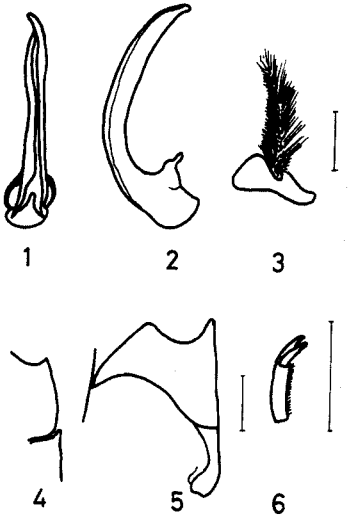



Fig.48

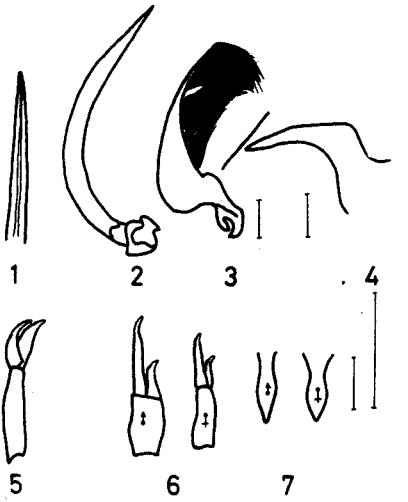



Fig.50

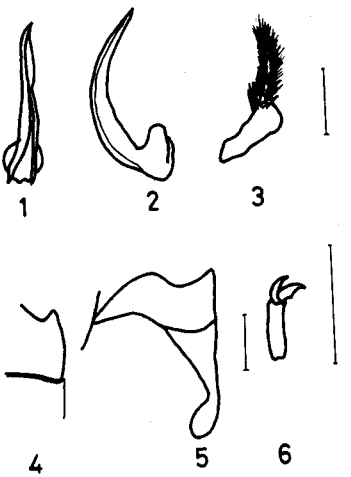



Fig.49

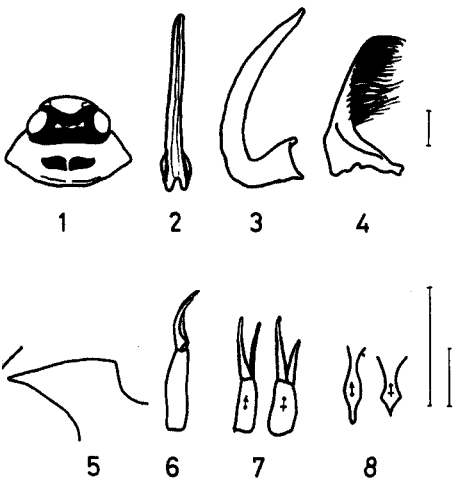



Fig.51

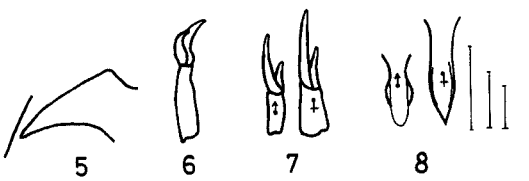




Fig. 52

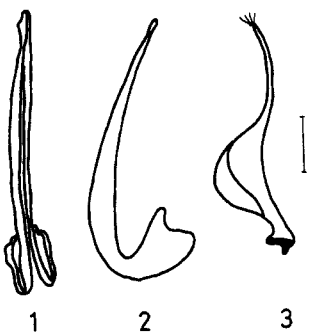



Fig.53

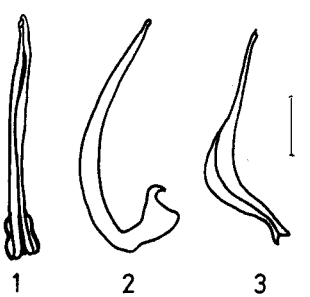



Fig.54

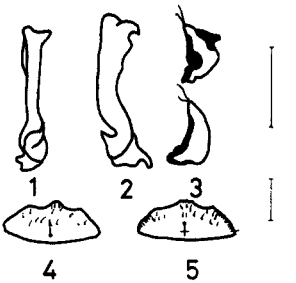



Fig.55

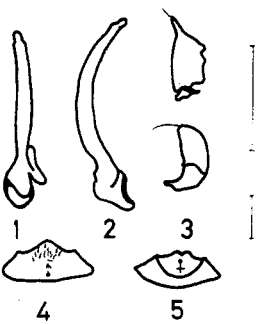



Fig.56

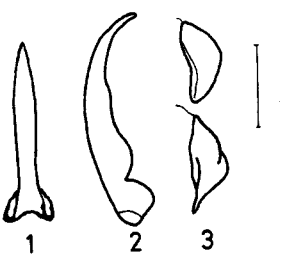



Fig.57

Fig. 58. *Philodytes umbrinus.* (1) penis, dorsal view. (2) penis, lateral view. (3) parameres. (4) male anal sternite. (5) female anal sternite. Scales 0.5mm.

Fig. 59. *Eretes stictcus.* (1) colour pattern of head and pronotum (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) metasternal wing and metacoxa. (6) male metatarsal claws. (7) female metatarsal claws. Scales 1mm.

Fig. 60. *Hydaticus leander.* (1) penis, dorsal view. (2) penis, lateral view. (3) parameres. (4) male metatarsal claws. (5) female metatarsal claws.Upper scale 0.5mm. Lower scale 1mm.

Fig. 61. *Hydaticus ponticus.* (1) penis, lateral view. (2) parameres. Scale 1mm.

Fig. 62. *Hydaticus bivittatus.* (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Scales 1mm.

Fig. 63. *Hydaticus decorus.* (1) elytron. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. (5) metasternal wing. (6) male protarsal claws. (7) female metatarsal claws. (7) male, female prosternal process. Scales 0.1mm.

Fig. 64. *Rhantaticus congestus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. (4) metasternal wing. Left scale 0.5mm. Right scale 1mm.

Fig. 65. *Dytiscus circumflexus.* (1) penis, dorsal view. (2) penis, lateral view. (3) paramere. Scale 1mm.

Fig. 66. *Cybister lateralimarginalis.* (1) metatarsus. (2) mesotarsus. (3) metatibial spurs. (4) penis, dorsal view. (5) penis, lateral view. (6) paramere. Scales 1mm.

Fig. 67. *Cybister tripunctatus* subsp. *africanus.* (1) metatarsus. (2) metatibial spurs. (3) penis, dorsal view. (4) penis, lateral view. (5) paramere. Scales 1mm.

Fig. 68. *Cybister vulneratus.* (1) metatibial spurs. (2) penis, dorsal view. (3) penis, lateral view. (4) paramere. Scales 1mm.

**Plate 1. Noteridae and Dytiscidae details of adults** (1) metacoxal process, Noteridae. (2) protibial spur, *Synchortus.* 3-4 posterior apical angle of the metafemur, (3) *Canthydrus,* (4) *Synchortus.* 5-6. anterior half of body, dorsal view, (5) Hydroporinae, (6) Colymbetinae. 7, 9. head, anterior view, (7) Colymbetinae, (9) Dytiscinae. 8, 10. protarsus, (8) Colymbetinae, (10) Dytiscinae. (11) metafemur, inferior face, Agabini. 12-13. epileuron, (12) *Platambus*, (13) *Agabus.* 14-15. metacoxal line, (14) *Aglymbus,* (15) *Copelatus.* 16-17. elytral reticulation, (16) *Colymbetes*, (17) *Rhantus.* 18-19. metatibia, apical spurs, (18) Hydaticini, (19) Aciliini. 20-21. metatibia, (20) Cybisterini, (21) Dytiscini. (22) metatarsus, Laccophilinae. 23-24. protarsus, (23) Laccophilinae, (24) Hydroporinae. 25-26. metatibial spurs, (25) *Laccophilus,* (26) *Philodytes.* (27) elytral apex, *Methles.* (28) anal sternite, *Methles.* 29-30. epipleuron, (29) Hygrotini, (30) Hydroporini. (31) metatarsal claws, Hyphydrini. (32) metacoxal processes, *Hyphydrus.* 33-34. prosternal process, (33) Hydrovatini, (34) Hygrotini. 35-36. head, anterior view, (35) *Hyphoporus*, (36) *Hygrotus.* 37-38. metacoxa, (37) *Herophydrus*, (38) *Hyphoporus.* 39-40. anterior half of body, dorsal view, (39) Bidessini, (40) Hydroporini. 41-43. body, dorsal view, (41) *Bidessus*, (42) *Yola*, (43) *Hydroglyphus.* 44-45. metafemur, dorsal view, (44) *Nebrioporus*, (45) *Scarodytes.* 46-47. metacoxal processes, (46) *Scarodytes*, (47) *Hydroporus.* 48-49. metasternal wing, (48) *Rhantaticus*, (49) *Hydaticus.*

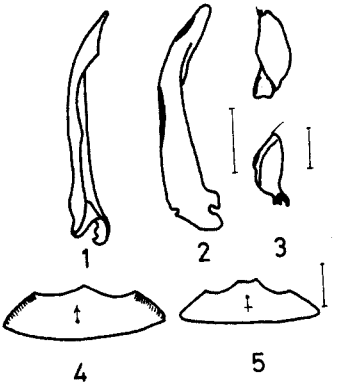



Fig.58

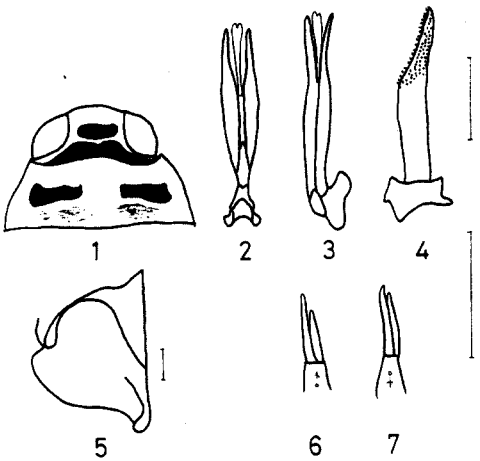



Fig.59

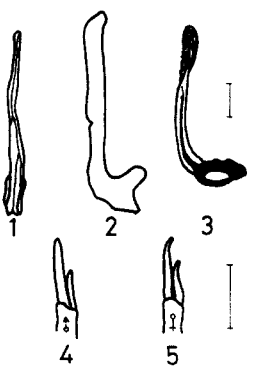



Fig.60

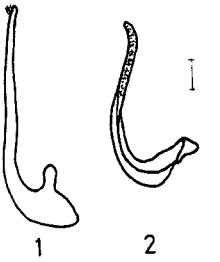



Fig.61

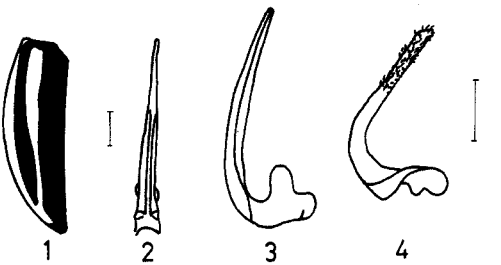



Fig.62

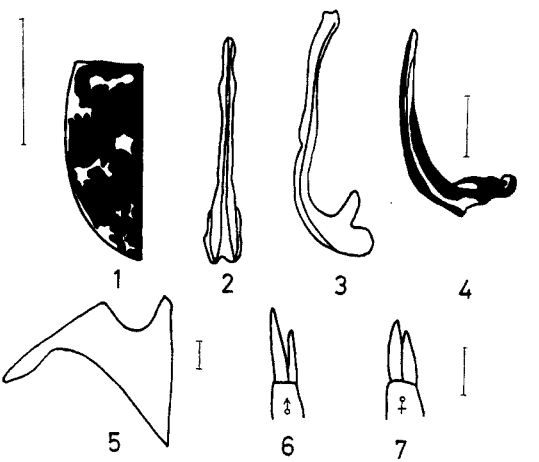



Fig.63

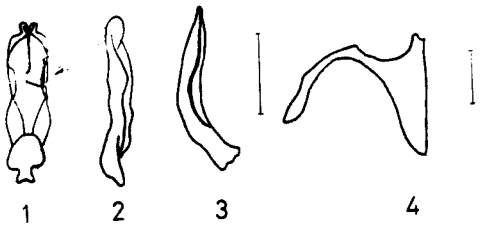
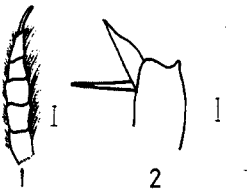



Fig.64



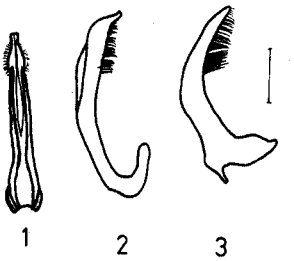




Fig.65

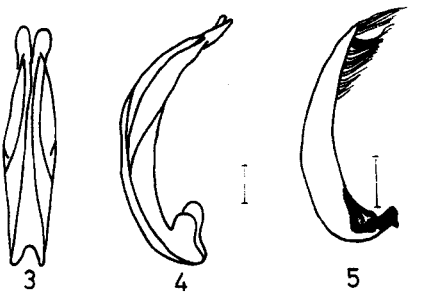



Fig. 67

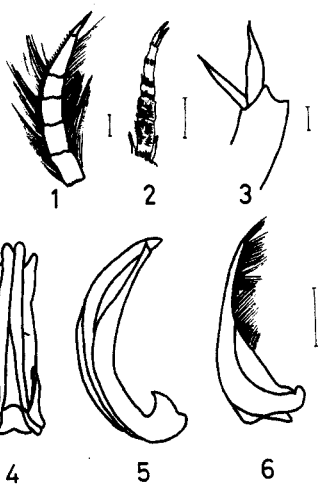



Fig.66

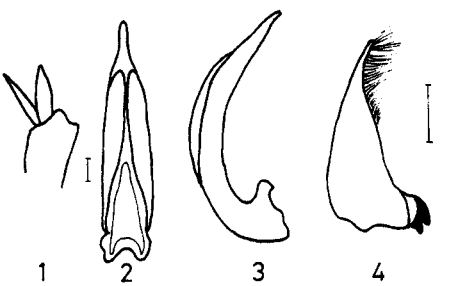
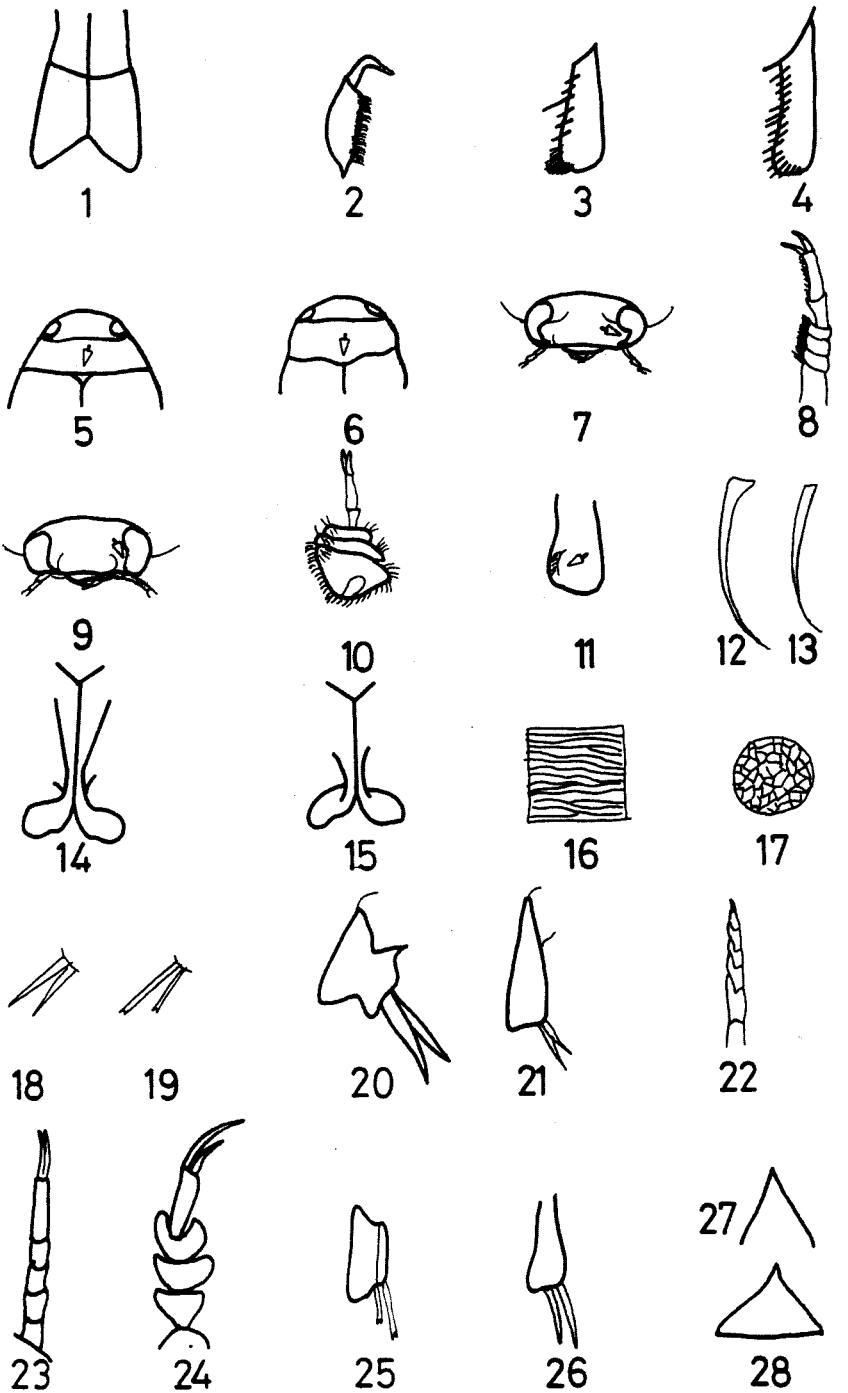
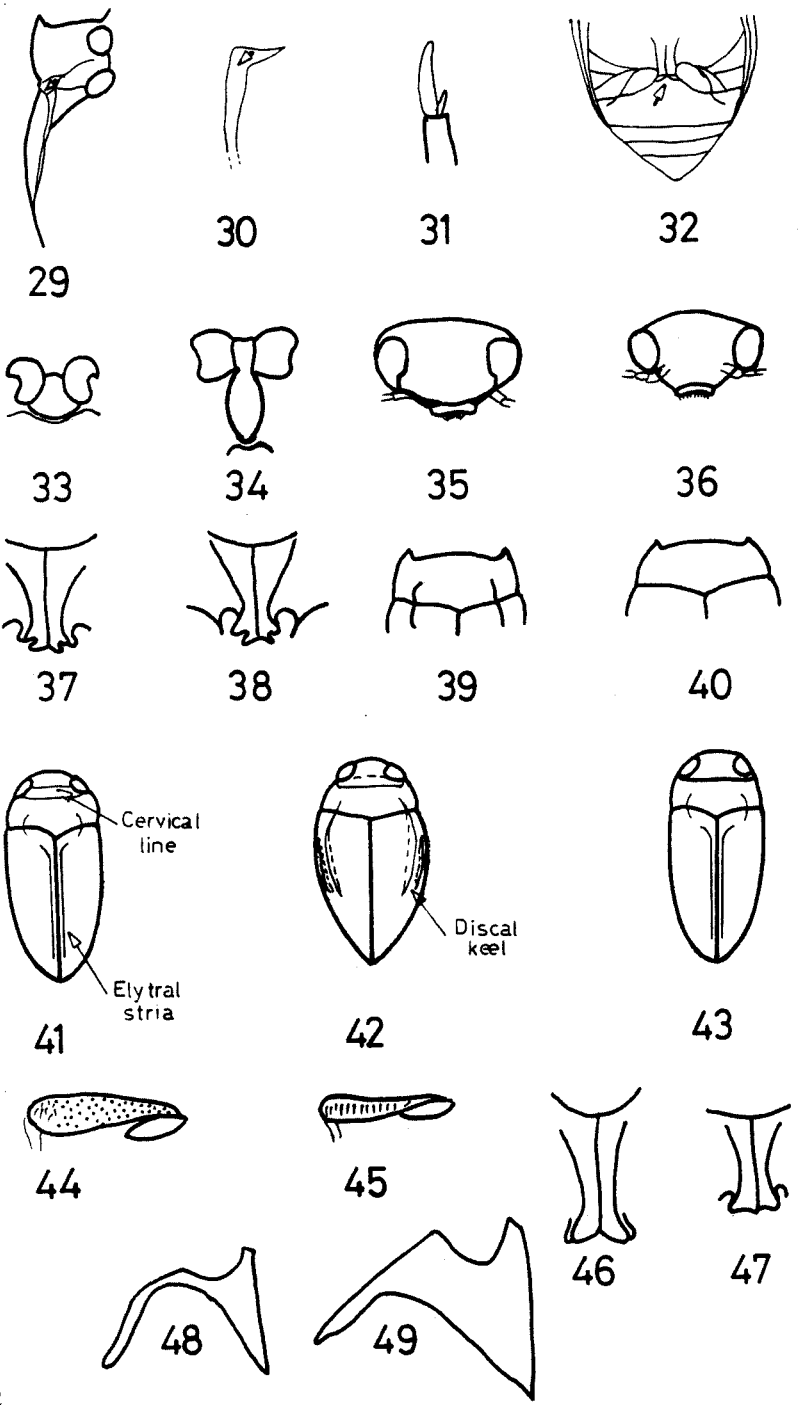
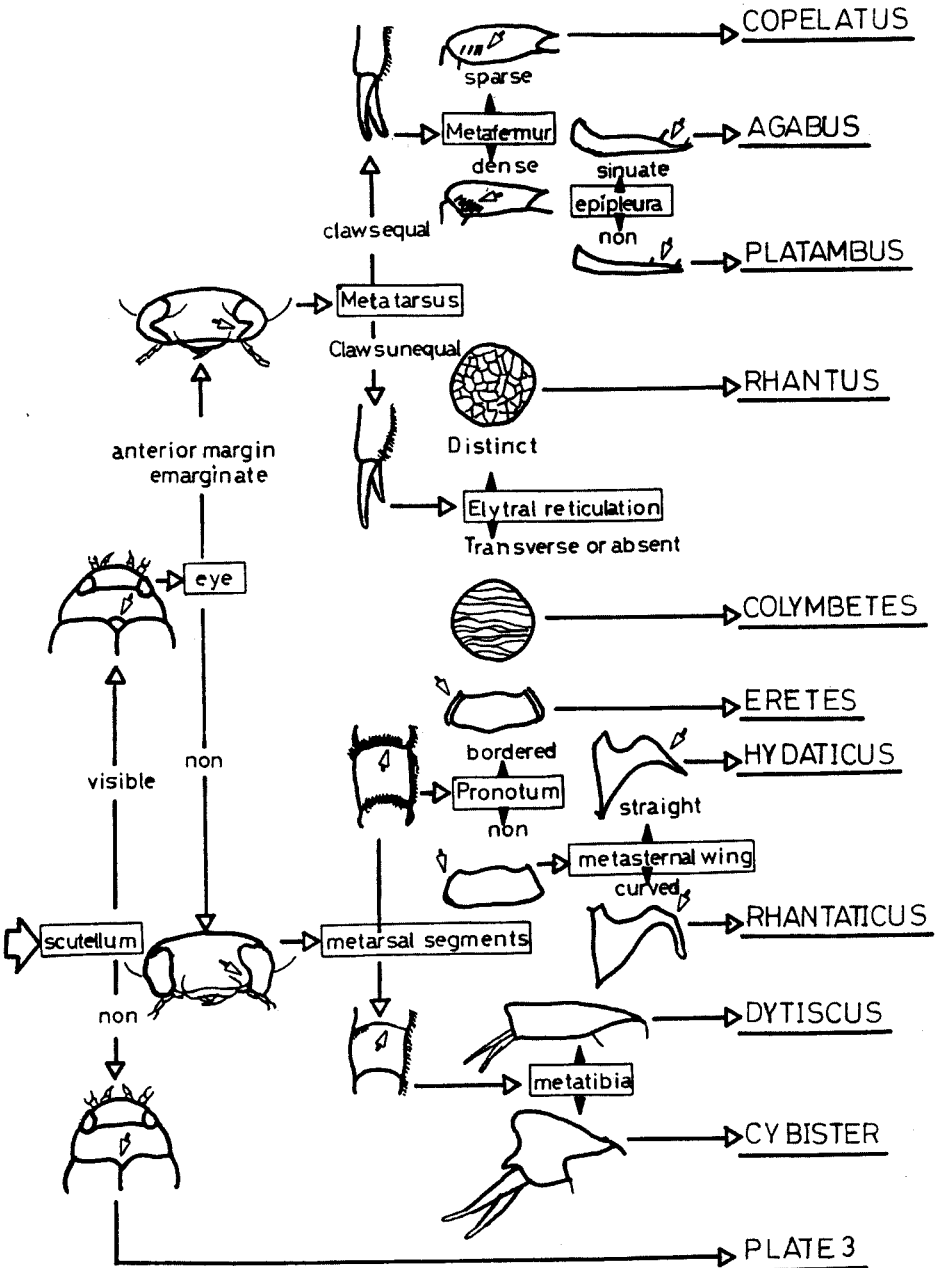



Fig.68

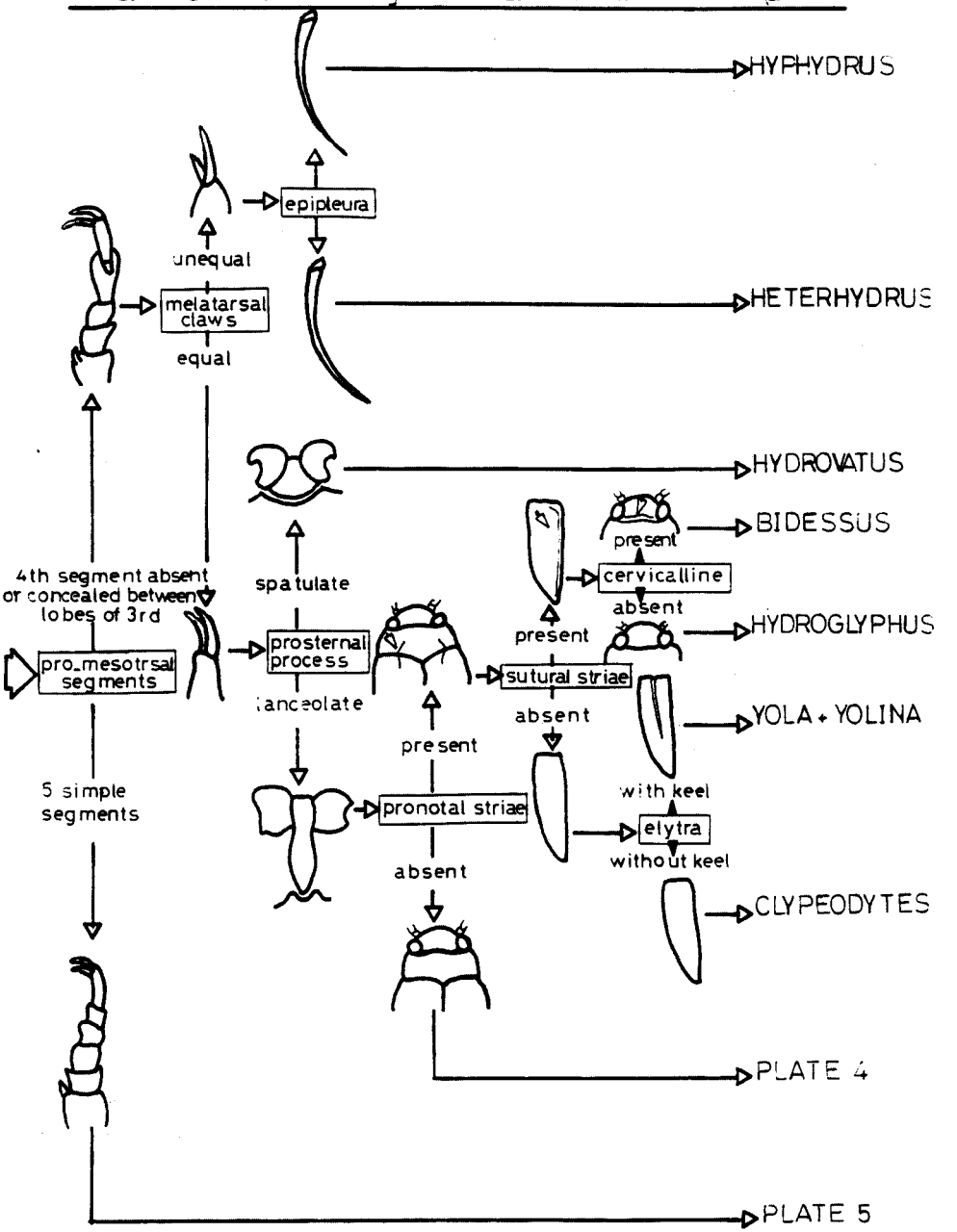

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28


29
30
31
32
33
34
35
36
37
38
39
40
Cervical line
Elytral stria
41
Discal keel
42
43
44
45
46
47
48
49

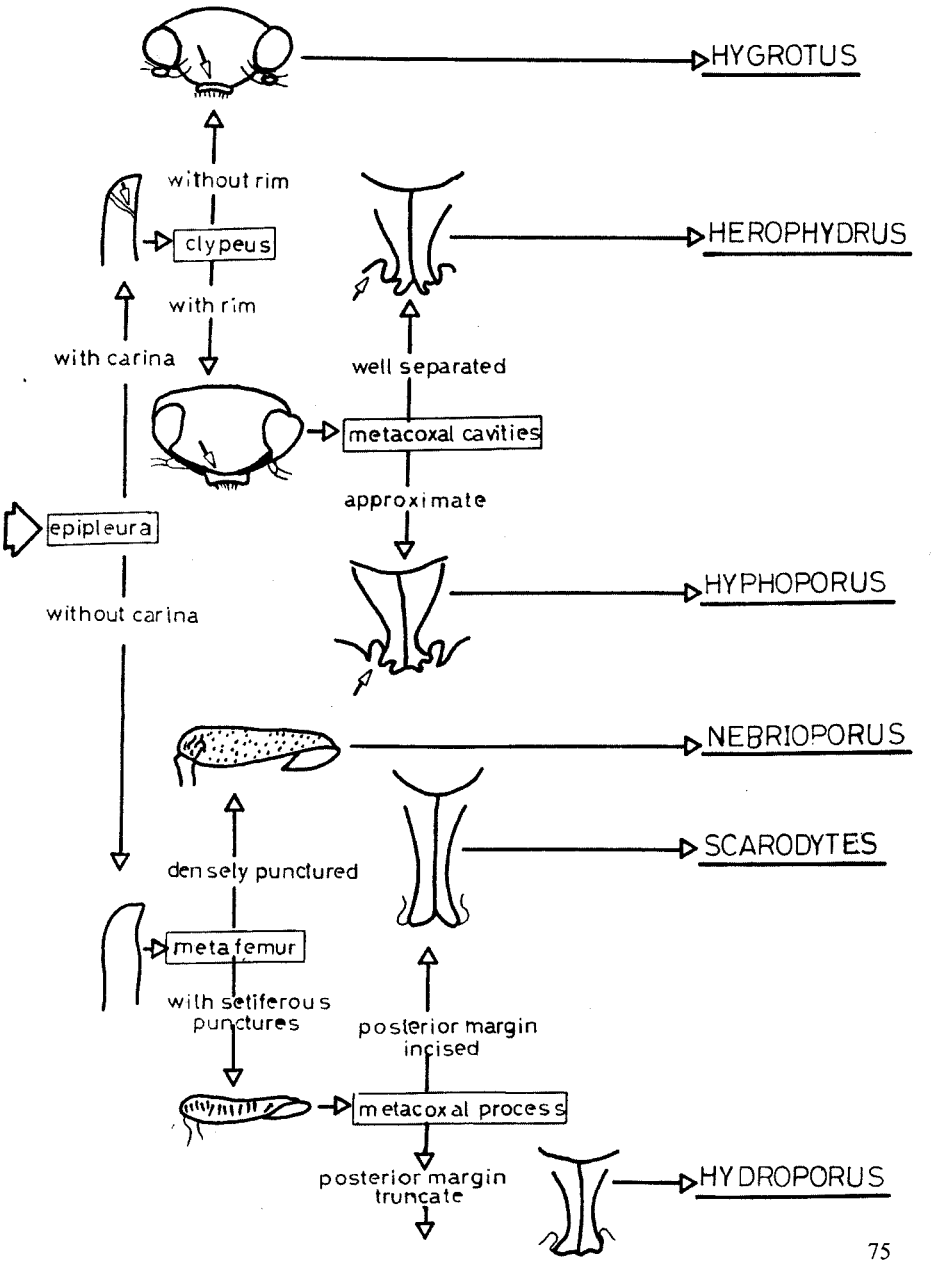
**Plates 2-6. Illustrated key to the genera of the Egyptian diving beetles (Family: Dytiscidae and Noteridae).**



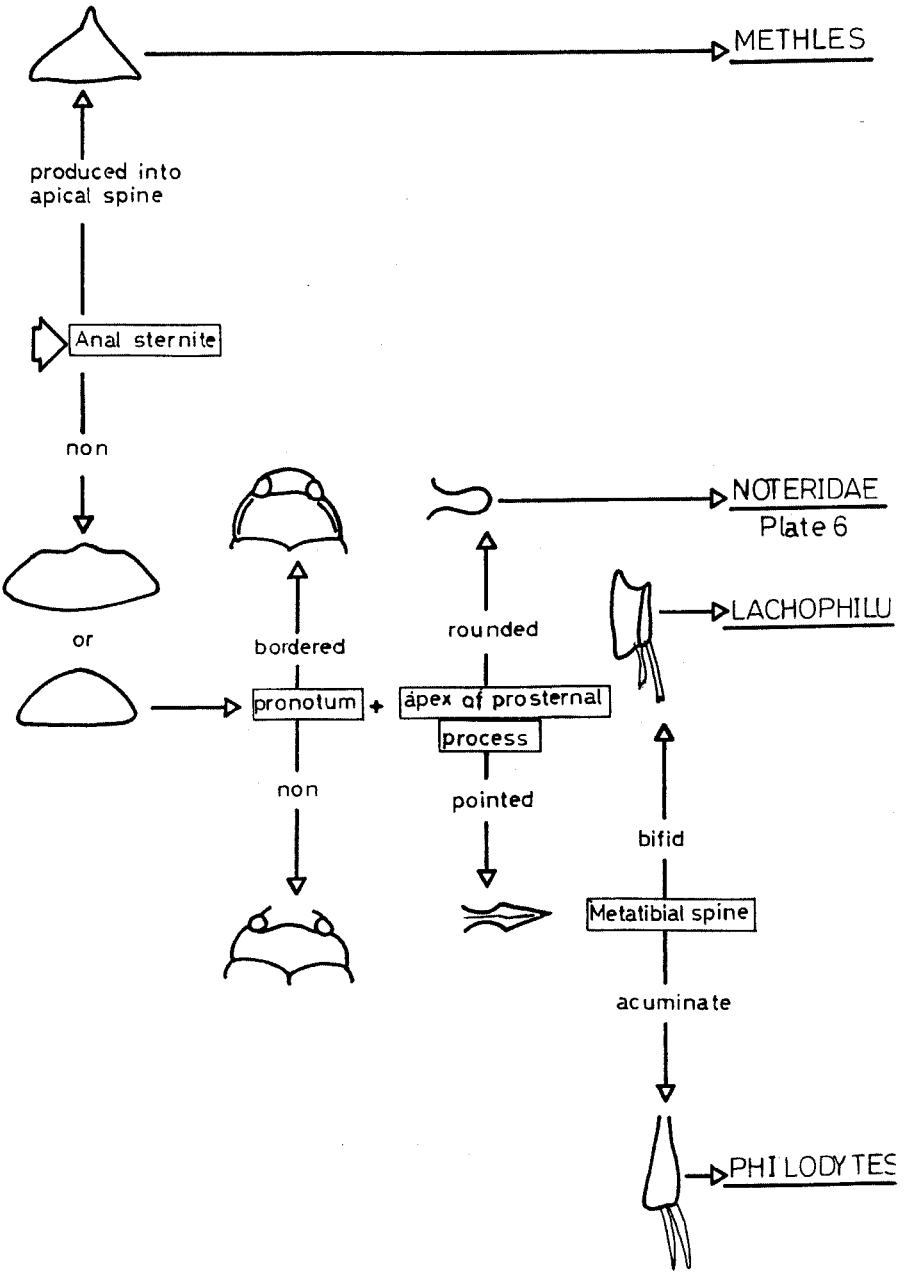
# Plate 3 Adults Dytiscidae and Noteridae



# Plate 4 Aduts. Dytiscidae and Noteridae



# Plate 5 Aduts: Dytiscidae and Noteridae



# Plate 6 Adults: Dytiscidae and Noteridae

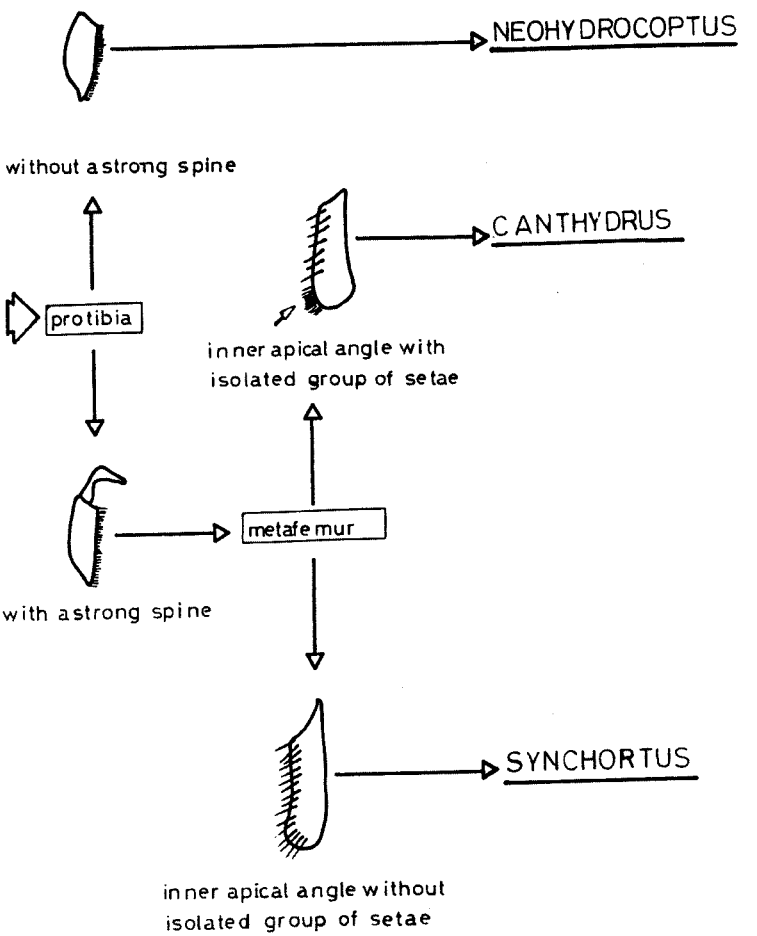


Plate 7. Scanning electron micrographs. (1) penis, dorsal view, *Copelatus ibrahimi* (2) penis, dorsal view, *Copelatus parallelipipedus*. (3) penis, lateral view, *Copelatus ibrahimi* (4) penis, lateral view, *Copelatus parallelipipedus*. Scale 0.35mm.

Plate 8. Scanning electron micrographs. (1) foremargin of the head (clypeus with rim), *Herophydrus musicus,* scale A 0.5mm. (2) metatarsal claws, *Hyphydrus grandis,* scale B 0.33mm. (3) apex of elytra, *Methles spinosus*, scale B 0.5mm. (4) last abdominal segment = anal sternite, *Methles spinosus,* scale B 0.5mm.

Plate 9. Scanning electron micrographs. 1, 2, 3, 4 body form. (1) *Hydrovatus cuspidatus*. (2) *Hydrovatus sordidus*. (3) *Hydrovatus longicornis*. (4) *Hydrovatus aristidus*. 5, 6 shape of _ antennae. (5) *Hydrovatus longicornis*. (6) *Hydrovatus aristidus*.Scale A 1mm, beetles, scale B 0.5mm, antennae.

Plate 10. Scanning electron micrographs. Penis of genus *Hydrovatus*. (1) *H. cuspidatus*, dorsal and lateral view. (2) *H. sordidus*, dorsal and lateral view. (3) *H. compactus*, dorsal and lateral view. (4) *H. longicornis*, dorsal and lateral view. (5) *H. clypealis*, lateral view. (6) *H. aristidis*. Scale 0.5mm.

Plate 11. Scanning electron micrographs. Protarsus. (1) *Hydroglyphus confusus,* Bidessini. (2) *Hydrovatus compactus*, Hydrovatini. (3) *Herophydrus musicus*, Hygrotini. (4) *Scarodytes halensis*. (5) *Nebrioporus cerisyi*. (6) *Nebrioporus insignis*. (7) *Nebrioporus lanceolatus*. (8) *Nebrioporus walkeri*. 4, 5, 6, 7, 8 Hydroporini. Scale 0.25mm in 1, 0.5mm in 2-7, 0.75 in 8.

Plate 12. Scanning electron micrographs. 1, 2 body form. (1) *Hydroglyphus pusillus*. (2) *H. confusus*. 3, 4 anterior half of the body. (3) *Hydroglyphus pusillus*, head without cervical line. (4) *H. confusus*, pronoto-elytral striae short and impressed. 5, 6 *Bidessus ovoideus,* anterior half of the body. (5) head with cervical line. (6) elytra with long impressed stria. Scales 0.5mm. A 3, 4, 5, 6. B 1, 2.

Plate 13. Scanning electron micrographs. 1, 3 *Yola porcata*. (1) body form, scale A 0.5mm. (3) anterior half of the body to show punctation and elytral ridges scale B 0.5mm. . 2, 4 *Yola enigmatica*. (2) body form, scale A 1mm.. (4) anterior half of the body to show punctation and elytral ridge, scale B 0.5mm.

Plate 7


Plate 8

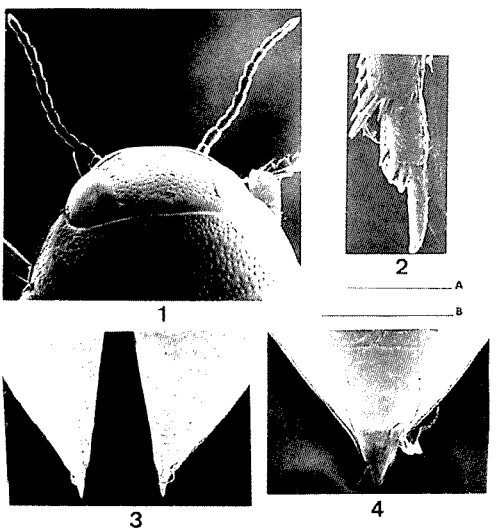



Plate 9

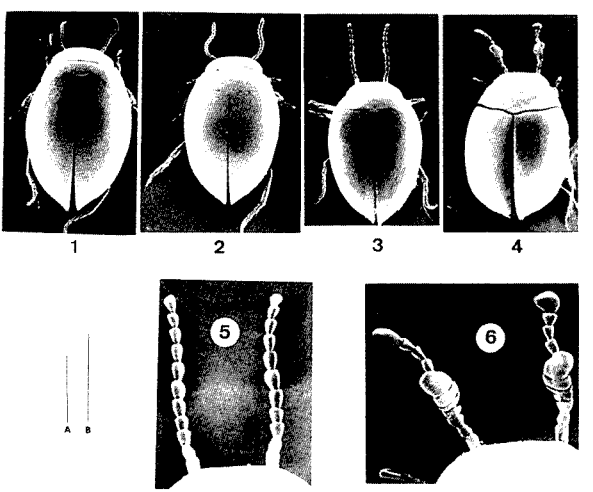


Plate 10

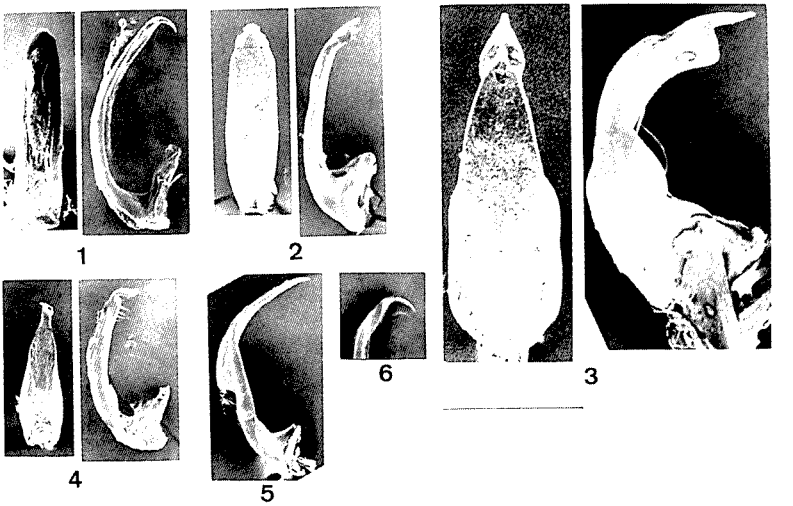
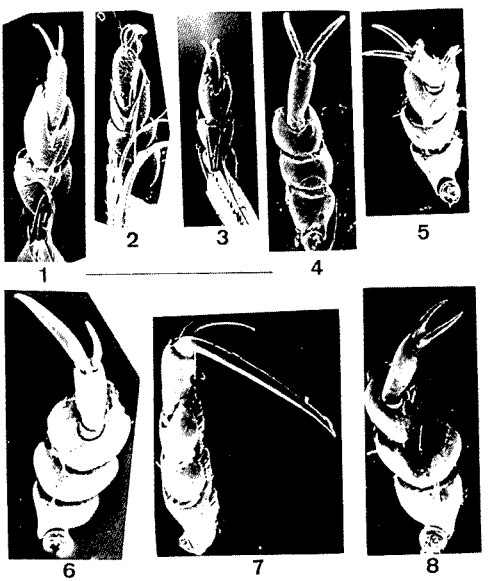
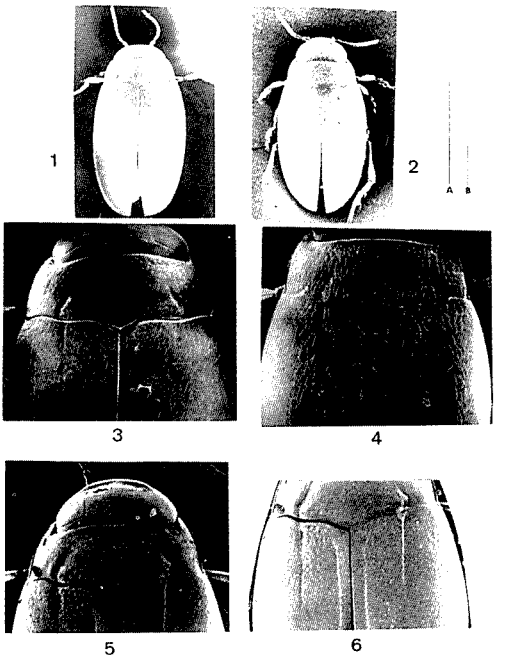



Plate 11



## Plate 12




## Plate 13

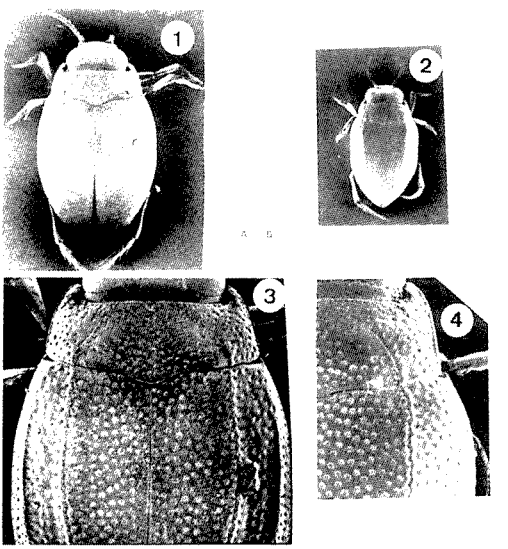


Plate 14. Scanning electron micrographs. 1, 2, 3, 4, 5 aedeagi of genus *Hydroglyphus*. (1) *H. pusillus*. (2) *H. confusus*. (3) *H. signatellus*. (4) *H. pentagrammus*. (5) *H. major*. (6) penis, dorsal view, *Bidessus ovoideus*. (7) paramere, *Bidessus ovoideus*. (8) aedeagus, *Yolina insignis*. (9) aedeagus, *Yola porcata*. Scale 0.5mm.

Plate 15. Scanning electron micrographs. 1, 2, 3 punctation of metasternal wing and metacoxa of genus *Hygrotus*. (1) *H. Lernaeus*. (2) *H. pallidulus*. (3) *H. confluens*. (4) punctation of metacoxa, *Scarodytes halensis*. (5) punctation of metacoxa, *Nebrioporus insignis*. Scales 0.05mm.

Plate 16. Scanning electron micrographs. (1) penis, dorsal view, *Herophydrus guineesis*. (2) penis, anterior view, *Herophydrus musicus*. Scale 0.5mm.

Plate 17. Scanning electron micrographs. prosternal process. (1) *Scarodytes halensis*. (2) *Nebrioporus lanceolatus*. (3) *Nebrioporus insignis*. 0.2mm.

Plate 18. Scanning electron micrographs genus *Nebrioporus*. 1, 2, 3, 4 penis, dorsal view (1) *N. cerisyi*. (2) *N. lanceolatus*. (3) *N. insignis*. (4) *N. walkeri*. Parameres of. (5) *N. cerisyi*. (6) *N. insignis*. (7) *N. walkeri*. 0.5mm.

Plate 19. Scanning electron micrographs. 1, 2, 3 protarsus and protarsal claws of genus *Agabus*. (1) *A. biguttatus*. (2) *A. dilatatus*. (3) *A. conspersus*. 4, 5, 6 protarsus and protarsal claws of genus *Rhantus*. (4) *R. suturalis*. (5) *R. includens*. (6) *R. consputus*. Scale 1mm (1-5), scale 0.5mm (6).

Plate 20. Scanning electron micrographs. elytral punctation. (1) *Agabus diltatus*, scale 0.04mm (2) *Colymbetes consputus*, scale 0.08mm. (3) *Colymbetes fuscus*, scale 1mm.

Plate 21. Scanning electron micrographs. protarsus. 1, 2, 3, 4 tribe Hydaticini. (1) dorsal view, *Hydaticus decorus*. (2) ventral view, *Hydaticus decorus*. (3) dorsal view, *Hydaticus leander*. (4) ventral view, *Hydaticus leander*. 5, 6 tribe Acillini. (5) dorsal view, *Rhantaticus congestus*. (6) ventral view, *Rhantaticus congestus*. 7, 8 tribe Dytiscini. (7) dorsal view, *Dytiscus circumflexus*. (8) ventral view, *Dytiscus circumflexus*. 9, 10 tribe Eretini. (9) dorsal view, *Eretes stictcus*. (10) ventral view, *Eretes stictcus*. 1mm.

Plate 22. Scanning electron micrographs. protarsus of tribe Cybisterini. (1) dorsal view, *Cybister lateralimarginalis*. (2) ventral view, *Cybister lateralimarginalis*. (3) ventral view, *Cybister vulneratus*. (4) ventral view, *Cybister tripunctatus* subsp. *africanus*. Scale 1mm.

Plate 14

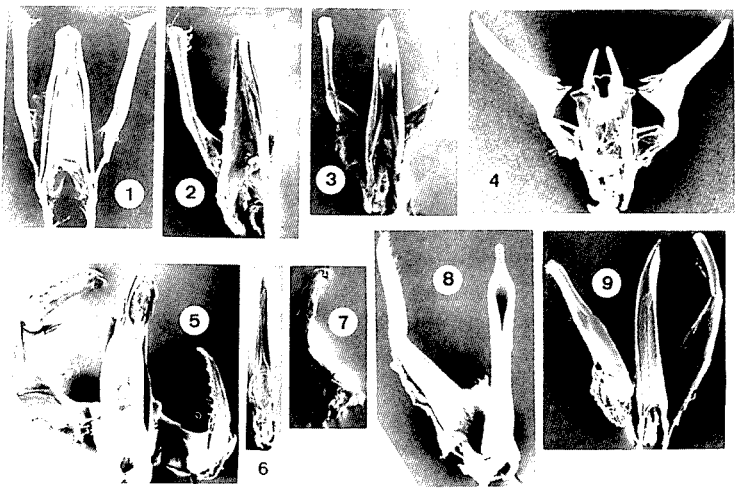



Plate 15

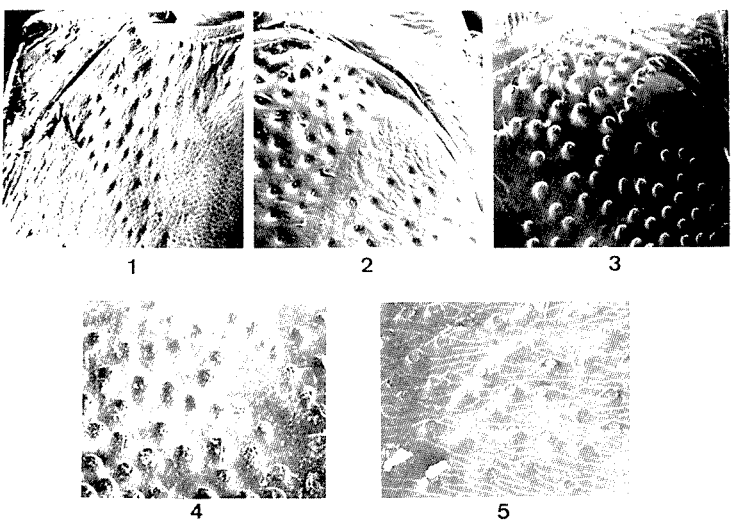


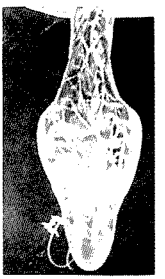
**Plate 16**

1

2

**Plate 17**

1



2

3

**Plate 18**

1

2

3

4

5

6

7

Plate 19

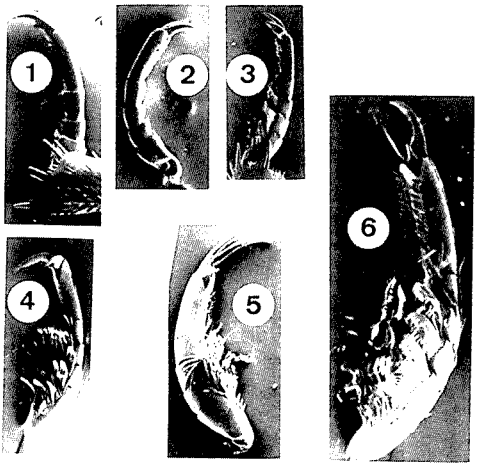
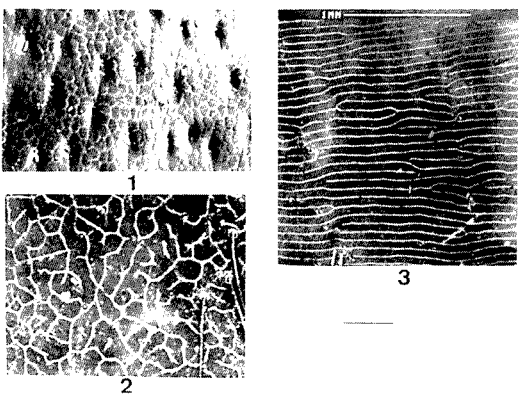
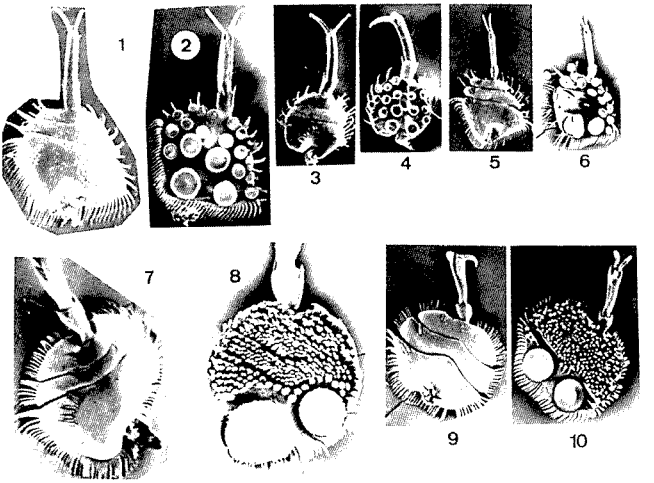


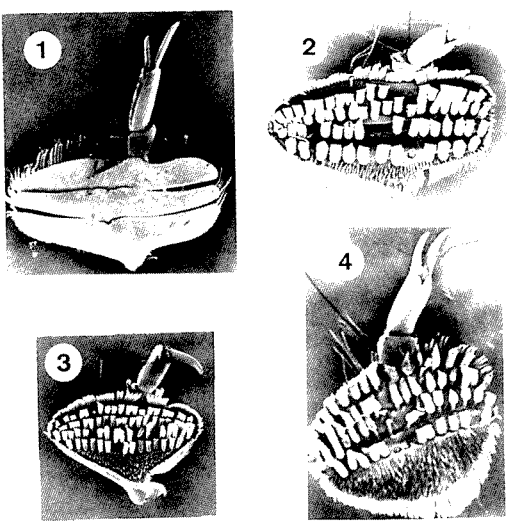

Plate 20



## Plate 21




## Plate 22



# Colour Plates

**Plate 23**

**1-*Neohydrocoptus angolensis* (Peschet)** (length= 2mm)

***2- Synchortus imbricatus* (Klug)** (length= 2.8-3.1mm)

***3- Canthydrus diophthalmus* (Reiche & Saulcy)** (length= 3-3.2mm)

***4- Aglymbus gestroi* Sharp** (length= 5.5-6mm)

**Plate 24**

***5- Copelatus ibrahimi* n. sp.**
(length= 4.8-5mm)

***6- Methles spinosus* Sharp**
(length= 3-3.1mm)

***7- Hydrovatus cuspidatus* (Kunze)**
(length= 2.5-2.9mm)

***8- Hydrovatus compactus* Sharp**
(length= 3.7-4mm)

**Plate 25**

*9- Hydroglyphus angularis* **(Klug)**
(length= 2.5-3mm)

*10- Hygrotus lernaeus* **(Schaum)**
(length= 4-4.6mm)

*11- Hygrotus confluens* **(Fabricius)**
(length= 3-3.4mm)

*12- Hygrotus pallidulus* **(Aubé)**
(length= 3.4-3.5mm)

**Plate 26**

*13- Hyphoporus solieri* **Aubé**
(length= 4.5-5.2mm)

*14- Herophydrus guineensis* **(Aubé)**
(length= 3.5-4mm)

*15- Herophydrus musicus* **(Klug)**
(length= 2.5-3.2mm)

*16- Hyphydrus pictus* **Klug**
(length= 3.9-4.8mm)

**Plate 27**

*17- Hyphydrus maculatus* **Babington**
(length= 3.2-3.7mm)

*18- Hydroporus humilis* **Klug**
(length= 3.9-4mm)

*19- Scarodytes halensis* **(Fabricius)**
(length= 4.1-4.4mm)

*20- Nebrioporus cerisyi* **(Aubé)**
(length= 4.2-5.1mm)

**Plate 28**

*21- Nebrioporus insignis* **(Klug)**
(length= 4.7-5.5mm)

*22- Nebrioporus lanceolatus* **(Walker)**
(length= 4.9-5.1mm)

*23- Platambus lunulatus* **(Steven)**
(length= 8-9mm)

*24- Agabus dilatatus* **(Brullé)**
(length= 8-8.3mm)

**Plate 29**

*25- Agabus conspersus* **(Marsham)**
(length= 7.8-8.4mm)

*26- Colymbetes piceus* **Klug**
(length= 13-16mm)

*27- Colymbetes fuscus* **(Linnaeus)**
(length= 15.3-16.5mm)

*28- Laccophilus ponticus* **Sharp**
(length= 3.8-4mm)

**Plate 30**

*29- Philodytes umbrinus* **(Motschulksy)** (length= 4.9-5.5mm)

*30- Hydaticus leander* **(Rossi)** (length= 8.7-11.4mm)

**31-** ***Hydaticus bivittatus*** **Laporte de Castelnau** (length= 12.9mm)

**32-** ***Dytiscus circumflexus*** **Fabricius** (length= 27-35mm)

**Plate 31**

*33- Cybister lateralimarginalis* **(De Geer)** (length= 29-37mm)

*34- Cybister tripunctatus* **(olivier) subspecies:** *africanus* **Laporte de Castelnau** (length= 23-32mm)

*35- Cybister vulneratus* **Klug** (length= 22-29mm)

## REFERENCES


Abo-Ghalia A, Zalat S & Saleh R (1992) Relation between aquatic insect fauna from Ismailia region (Egypt) and water properties. *Ain Shams Science Bulletin* 30: 359-371.

Alfieri A (1917) Coléoptères et Hemiptères de la fauna aquatique d'un etang et' Abou-Zaabal et observations diverses sur certain espéces. *Bull. Soc. Ent. Egypte* 4: 63-77.

Alfieri A (1917) The Coleoptera of Egypt. *Mem. Soc. Entomol. Egypte* 5: 31-37.

Andres A (1914) Sur une liste de Coléoptères capturés en 1867 par le Dr. O Schneider Ramleh prés d'Alexandria. *Bull. Soc. Ent. Egypte* 3: 39-48.

Balfour-Browne F (1938) Systematic notes upon British aquatic Coleoptera. Being a corrected and revised edition of a series of papers which appeared in the Entomologists Monthly Magazine from 1934 to 1936. Volume 1, Hydradephaga. London, Nathaniel Lioyd & Co., LTD. 95pp.

Balfour-Browne F (1940) British water beetles. Vol. 1. Ray Society. London. 375pp.

Balfour-Browne F (1950a) British water beetles. Vol. 2. Ray Dociety. London. 394pp.

Balfour-Browne F (1950b) On the aquatic Coleoptera of northern Rhodesia (Dytiscidae, Gyrinidae and palpicornia). *Occas. Paper National Mus. S. Rhodesia* 2: 359-399.

Balfour-Browne F (1951) Coleoptera: Haliplidae, Dytiscidae, Gyrinidae, Hydraenidae, Hydrophilidae. 16. *Brit. Mus. (Nat. Hist.) Exped. S. W. Arabia* 1937-8, 1(16): 179-220.

Balfour-Browne F (1961) Notes on the African *Hydrocoptus* (Col. Dytiscidae). *Ent. Arb. Mus. FREY, Tutzing* 12 (1): 60-67.

Balfour-Browne F (1963) Haliplidae, Noteridae and Dytiscidae. Professor E. Janssenes Journeys to Greece, 1961, and Anatolia, 1962. *Bull. Inst. R. Sci. Nat. Belgique* 39 (17): 1-3.

Balfour-Browne F (1969) A new genus of Noteridae (Coleoptera: Noteridae, Noterini). *Proc. R. Entomol. Soc. London (Ser B), Taxon.* 38: 5-6.

Balfour-Browne F & Balfour-Browne J (1940) An outline of the habits of the water- beetle, *Noterus capricornis* Herbst (Coleoptera). *Proc. Roy. Entom. Soc.* (A) 15 (10-12): 105-112, 4figs, 1pl.

Balfour-Browne J (1944). New names and new synonymies in the Dytiscidae (Col.). *Annals and Magazine of Natural History* 78: 346-359.

Balfour-Browne J (1947) New and interesting aquatic Coleoptera from Sudan. *Proc. Entomol. Soc. London* (B) 16: 133-142.

Balfour-Browne J (1951) Proposal that the generic name "*Rantus*" Dejean,

1833 (Class: Insecta, Order: Coleoptera) should be emended to *"Rhantus"* under Article 19 and that the type species of this genus should be determined under the procedure laid down for dealing with genera based upon misidentified type species. Bulletin of Zoological nomenclature 40-45.

Balfour-Browne J (1961) Notes on African *Hydrocoptus* (Col. Dytiscidae). *Ent. Arb. Mus. Frey, Tutzing* 12(1): 60-67.

Balke M (1990) Die Gattung *Rhantus* Dejean. IV. Taxonomie und faunistik verschiedener paläarktischer und nearktischer spezies (Coleoptera: Dytiscidae). *Mitt. Schweiz. Ent. Ges.* 63: 195-208.

Balke M & Fery H (1993) Taxonomic notes on western Palaearctic species of *Hyroporus* Clairville and *Coelambus* Thomson (Coleoptera: Dytiscidae). *Ann. Soc. Entomol. Fr. (N.S.).* 29(1): 89-101.

Bedel L (1881) Fauna des Coléoptères du Bassin de la sein. *Ann. Soc. Entom. France* 1: 1-360, 1pl.

Bedel L (1908) Coléoptères du Sinai et des coutrées limitrophes. *Annexe Bibliographique, historique et descriptions de Crotch. L'Abeille.* 31: 19-55

Bertrand HPI (1928) Les larves et nymphes des dytiscides, hygrobiides et haliplides. In: P. Lechevalier (ed.), Encylopedia Entom. X. Paris, 366pp., 33pls., 207 figs.

Beutel RG & Roughley RE (1987) On the systematic position of the genus *Notomicrus* Sharp (Hydradephaga, Coleoptera). *Can. J. Zool.* 65: 1898-1905.

Bilardo A & Rocchi S (1987) Contributo alla conoscenza degli Haliplidae e dei Dytiscidae del. Botswana (Coleoptera). *Atti. Soc. Ital. Sci. Nat.* 128: 85-106, pl. 1-4.

Bilardo A & Rocchi S (1990) Haliplidae et Dytiscidae (Coleoptera) del Gabon con note sistematiche sulle species confronto (parte prima: Haliplidae, Methlinae, Hydroporinae, Noterinae, Laccophilinae). *Atti. Soc. Ital. Sci. Nat.* 131: 157-196.

Biström MO (1979) A revision of the genus *Derovatellus* Sharp (Coleoptera: Dytiscidae) in Africa. *Acta Entomol. Fennica* 35: 1-28.

Biström MO (1982) A revision of the genus *Hyphydrus* Illiger (Coleoptera: Dytiscidae). *Acta Zool. Fenn.* 165: 1-121.

Biström MO (1983) Revision of the genera *Yola* Des Gozis and *Yolina* Guignot (Coleoptera, Dytiscidae). *Acta Zool. Fenn.* 176: 1-67.

Biström MO (1984) *Bidessus* species (Coleoptera: Dytiscidae) from Africa, with description of *Bidessus excavatus* n. sp. *Entomologica Basiliensia* 9: 75-79.

Biström MO (1985) A revision of the species group *B. sharpi* in the genus Bidessus (Coleoptera, Dytiscidae). *Acta Zool. Fenn.* 178: 1-40.

Biström MO (1986a) Review of the genus *Hydroglyphus* Motschulsky (= *Guignotus* Houlbert) in Africa (Coleoptera: Dytiscidae). *Acta Zool. Fenn.* 182: 1-56.

Biström MO (1986b) Derovatellus intermedius sp. n. And notes on the genus in the Omer-Cooper collection (Coleoptera: Dytiscidae). *Ann. Entomol. Fennici* 52: 44-45.

Biström MO (1988a) Review of the genus *Uvarus* Guignot in Africa (Coleoptera: Dytiscidae). *Entomol. Scand.* 19: 199-238.

Biström MO (1988b) Revision of the genus Clypeodytes Régimbart in Africa (Coleoptera: Dytiscidae). *Ent. Scand.* 19: 199-238.

Biström MO (1988c) Generic review of the Bidessini (Coleoptera, Dytiscidae). *Acta Zool. Fenn.* 184: 1-41.

Biström MO (1990) Revision of the genus *Queda* Sharp (Coleoptera, Dytiscidae). Quaest. Ent. 26: 211-220.

Biström MO & Silfverberg H (1981) *Hydroglyphus* Motschulsky, a senior synonym of *Guignotus* Houlbert (Coleoptera, Dytiscidae). *Ann. Entomol. Fenn.* 47: 124.

Bournaud M, Richoux P & Usseglio-Polatera P (1992) An approach to the synthesis of qualitative ecological information from aquatic Coleoptera communities. *Regulated Rivers* 7: 165-180.

Böving AG & Grainghead FC (1931) An illustrated synopsis of the principal larval forms of the order Coleoptera Brookhym Entom. Soc., New York, 351pp., 125 pls.

Brancucci M (1981) Insects of Saudi Arabia. Coleoptera: Fam. Haliplidae, Noteridae, Dytiscidae, Gyrinidae (part 4). *Fauna Saudi Arabia* 6: 229-242.

Brancucci M (1982a) Les *platambus* du sous-genre *Anagabus* (Col., Dytiscidae*). Mitt Schweiz. Ent. Ges.* 55: 115-124.

Brancucci M (1982b) Ein neuer *platambus* aus Nepal, nebst Bemerkungen zu Weiteren dort vorkommenden Arten (Coleoptera, Dytiscidae). *Entomologica Basiliensia* 7: 226-230.

Brancucci M (1983) Révision des espèces est- paléarctiques, orientales et australiennes du genre *Laccophilus* (Col. Dytiscidae). *Ent. Arb. Mus. Frey.* 31\32: 241-426.

Brancucci M (1984a) Insects of Saudi Arabia. Coleoptera: Fam. Haliplidae, Noteridae, Dytiscidae, Gyrinidae (Part 4). *Fauna of Saudi Arabia* 4: 229-242.

Brancucci M (1984b) A new *Platambus* from China (Coleoptera: Dytiscidae). *Mitt. Schweix. Ent. Ges.* 57: 158-154.

Brancucci M (1986) Revision of the genus *Lacconectus* Motschulsky (Coleoptera, Dytiscidae). *Entomologica Basiliensia* 11: 81-202.

Brancucci M (1988) A revision of the genus *platambus* Thomson (Coleoptera,

Dytiscidae). *Entomologica Basiliensia* 12: 165-239.
Brink P (1942) Die von J. W. Zetterstedt und C. G. Thomson neubeschriebenen Halipliden und Dytisciden. *K. Fydiogr. Sällsk. Lund Förh* 12(11): 1-17.
Chapman RF (1982) (1982) The insects: structure and function. 3rd ed. xiv + 919 pp. London.
Crotch GR (1873) Revision of the Dytiscidae of the United states. *Trans. Amer. Entom. Soc.* 4: 383-424.
Crowson RA (1955) The natural classification of the families of Coleoptera. 1-187 London.
Cuppen JGM (1986) The influence of acidity and chlorinity on the distribution of *Hydroporus* species (Coleoptera, Dytiscidae) in the Netherlands. *Entomologica Basiliensia* 11:327-336.
Debaisieux P (1909) Les debuts de l'ovogenese dans le *Dytiscus marginalis. Cellule* 25: 205-240.
Desing J (1988) Gut content analysis of diving beetles (Coleoptera: Dytiscidae). *Natura Jutl.* 22: 177-184.
Drummond H & Wolfe W (1981) An observation of a diving beetle larva (Insecta: Coleoptera: Dytiscidae) attacking and killing a Garter snake, *Thamnophis elegans* (Reptilia: Serpentes: Colubridae). *Col. Bull.* 35 (1): 121-124.
Eyre MD, Carr R, McBlane RP & Foster GN (1992) The effect of varying site water duration on the distribution of assemblages, adults and larvae (Coleoptera: Haliplidae, Dytiscidae, Hydrophilidae). *Arch. Hydrobiol.* 124 (3): 281-191.
Franciscolo ME (1979) Coleoptera; Halplidae, Hygrobiidae, Gyrinidae, Dytiscidae. *Fauna Ital.* 14: 1-804.
Friday LE (1988) A key to the adults of British water beetles. *Fld Stud.* 7: 1-151.
Ferrante G (1909) Contributo al catalogo dei coleotteri dell'Egitto. *Bull. Soc. Ent. Egypte* I: 167-172.
Fernado CH (1963) Aquatic Coleoptera and Hemiptera taken at light in some Asian countries with a note on *Sphaerodema* (Hemiptera-Belostomatidae). *Bull. Fish. Res. Stn. Ceylon, Colombo,* 16 (1): 25-28.
Fery H (1991) Revision der "*minutissimus*- gruppe" der Gattung *Bidessus* Sharp (Coleoptera: Dytiscidae). *Entomologica Basiliensia* 14: 57- 91.
Fery H (1992a) Revision der *saginatus*- Gruppe der Gattung *Coelambus* Thomson (Coleoptera: Dytiscidae). *Linzer biol. Beiter.* 24 (1): 339-358.
Fery H (1992b) *Coelambus lagari* n. sp. Und *Coelambus sanfilippoi* n. sp. Aus dem westtichen Mittelmeergebiet (Coleoptera: Dytiscidae). *Entomol. Z. Frankf. A. M.* 102: 113-132.
Fery H & Nilsson AN (1993) A revision of the *Agabus chalconatus*- and

*erichsoni*-groups (Coleoptera: Dytiscidae), with a proposed phylogeny. *Ent. Scand.* 24: 79-108.

Furth DG (1983) Aquatic entomofauna of a Dead Sea Oasis. *Hydrobiologia* 102: 3-25.

Galewski K (1971) A study on morphobiotic adaptions of European species of Dytiscidae (Coleoptera). *Polsk. Pisma Ent.* 41: 487-702.

Ganglbaur L (1892) Coleoptera, Dytiscidae. Kǒfer von Mitteleuropa, 1.

Giardina A (1901) Origine dell' oocite e delle cellule nutrici nel *Dytiscus*. *Int. Monatsschr. Anat. Physiol.* 18: 417.

Grosso L (1977) Noteridae. In: S. H. Hurlbert (ed.), Biota Acuatica de Sudamérica Austral. San Diego State Univ., San Diego, Colifornia. 225-227.

Guèorguiev VB (1968) Essai de classification des Coléoptères Dytiscidae. I. Tribus Copelatini (Colymbetinae). *Izvestiya na Zoologicheskiya Institute (S Muzei) Sofiya* 28: 5-45.

Guignot F (1943) Dytiscidae et Gyrinidae de la Cote d'-Ivoire et du Soudan Fraincais. *Rev. Francaise Entomol.* 9: 81-103.

Guignot F (1946) Génotypes des Dytiscoidea et des Gyrinoidea. *Revue Fr. Ent.* 13: 112-118.

Guignot F (1947a) Dytiscidae et Gyrinidae nouveaux du parc national Albert (Congo Belge). *Soc. Etude Sci. Nat. Vaucluse* 25-29.

Guignot F (1947b) Vingt- et- Uniéme note sur les Hydrocanthares. *Bull. Soc. Entomol. France* 52: 12-16.

Guignot F (1948) Dytiscidae et Gyrinidae. *Explor. Parc. Nantn. Albert Miss. H. Damas* 16: 1-44.

Guignot F (1956) Coléoptères Dytiscidae et Gyrinidae du Soudan Francais. *Bull. Inst. Francais Afr. Noire (A)* 18: 83-92.

Guignot F (1959-1961) Revision des Hydrocanthares d'Afrique (Coleoptera: Dytiscoidea). *Annls Mus. R. Congo Belge sér 8vo (Sci. Zool.)* 70: 1-313, 78: 323-648, 90: 659-995.

Günthert T (1910) Die Eibildung der Dytisciden. *Zool. Jahrb* 30: 301-372.

Hatch MH (1953) The beetles of the Pacific North West, introduction to Adephaga Pt. 1. Univ., Wash. Publ. Biol. 16: 1-340.

Henderson WD (1907) Zur kenntnis der spermatogenese von *Dytiscus marginalis* L., nebst einigen Bemerkungen über den Nukleolus. *Zeitschr. Wiss. Zool.* 87: 644-687.

Heus K (1989) Water beetles as indicators of water quality. Balfour-Browne Clube, *Newsletter* 44: 7-12.

Hilsengoff WL (1992) Dytiscidae and Noteridae of Wisconsin (Coleoptera). 1. Introduction, key to genera of adults, distribution, habitat, life cycle, and identification of species of Agabetinae, Laccophilinae and Noteridae. *Great*

*Lakes Entomologist* 25 (2): 57-69.

Holmen M (1987) The aquatic Adephaga (Coleoptera) of Fennoscandia and Denmark. I. Gyrinidae, Haliplidae, Hygrobiidae and Noteridae. *Fauna Ent. Scand.* 20: 1-168.

Horn W & Kahle I (1935) über entomologische Sammlungen, Entomologen und Entomo-Museologie. Ein Beitrag zur Geschichte der Entomologie *Ent. Beihefte* 2: 1-160

Hosseinie SO (1978) Aquatic Coleoptera from South-western Iran (Haliplidae, Dytiscidae, and Gyrinidae, with a note on Hydrophilidae). *The Coleopterists Bull.* 32 (2): 167-176.

Iczn I (1985) International Code of Zoological Nomenclature. British Museum (Natural History), London. Third Edition. xx + 338 pp.

Jäch M & Margalit J (1987) Distribution of dytiscids in springs of the western Dead Sea area (Coleoptera: Dytiscidae). *The Coleopterists Bull.* 41 (4): 327-334.

James HG (1961) Some predators of *Aedes stimulans* (Walk.) and *Aedes trichurus* (Dyar) (Diptera: Culicidae) in woodland pools. *Canadian Journal of Zoology* 39: 533-540

Johnson GH & Jakinovich W (1970) Feeding behavior of the predaceous diving beetle *Cybister fimbriolatus* Say. *Bioscience* 20: 1111.

Klug F (1834) Coleoptera. 13. Symbolae Physicae. 4. Berolini ex. Officina Academica.

Larson DJ (1975) The predaceous water beetles (Coleoptera: Dytiscidae) of Alberta: Systematics, natural history and distribution. *Quaest. Entomol.* 11: 245-498.

Larson DJ (1991) Revision of North American *Agabus* Leach (Coleoptera, Dytiscidae): *elongatus-*, *zeterstedti-*, and *confinis-* groups. *Can. Ent.* 123: 1239-1317.

Larson DJ (1992) Butterflies of Egypt. American University Press in Cairo.

Leech HB (1945) The specific characters and distribution of *Agabus vancouverensis* and *A. hypomelas* (Coleoptera: Dytiscidae). *Canadian Ent.* 77: 77-78.

Leech & Chandler HP (1956) Aquatic Coleoptera. In: Aquatic insects of California. Ed., RL Usinger,. University of California press, Berkeley. 293-371.

Lindberg H (1948) Zur kenntnis der Insektenfauna im brack wasser des Baltischer meeres. *Soc. Sci. Fenn. Comm. Biol.* 10 (9): 1-206.

Meinert F (1901) Vandaklaverne (larvae Dytiscidarum). *Kgl. d. vid. Selsk. Nat. Afd.* 6 (9): 341-440, 4pls.

Montes C & Soler AG (1985) *Canthydrus diophthalmus* (Reiche & Saulcy, 1855), nuevo Noterinae para el Continente Europeo (Col. Dytiscidae). *Mus.*

*Civ. St. Nat. Genova* 85: 187-199.
Nilsson AN (1982) The larval stages of *Agabus elongatus* and *A. wasastjernae* (Coleoptera: Dytiscidae). *Ent. Scand.* 13: 69-76.
Nilsson AN (1985) Notes on the *Agabus congener* group (Coleoptera: Dytiscidae). In: Kilpisjärvi and Åland. *Notul Ent.* 65: 137-141.
Nilsson AN (1988) A review of primary setae and pores on legs of larval Dytiscidae (Coleoptera). *Canadian Journal of Zoology* 66: 2283-2294.
Nilsson AN (1990) Revisional notes on selected East Palaearctic species of *Agabus* Leach (Coleoptera, Dytiscidae). *Ent. Tidskr.* 111: 149-161.
Nilsson AN (1991) On the African species of *Aglymbus* Sharp 1882 (Coleoptera, Dytiscidae) with a new species from Ethiopia. *Tropical Zoology* 4:75-80.
Nilsson AN (1992a) A revision of Afrotropical *Agabus* Leach (Coleoptera, Dytiscidae), and the evolution of tropico-alpine super specialists. *Systematic Entomology* 17: 155-179.
Nilsson AN (1992b) A revision of the East- African *Nebrioporus abyssinicus* group (Coleoptera, Dytiscidae). *Entomol. Fennica* 3: 81-93.
Nilsson AN (1993) *Dytiscus biguttatus* Olivier, 1795 (currently *Agabus biguttatus*; Insecta, Coleoptera): proposed conservation of the specific name. Case 2777. *Bulletin of Zoological Nomenclature* 50 (2).
Nilsson AN (1994) The new East Palaearctic *Agabus* species of the *adpressus* and *confinis*-groups (Coleoptera, Dytiscidae). *Entomol. Fennica* 5: 169-175.
Nilsson AN (1995) Noteridae and Dytiscidae. Annotated check list of the Noteridae and Dytiscidae of China (Coleoptera). In: water beetles of China. (ed, MA Jäch) I: 35-96.
Nilsson AN & Angus RB (1992) A reclassification of the *Deronectes*-group of genera (Coleoptera, Dytiscidae) based on a phylogenetic study. *Ent. Scand.* 23: 275-288.
Nilsson AN & Holmen M (1995) The aquatic Adephaga (Coleoptera) of Fennoscandia and Denmark. II. Dytiscidae. *Fauna Ent. Scand.* 32:1-192.
Nilsson AN & Person S (1989). The distribution of predaceous water beetles (Coleoptera: Noteridae, Dytiscidae) in Sweden. *Entomologica Basiliensia* 13: 59-146.
Nilsson AN & Person S (1993) Taxonomy, distribution and habitats of the Dytiscidae (Coleoptera) of Ethiopia. *Entomol. Fennica* 4: 57-94.
Nilsson AN, Roughley RE & Brancucci M (1989) A review of the genus- and family- group names of the family Dytiscidae Leach (Coleoptera). *Ent. Scand.* 20: 287-316.
Nilsson AN, Stille B & Douwes P (1988) Allozyme variation supports the recognition of *Agabus lapponicus* (Thomson) (Coleoptera, Dytiscidae) as

a distinct species. *Ent. Scand.* 19: 31-33

Olivier AG (1795) Entomologie ou histoire naturelle des Insectes 3. Coléoptères 40. Paris. 39 pp.

Omer-Cooper J (1930). Notes on the fresh water fauna of southern Tunisia. *Entomologist* LXIII: 251-255.

Omer-Cooper J (1931) Report of the Dytiscidae (Coleoptera). Mr. Omer-Cooper's investigation of the Abyssinian fresh waters (Hugh Scott expedition). 42. *Proc. Zool. Soc. London.* 751-801.

Omer-Cooper J (1937) Zoological expedition to the Oasis of Siwa, Egyptian Libya. *Nature.* CXL: 919.

Omer-Cooper J (1948) General report. The Armstrong College Zoological expedition to Siwa Oasis: Libyan desert 1935. *Proc. Egyptian Acad. Sci* 3: 1-51.

Omer-Cooper J (1953) Some new species of Dytiscidae from the Cape province of *South Africa. Proc. R. Ent. Soc. Land* (B). 22 (1-2): 23-31.

Omer-Cooper J (1954a) A new species of *Yola* from French Somaliland. *Ent. Mon. Mag.* Xc: 212-213.

Omer-Cooper J (1954b) Results of the Armstrong College expedition to Siwa Oasis (Libyan desert), 1935, under the leadership of Prof. J. Omer-Cooper. Dytiscidae (Coleoptera). *Bull. Soc. Fouad 1er Entomol.* 38: 251-290.

Omer-Cooper J (1956) Some records of Dytiscidae (Col.) from Mozambique. Soc. *Estudios Mocambique* 101:19-32.

Omer-Cooper J (1957a) Dytiscidae (Coleoptera) collected in the Transvaal (Rhodes University expedition 1948). *Mem. Entomol. Soc. S. Afr.* 5: 1-90, 81figs.

Omer-Cooper J (1957b) Dytiscidae from Nyasaland and S. Rhodesia. Parts I and II. *J. Ent Soc. S. Afr.* 20 (2): 302-309.

Omer-Cooper J (1958a) Some Dytiscidae (Col.) from Swaziland, S. Africa with the description of a new species. *Entomol. Month. Mag.* 94: 57-60.

Omer-Cooper J. (1958b) Dytiscidae from Nyasaland and S. Rhodesia. Part III. Laccophilinae. *J. Ent.Soc. S. Afr.* 21 (1): 36-55.

Omer-Cooper J (1958c) Dytiscidae from Nyasaland and S. Rhodesia. Part IV. Vatellinae, Methlinae and Hydroporinae, Hyphydrini. *J. Ent .Soc. S. Afr.* 21: 249-260.

Omer-Cooper J (1959a) Dytiscidae from Nyasaland and S. Rhodesia. Part V. Hydroporinae, Bidessini. *J. Ent .Soc. S. Afr.* 22 (1): 108-137.

Omer-Cooper J (1959b) A new species of *Clypeodytes* from northern Rhodesia. *J. Ent. Soc. S. Afr.* 22 (1): 199-200.

Omer-Cooper J (1964) Dytiscidae from Nyasaland and S. Rhodesia. Part VIII. Colymbetinae: Agabini, Copelatini and Colymbetini. *J. Ent. Soc. S. Afr.* 27: 117-133.

Omer-Cooper J (1965a) Coleoptera: Dytiscidae. A review of the Dytiscidae of Southern Africa being the results of the Lund University expedition 1950-1951, with which are incorporated all other records known to the author. *S. Afr. Animal Life* 11: 59-214.

Omer-Cooper J (1965b) Dytiscidae from Nyasaland and S. Rhodesia. Part IX. Dytiscinae: Eretini, Hydaticini, Thermonectini. *J. Ent .Soc. S. Afr.* 28: 92-106.

Omer-Cooper J (1967) Dytiscidae from Nyasaland and S. Rhodesia. Part X. Cybisterini and addenda. *J. Ent. Soc. S. Afr.* 29: 48-63.

Omer-Cooper J (1970) New and little known species of African *Laccophilus* (Coleoptera: Dytiscidae*). J. Ent .Soc. S. Afr.* 33: 285.

Omer-Cooper J (1972) On the species of the genus *Synchortus* Sharp (Coleoptera: Dytiscidae) and the description of a new species. *J. Ent .Soc. S. Afr.* 35: 35-43.

Omer-Cooper J (1974) The species of *Bidessus* Sharp (Coleoptera: Dytiscidae) of Africa South of the Sahara including Madagascar. 1. *J. Ent. Soc. S. Afr.* 37: 305-314.

Omer-Cooper J (1979) The species of *Bidessus* Sharp (Coleoptera: Dytiscidae) of Africa South of the Sahara including Madagascar. 2. *J. Ent.Soc. S. Afr.* 42: 197-216.

Ordish RG (1966) A systematic revision of the New Zealand water beetles (Coleoptera: Dytiscidae). Published by order of the Board of Trustees, Dominion Museum Wellington, New Zealand. 5 (22): 217-264.

Panzer GWF (1795) Entomologica Germanica exhibens insecta per Germanian indigena 1. Eleutherata. Norimbergae, 368 pp.

Peyerimhoff P (1931) Mission Scientifique du Hoggar: Coléoptères. *Mém. Soc. Hist. Natur. Afrique Nord, Maroc*, 172 pp.

Pic M (1920) Sur divers Coléoptères d'Egypte et sinar eu partie nouveaux. *Bull. Soc. Ent. Egypt.* 6 (1): 44-56.

Pujatti D (1953) Hydrophilidae, Dytiscidae del sud India con Metacercariedel gen. *Lecithodendrium looss. Bull. Soc. Ent. Ital., Genova* 83: 137-139.

Régimbart M (1878) Etude sur la classification des Dytiscidae .Ann. Soc. Entom .France, ser. 5, 8: 447-464, 28 figs.

Régimbart M (1895) Revision des Dytiscidae et Gyrinidae d'Afrique, Madagascar et iles voisines. *Mem. Soc. Entomol. Belgiques* 4: 1-244.

Richoux P (1994) Theoretical habitat templetes, species traits, and species richness: aquatic Coleoptera in the upper Rhône River and its flood plain. *Freshwater Biology* 31: 377-395.

Roughley RE (1990) A systematic revision of species of Dytiscus Linnaeus (Coleoptera: Dytiscidae). Part 1. Classification based on adult stage. *Quaest. Entomol.* 26: 383- 557.

Roughley RE & Pengelly, DH (1981) Classification, phylogeny and zoogeography of *Hydaticus* Leach (Coleoptera: Dytiscidae) of North America. *Quaest. Entomol.* 17: 249-309.

Runau S & Brancucci M (1984) Studies on the genus *Lancetes*. 2. Analysis of its phylogenetic position using preimaginal characters (Coleoptera, Dytiscidae). *Entomol. Basilien.* 9: 80-107.

Said R (1990) The geology of Egypt. Published for the Egyptian general petroleum corporation, Conoco Hurghada Inc. and Repsol Exploration, S. A. By A. A. Balkema, Rotterdam, Brookfield. 278pp.

Saleh R (1991) Study of Aquatic insects in Suez Canal Region. M.Sc. thesis, Suez Canal University, 237p.

Saleh R, Zalat S & Abou-Ghalia A (1992) Relative population density and seasonal abundance of some aquatic insects in Ismailia Governorate. *J. Egypt Ger. Soc. Zool.* 9:191-200.

Santiago FS (1991) Redescripcion de *Eretes stictcus* (L.) (Coleoptera: Dytiscidae). *Folia Ent. Mexicana* 82: 107-112.

Satô M (1972) Some notes on Dytiscoid-beetles from vietnam (Coleoptera). *Annls hist.- Nat. Mus. Nat. Hung.* 64: 143-153.

Schäfer F (1907) Spermatogenese von *Dytiscus*. (ein Beitrag zur Frage der Chromatinreduktion). *Zool. Jahrb.* 23: 535-586.

Schaum HR (1864) Die egyptischen Dytisciden. Berliner Entomologiche Zetischrift. 8: 105-108.

Seidlitz G (1987) Bestimmungs. Tabelle der Dytiscidae und Gyrinidae. *Verh. Andl. Naturf. Ver. Brunn.* 25: 1-136.

Sharp D (1882) On aquatic carnivorous Coleoptera or Dytiscidae. Scient. *Trans. R. Dublin Soc.* 2 (2): 179-972.

Sharp D (1903) Results of the Swedish zoological expedition to Egypt and the white Nile 1901 under the direction of LA Jägerskiöld. *Jägerskiöld Expedition* 10 (6): 1-10.

Spangler PJ (1981) Supplement to the aquatic and semiaquatic Coleoptera of Cuba collected by the biospeleological expeditions to Cuba by the Academies of Science of Cuba and Romania. In: *Orghidian et al.* (eds.), Resutats des expeditions biospeologiques Cubano-Roumaines a Cuba. 3: 145-171, 8figs. Editura Academiei Republicii Socialiste Romania.

Spangler PJ (1982) Coleoptera. In: Aquatic Biota of Tropical South America. SH Hurlbert, G Rodriguez & ND dos Santos (eds). San Diego State Univ., San Diego, California 328-397

Spangler PJ (1986) Insecta: Coleoptera. In: Botosaneanu L. (ed.), Stygofauna Mundi. E. J. Brill, W. Backhuys, Leiden 622-631.

Thoson CG (1860) Skandinaviens Coleoptera. (Lund) 2: 1-304.

Vazarani TG (1965) Revision of the Oriental species of *Platambus* Thomson

(Insecta: Coleoptera: Dytiscidae), with description of three new species. *Proc. Zool. Soc. Calcatta* 18: 25-34.

Vazarani TG (1968) Contribution to the study of aquatic beetles (Coleoptera). A review of the subfamilies Noterinae, Laccophilinae, Dytiscinae and Hydroporinae (in part) from India. *Oriental Insects* 2: 221-341.

Vazarani TG (1969) Contribution to the study of aquatic beetles (Coleoptera). 2. A review of Noterinae and Hydroporinae (in part) (Coleoptera: Dytiscidae) from India. *Oriental Insects* 2: 221-341.

Voinov DN (1903) La spermatogenese d'ete chez le *Cybister roeselii. Arch. Zool. Exp. Gen.* 4 (1): 173-260.

Watts CHS (1978) A revision of Australian Dytiscidae (Coleoptera). *Australian Journal of Zoology* 57: 1-163.

Wesenberg-Lund C (1912) Biologische studien über Dytisciden. Int. Revue ges. Hydrobiol. Hydrogeogr., *Biol. Suppl.* 5: 1-129, 9 pls.

Wewalka G (1975) Revision der Artengruppe des *Hydaticus vittatus* (Fabricius), (Dytiscidae, Col.). *Koleopt. Rdschau.* 52: 78-100.

Wewalka G (1977) Die Arten der Gattung *Scarodytes* aus Griechenland und eine neue art dieser Gattung aus Israel (Dytiscidae, Col.). *Koleopt. Rdschau.* 53: 137-144.

Wewalka G (1980a) Revision der afrikanischen Gattung *Heterhydrus* Fairm. (Coleoptera, Dytiscidae). Ann. *Hist.-nat. Mus. Nationalis Hungarici* 72: 97-101.

Wewalka G (1980b) Results of the Austrian Hydrobiological Mission, 1974, to the Seychelles-, Comores- and Mascarene Archipelagos. Part VII: Dytiscidae, Gyrinidae (Coleoptera*). Ann. Naturhist.Mus. Wien.* 83: 723-732.

Wewalka G (1982) Neue Copelatini aus Madagaskar and Afrika (Dytiscidae, Col.). *Koleopt. Rdschau.* 56: 127-133.

Wewalka G (1986) Zoogeography and ecology of the Dytiscidae fauna of the Levant. *Entomol. Basilien.* 11: 273-288.

Wewalka G (1989) Systematic and faunistic notes on Noteridae and Dytiscidae of the near East (Coleoptera). *Koleopt. Rdschau.* 59: 143-152.

Wewalka G (1992) Revisional notes on Palaearctic species of the *Hydroporus planus* group (Coleoptera: Dytiscidae). *Koleopt. Rdschau.* 62: 47-60.

Wewalka G & Nilsson AN (1990) A new species of *Agabus* Leach (Coleoptera, Dytiscidae) from the highlands of Ethiopia. *Trop. Zool.* 3: 151-157.

White MJD (1973) Animal cytology and evolution. 3rd Edition, Cambridge. 454 pp.

Wilson CB (1923) Water beetles in relation to pond fish culture, with life histories of those found at Fairport, Lowa. Bull. U.S. Bur. Fisher. 39: 321-

345, 148 figs.
Wolfe GW (1988) A phylogenetic investigation of *Hydrovatus*, Methlini and other plesiotypic Hydroporines (Coleoptera, Dytiscidae). *Psyche* 95 (3-4): 327-346.
Yano K, Chu YI, Resma PW & Satô (1983a) Faunal and biological studies on the insects of paddy fields in Asia. XI. Records on Aquatic Coleoptera from paddy fields. *Chinese J. Ent.* 3: 15-31.
Yano K, Chu YI, Resma PW & Satô (1983b) Faunal and biological studies on the insects of paddy fields in Asia. XII. Aquatic Coleoptera from Taiwan and the philippines. *Chinese J. Ent.* 3: 103-118.
Young FN (1954) The water beetles of Florida. Univ., Of Florida studies, Biol. Sci. Ser.5 (1): ix + 238pp., 31figs.
Young FN (1967) A possible recycling mechanism in tropical forests. *Ecology* 48:506.
Zaitsev FA (1953) Nasekamye zhestkokrylye. Plavuntsovyei vertyachki. *Fauna SSSR* 58: 1-376.
Zaitsev FA (1972) Fauna of the U.S.S.R. Coleoptera: Amphizoidea, Hygrobiidae, Haliplidae, Dytiscidae, Gyrinidae. Jerusalem. Israel Progr. Sci. Transl., 401pp. (In English).
Zalom FG, Grigarick AA & Way MO (1980) Diel flight periodicities of some Dytiscidae (Coleoptera) associated with California rice paddies. *Ecol. Ent.* 5: 183-187.
Zimmermann A (1920) Dytiscidae, Haliplidae, Hygrobiidae, Amphizoidae. In: Junk, W.& Schenkling, S. (eds.). *Coleoptm. Cat.* 4, Pars 71: 1-326. Berlin.
Zimmermann A (1921) Zoologische Ergebnisse Zweier in den jahren 1902 und 1904 durch die sinaihalbinsel enternommener botanischer studie n reisen. Dytiscidae et Gyrinidae. *Entom. Blatter XVII*: 4-6.
Zimmermann A & Gschwendtner L (1930-1939) Monographie der paläarktischen Dytiscidae. *Koleopt. Rdschau* 16: 35-118, 17: 97-159, 18: 69-111, 19: 153-193, 21: 61-92, 22: 61-102, 23: 57-92, 24: 33-76, 25: 23-69.
Zimmermann JR (1970). A taxonomic revision of the aquatic beetle genus *Laccophilus* (Dytiscidae) of North America. *Mem. Am. Ent. Soc.* 26: 1-275.

## الملخص العربى

# خنافس الغطس المصرية
# (رتبة غمدية الأجنحة - فصيلتى: دايتسكيدى ونوتاريدى)

سامى زلط[1]، رويدا صالح[1]، روبرت أنجس[2]، أحمد كاشف[3]

١. قسم علم الحيوان - كلية العلوم - جامعة قناة السويس - الإسماعيلية - مصر
٢. قسم البيولوجى - رويال هولواى - جامعة لندن - إيجهام - سارى - إنجلترا
٣. قسم علم الحشرات - كلية العلوم - جامعة عين شمس - القاهرة - مصر

تناول هذا البحث تصنيف وتوزيع وبيئة خنافس الغطس المصرية والتى تشمل ثمانية وستون نوعاً تنتمى إلى ثلاثين جنساً وسبعة عشر قبيلة من فصيلتى دايتسكيدى ونوتاريدى.

ومن خلال الدراسة تم التوصل إلى النتائج التالية:-

- تم تسجيل ثلاثة قبائل (نوتارينى، أسيلينى، دايتيسينى) والتى تحتوى على أربعة أجناس (*سانكوتيس، بيديساس، رانتيتيكاس، دايتيسيكاس*) وثمانية أنواع (*سانكوتيس إمبريكاتيس، هايفيديراس سايكلوديس، هايفيديراس ماكيولاتس، هايجروتيس باليديليس، بيديساس أوفويديس، هايديتيكاس بيفيتاتيس، رانتيتيكاس كونجيستيس، دايتيسيكاس سيركيمفليكسيس*) وذلك لأول مرة فى جمهورية مصر العربية.
- تم تسجيل أربعة أنواع لأول مرة فى أفريقيا وهم: *نيبريوبوريس إنسيجنيس، نيبريوبوريس لانسيولاتيس، نيبريوبوريس واكارى، سكارودايتيس هالينسيس*.
- تم تسجيل نوعاً جديداً إلى الفونا العالمية وهو النوع *كوبيولاتاس إبراهيمى*، حيث تم وصفه وتسميته وعمل الرسومات وتحديد العينات النمطية بصورة علمية سليمة
- تم إقتراح نيوهايدروكوبتينى كقبيلة يقترح أن ينتمى إليها جنس *نيوهايدروكوبتيس* حيث أن قبيلة هايدروكوبتينى (القبيلة القديمة لهذا الجنس) تعتبر الآن مرادفاً لقبيلة هايدروبورينى.

- تم إقتراح ثلاثة مرادفات جديدة وهى: *ساينكورتيس سيمبليكس إشيناتاس* للنوع *ساينكوربيس إمبراكاتيس*، *لاكوفيلاس بوشيلايس* للنوع *لاكوفيلاس بونتيكاس*، *ونيبريوبوريس برينسيبيس* للنوع نيبريوبوريس إنسيجينس.
- تم تصحيح بعض التسجيلات السابقة الخاطئة حيث ثبت وجود النوع *نيوهايدروكوبتاس سيراتاس* بدلا من *نيوهايدروكوبتاس أنجولينا سيس*، والنوع *كانثيديراس نوتيلا* بدلا من *كانثيديراس ديوفثاميس*، وأخيرا النوع *يولا دوهرنا* بدلا من *يولا إنيجماتيكا*.
- تم تأكيد وجود الأنواع التالية فى مصر وهى: *هادروجلايفيس أنجيلابيس*، *هادروجلايفيس بينتاجراميس*، *كوبييلاتيس بيلاشيلايس*.
- تم تعيين العينات النمطية للأنواع التالية: *ساينكوربيس إمبراكاتيس*، *ساينكوربيس سيمبليكس إشيناتيس*، *كوبيولاتاس بارالايلبدس*، *نيبريوبوريس واكارى*، *كوليمبيتيس بيشييس*، *هايداتيكيس ديكوريس*.
- تم دراسة النوع *كوبيولاتاس بارالايلبدس* وتحديد العينة النمطية له حيث ثبت تشابهه الكبير مع النوع الجديد(*كوبيولاتاس إبراهيمى*) والذى تم إضافته إلى الفونا العالمية من خلال هذه الدراسة.
- تم تسجيل أماكن إنتشار ونوع البيئة المائية المناسبة لتواجد الأنواع المصرية من خنافس الغطس والتى سبق تسجيلها من أماكن محددة فى مصر.