A REVIEW OF THE EGYPTIAN SPECIES OF TIGER BEETLES (COLEOPTERA, CARABIDAE, CICINDELINAE)

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INTRODUCTION

The cicindelids, known as tiger beetles, are among the most striking and interesting group of the order Coleoptera. Adult tiger beetles are characterized by their big-eyed; long-legged bodies; and by the long sickle shaped mandibles. Eyes together with head are relatively wider than the pronotum. Antennae are 11-segmented, filiform and inserted on the frons above clypeus and below the eyes. Pronotum is narrower than elytra. Tarsi are 5-segmented. Several species with dull black, but some species are brightly colored in various combinations of brilliant green, violet, blue, red and yellow (Pearson and Vogler, 2001). Adults have membranous functional hind wings, folded and hidden beneath the elytra.

Tiger beetles live in very specific types of habitats like sand dunes near seashores, rivers and lakes, or far away from water. Some species are found in various upland sites, like hill sides, rocky areas near roads, trails and forest openings. Tiger beetles are predators as adults and larvae generally prey on small arthropods as flies and ants.

They comprise a diverse group containing approximately 2300 species allover the world (Pearson and Vogler, 2001). In Egypt the subfamily Cicindelinae is represented by 13 confirmed species and subspecies, out of 14 species listed in the literature, belonging to 2 tribes and 8 genera. Although the working with tiger beetles with binomial nomenclature had begun earlier at the time of Carolus Linnaeus in 1758; dealing with these beetles in Egypt started during 1800s. Klug (1832), Ferrante (1908), Andres (1913 and 1929) and Britton (1947) catalogued our early data on the Egyptian tiger beetle fauna. The most detailed information about cicindelids in Egypt is known from the work of Schatzmayr (1936), who

taxonomically revised our fauna and provided species level key for the adults; and Alfieri (1976), who gave an excellent faunistic work on the Egyptian beetles.

It has been 27 years since the work of Alfieri (1976) on the Egyptian beetles. That considerable change in the tiger beetle classification and nomenclature resulted from the elevation of subgenera to the generic rank. The most significant is the division of the genus *Cicindela* into many genera, only 7 of which occur in our country. Gebert (1991) revised and reviewed taxonomically the closely related species *Cephalota litorea* (FORSKAL 1775) and *C. tibialis* (DEJEAN 1822). All these important changes lead to warrant a revised work, to update our knowledge about this group of beetles; which has considerable importance as an excellent model to study community ecology, biology, morphology, thermoregulation, physiology, predator-prey interactions, and as biogeography, bioindicators for conservation purposes.

This work is an attempt to bring together all published information with the results of a wide survey and an extensive examination of all available collections of the subfamily in Egypt. It provides keys to tribes, genera and species; in addition to diagnosis, and more new accumulated data on distribution and bionomics.

MATERIAL AND METHODS

This reversion is based on the previously published literatures and materials preserved in the main 5 Egyptian collections namely:

1. Ain Shams University Collection, Entomology Department, Faculty of Science.
2. Alfieri's Collection, El-Azhar University, Faculty of Agriculture.
3. Cairo University Collection, Entomology Department, Faculty of Science.
4. Egyptian Entomological Society Collection.
5. Ministry of Agriculture Collection, Plant Protection Institute.

Moreover the new data on the distribution and bionomics resulted from 10 years of field survey in the different Egyptian districts.

The collected specimens were prepared for study and illustration. The measurements used for this work, standardized body length along the midline, from the anterior margin of labrum to the apex of elytron; and the width of the body at the broadest points on the elytra. Adult males of most species were dissected to examine

the genitalia. Line drawings were made by the first author with the aid of camera Lucida attached to Hund Wetzlar SM33 stereomicroscope.

RESULTS AND DISCUSSION

Many authors regarded tiger beetles as a separate family (Cicindelidae), but they are treated here as subfamily Cicindelinae belonging to the family Carabidae. We following the system of Lawrence and Newton (1995) for arrangement and grouping of families, subfamilies and genera of Coleoptera. In Egypt, this subfamily is represented by 2 tribes, 8 genera and 13species and subspecies.

Klug (1832) described *Cicindela dongalensis* from Ambukohl (Nubia) that belongs to Sudan and not to Egypt; then Junek in 1910 noted that this species occurs in Egypt. All workers who came after Junek listed Egypt within the distribution range of this species, which became synonym to *Lophyridia fimbriata* (DEJEAN 1831). Until now the occurrence of this species is not confirmed, and it does not seem to occur in Egypt.

KEY TO THE TRIBES

1- Scutellum invisible (fig.1); penultimate segment of the maxillary palp much longer than the last (fig.55); size large (15.5-22 mm long, 5.5-8 mm wide) ..... **Megacephalini**

- Scutellum visible (figs.2-12); penultimate segment of the maxillary palp shorter than the last (fig. 56); size small (7.5-15 mm long, 3.5-5 mm wide)..... **Cicindelini**

Tribe Megacephalini

Genus: *Grammognatha* MOTSCHULSKY 1850

Grammognatha euphratica euphratica (LATREILLE & DEJEAN 1822)

Tetracha euphratica Latreille & Dejean, 1822. Hist. Nat. Icon. Coléopt. d' Europe, 37: Tab. 1, Fig. 4.

Type locality: the banks of the Euphrates, Iraq.

Length 15.5-22 mm; width 5.5-8 mm (fig. 1). This is our largest and biggest species, with upper surface, below of head, lateral sides of thorax and the first abdominal segment brilliant green, being blackish towards the posterior part of elytra; with 2 very wide yellow maculae at the extremity of elytra (fig. 13). Antennae, labrum, mouth parts, legs, lateral sides of 3rd and 4th abdominal sternites, 5th and 6th abdominal sternites testaceous; rest of abdominal sternites brown. Head finely grooved above and below, with some slight metallic red reflections above. Labrum (fig. 27) without dent at anterior margins. Pronotum (fig. 39) grooved as head, transversally sulcate anteriorly and posteriorly, longitudinally grooved at middle; prosternum nearly smooth; lateral sides of meso - and meta-thorax grooved. Elytra covered with a strong acuminate granulation decreasing in measuring towards the extremity. Fifth abdominal sternite deeply notched at middle of posterior edge in male (fig. 63), while in female it is complete (fig. 62). Penis (fig. 65).

Global Distribution: Palaearctic species extends its range to Afrotropical region. It is distributed in Mauritania going up through North Africa from Morocco to Egypt, and extending east-northwardly from Egypt to Palestine, Jordan, Syria, Iraq, Iran and Afghanistan. It continues its range southwardly from Iraq to Kuwait, Emirates, Oman, Yemen and Djibouti. Also it extends from Iraq northwardly to Turkey, Caucasus, and Tadzhikistan then goes westward to Rhodes, Cyprus, Greece, Crete and Spain.

Local distribution: in Egypt it is fairly rare, distributed through Mediterranean coast from Marsa Matrouh to Arish, and diffused southwards to Nile Delta until Cairo, Western Desert in Siwa Oasis, and to Sinai till Aqaba Gulf (El Tor).

Bionomics: Almost confined to sulphurous springs in sandy soils and attracted to light at night. It begins its activity during early spring and increases its population during mid summer, then decreases this activity during late summer and autumn.

***Grammognatha euphratica nigra* (HORN 1899)**

Tetracha euphratica var. *nigra* Horn, 1899. Deut. Ent. Zeit., P. 382.

Megacephala nigripennis Ferrante, 1908. Bull. Soc. ent. Egypte, I, P. 114.

Type locality: Ras El-Bar, Egypt.

It is separated from the typical subspecies by the dull black color of its body as an alternative of shiny green.

Global Distribution: this subspecies was described from Egypt and seems to be endemic to it.

Local Distribution: it occurs along the Mediterranean from Mex to Port Said, and spreads southwardly through Nile Delta to reach Helwan.

Bionomics: very rare subspecies scattered in sulphurous localities in sandy or clayey soils. It is found from May to September.

Tribe Cicindelini

Key to Genera

1-Elytra yellowish white in color, with dark markings (fig. 19)..... .....***Hypaetha*** **LECONTE**

- Elytra dark with yellowish white spots or markings (figs. 14:18, 20:26)..... **2**

2- Elytra with yellowish white longitudinal line adjacent and parallel to the suture (fig. 18)..... ***Habrodera*** **MOTSCHULSKY**

- Elytra without the said line along the suture (figs. 14:17, 20-26)..... **3**

3- Elytra with 2 small yellowish white maculae at base (fig. 20). First macula beside the scutellum and 2nd one behind the scutellum and nearer to the suture than the 1st ..... ***Lophyra*** **MOTSCHULSKY**

- Elytra without such yellowish white maculae at base (figs. 14:17, 21:26).....**4**

4- Genae (cheek area beneath eyes) with decumbent white setae (fig. 50) .... ***Lophyridia*** **RIVALIER**

- Genae glabrous (fig. 51) **5**

5- Elytral markings wide, not appearing like spots, and connected at outer margin (figs. 14:17). **6**

- Elytral markings very slender, appearing like spots or interrupted lines, and not connected at outer margin (fig. 26). ..... ***Myriochile*** **MOTSCHULSKY**

6- Anterior and posterior edges of pronotum (sometimes the disk also) with white setae (fig. 40)..... ***Cephalota*** **DKHTOUROFF**

- Only lateral edges of pronotum with white long setae (fig. 42)..... .....***Cylindera*** **WESTWOOD**

Cephalota DKHTOUROFF 1883

Key to species

1- Labrum tridentate (fig. 29)..... ***tibialis*** **(DEJEAN)**

- Labrum unidentate (fig. 28)..... **2**

2- First antennal segment with some setae (fig. 58). Elytral markings strongly ragged (fig. 14)..... ***circumdata*** **(DEJEAN)**

- First antennal segment with only normal one seta at end (fig. 57). Elytral markings not strongly ragged (fig. 15) ..... ***litorea*** **(FORSKAL)**

Cephalota (Taenidia) circumdata (DEJEAN 1822)

Cicindela circumdata Dejean, 1822. in Latr. & Dej. Hist. Nat. Icon. Coléopt. d' Europe, 1: 57, Tab. 5, Fig. 2.

Type locality: Island of Archipelago, Greece.

Length 12-15 mm; width 4-5 mm. Dorsum usually coppery. Antennae with segments 5-11 commonly reddish. Head much wider than prothorax; frons rather finely longstriped between eyes from each side. Labrum less transverse, strongly unidentate at middle of anterior edge. Antennae with first segment (fig. 58) with some setae. Pronotum little wider than long, forwards as wide as backwards, with a white pubescence above. Scutellum with a crosswise wrinkle. Elytra (fig. 14) widen back to the middle, punctate and finely grained, bronzy above, with strongly ragged lunules, and with a moderately wide lateral white band.

Global Distribution: Palaearctic element spread from western to eastern areas of the region. It is recorded from North Africa: Algeria, Tunisia, Egypt; Southwest to east Europe: Spain, South France, Italy, Greece, Crete, Bulgaria, East Romania, Turkey and southeast Russia.

Local Distribution: Very rare species confined to Sinai: El Tor.

Bionomics: littoral species that lives along the Aqaba Gulf (Red Sea) coast, and found during August.

Cephalota (Taenidia) litorea (FORSKAL 1775)

Cicindela litorea Forskal, 1775. Descriptiones Animalium: 77.

Cicindela jiddaica Ali, 1978. Coleopterists Bulletin 31: 1-20.
Cicindela eudeserticola Ali, 1978. Coleopterists Bulletin 31: 1-20.
Cicindela dilatana Van Nidek, 1984. Cicindela, 16(1/2): 1-5.

Type Locality: Suez, Egypt.

Length 10-12 mm; width 4-5 mm (fig. 2). Body subdepressed, coppery green. Labrum, base of mandibles and also the basal segments of labial palpi white; last segments black. Underside of prothorax bronzy green, meso- and meta-thorax and abdomen violet red; coxae, femoral apices, tibiae and tarsi red-pitch black. Head striated between eyes, punctuate posteriorly. Labrum (fig. 28) transverse, with a median tooth at anterior margin. Antennae with the first segment (fig. 57) with only one apical seta. Pronotum (fig. 40) subcylindrical, punctate, transversely impressed anteriorly and posteriorly, scarcely longitudinally grooved at middle; disc anteriorly, posteriorly and laterally with white pilose. Elytra (fig. 15) subdepressed, widen before apex, serrate apically, finely impresso-punctate dorsally, punctation metallic green, the external elytral margin yellowish white, rather wide, connected internally with the elytral lunules. Humeral lunule bow shaped; the middle one inflexed; the apical one continues and wider than the previous ones. Abdomen ventrally provided with dense white hairs at lateral margins. Penis (fig. 66).

Global Distribution: Palaearctic species described from Egypt. It extends to North Africa: Morocco, Tunisia and Egypt, increasing its range eastwardly to Saudi Arabia, Oman and Syria. Also it is distributed in south Europe: south Spain, Sardinia, Sicily, Cyprus. Moreover it is dispersed to Afrotropical region in Djibouti, Somalia and Yemen.

Local Distribution: A common species distributed along Red Sea littoral from Nabq Protectorate, at Aqaba Gulf, to Hurghada southerly.

Bionomics: A typical Halophilous species broadly live in saltpans and seashores. It is common during May to July, attracted to light at night.

Cephalota tibialis (DEJEAN 1822)

Cicindela tibialis Dejean, 1882. in Hist. Nat. Icon. Coléopt. d' Europe, 1: 55, Tab. 4, Fig. 8.

Type locality: Port Said, Egypt.

Length 10-13.5 mm, width 3.5-5.7 mm (fig. 3). This species was long confused with *litorea* but differs in the following features: it is larger; labrum (fig.

29) with three teeth anteriorly; pronotum (fig. 41) longitudinally grooved and transversely impressed anteriorly and posteriorly; elytra (fig. 16) with wide whitish external margin, there are large punctation arranged in one longitudinal row near the suture. Penis (fig. 67).

Global Distribution: Palaearctic species endemic to Egypt.

Local Distribution: very common species restricted to the Mediterranean Coast from Marsa Matrouh to Arish.

Bionomics: Nocturnal halophilous species extensively inhabit saltpans and shores of lagoons and it is active throughout the summer. It is recorded during February to October. It is very common at Zaranik Protectorate (North Sinai); breeding takes place during August, copulation lasted for more than 2 hours. The adult beetles become active immediately after sunset and their activities increase until midnight, then begin to decrease until dawn. Sometimes the females during copulation eat other dead beetles of the same species. The species mainly feeds on mosquitoes and chironomid flies.

Cylindera WESTWOOD 1831

Cylindera (Eugrapha) contorta (FISCHER 1828)

Cicindela contorta Fischer, 1828. Ent. Ross. 3: 30.

Cicindela figurata Chaudoir, 1835. Ann. Soc. Ent. Fr., 4: 435.

Cicindela plicata Motschulsky, 1850. Kafer Russland, P. 3.

Type locality: South east of Russia.

Length 9-10 mm; width 3.5-5 mm (fig. 4). Dorsum mat, with a slight reddish greenish reflection on elytra; mandibles and palpi yellow, hook of mandibles and last segment of palps bluish; femora green bronzy; tibiae reddish; tarsi black; body below black. Labrum (fig. 30) transverse with small dent onwards. Pronotum (fig. 42) squared, slightly wider than long, impressed onwards and backwards, the median groove abridged, lateral sides with dense and long white hairs. Elytra (fig. 17) dilated towards apex, lateral margin nearly entirely yellowish; the humeral lunule wired at end or representing a turned over 6; the median band with a large sinuosity, directed right towards the suture then descending along the suture in an inversed 5; the apical lunule emitted in a wavy branch that of superior goes up until the curvature of the median band. Ventrum hairy on sides.

Global Distribution: Palaearctic element distributed through the eastern Palaearctic region. It is distributed in east of Anatolia, East of Black Sea, Caspian Sea until East of Russia, Azerbaijan, Turkmenistan, Tajikistan, Kazakhstan, West Siberia until Mongolia. It is also distributed in Egypt.

Local Distribution: rare and local along the Mediterranean coast from Abu Qir to Ras El Bar.

Bionomics: This species is found during June-August. It was confused for a long time with *C. neglecta* DEJEAN that is not found in our country (Alfieri, 1976).

Habrodera MOTSCHULSKY 1862

Habrodera nilotica (DEJEAN 1825)

Cicindela nilotica Dejean, 1825. Spec. Col., 1: 119.

Type locality: Upper Egypt.

Length 7.5-8.5 mm, width 3-3.5 mm (fig. 5). Dorsum coppery or coppery green. Labrum (fig. 31) transverse, entire without any dent onwards, white in colour. Mandibles bronzy with white base and black apex. Palpi white with last segment bronzy. Antennae black, with the 4 first segments coppery. Ventral side of abdomen coppery green. Femora green bronzy at base; tibiae and tarsi golden splendid shining. Head with cluster of white hairs in front of eyes (fig. 52), 1st antennal segment provided with many setae. Pronotum (fig. 43) punctate, with white pilosity. Elytra (fig. 18) subdepressed, apex serrate, dorsally punctate, coppery; external margin pale yellowish, connected basally with an oblique short humeral line, scutellar macula triangular; the external margin connected internally with 2 pale yellowish lines, the first near the scutellar macula and obliquely transverse, the second one at the middle of elytra and flexed, usually descending until apex; there is an annular line before apex; suture longitudinally accompanied with a pale yellowish band on each side. Penis (fig. 68).

Global Distribution: Afrotropical species described from Egypt. It spreads over almost entire Africa south of the Sahara and North Africa from Morocco until Egypt. It is recorded from Ethiopia, Togo, Kenya, Tanzania, Chad, and Zaire.

Local Distribution: this species invaded our country from the south via Nile River. It is commonly distributed along Nile Valley from Aswan until Kafr Shukr in Nile

Delta. Also it extends its range eastwardly to reach the limits of the Eastern Desert. Furthermore it occurs in south Sinai at Wadi Isla.

Bionomics: It is an inhabitant of the border of standing and running fresh water. It occurs on sandy or clayish soil. The activity period of this species persist for along time of the year ranging from January to November; also it is attracted to light at night.

Hypaetha LECONTE 1860

Hypaetha singularis (CHANDOIR 1876)

Cicindela singularis Chaudoir, 1876. Rev. Mag. Zool., 39: 330.

Type locality: Dahlak Island, Ethiopia.

Length 7.5-10 mm; width 2.5-3 mm (fig. 6). At once it is recognized by its yellowish white elytra and their dark brown markings. Vertex, 1st antennal segment, thorax, femora and tarsi green bronzy; tibiae reddish but green bronzy at their apices. Elytral (fig. 19) suture maculed with dark until backwards of middle. Ventrum bronzy brown, pubescent at lateral sides of thorax only. Labrum (fig. 32) with a median small dent at anterior margin. First antennal segment with only one apical seta. Pronotum (fig. 44) with a transverse sulcus at anterior and posterior bases, grooved longitudinally at middle, with white pilosity. Third abdominal sternite in the female with 2 protrusions at posterior margin (fig. 64), while in the male it is complete without these protrusions. Penis (fig. 69).

Global Distribution: Afrotropical species described from Red Sea coast. It is familiar to occur on both sides of the Red Sea and the Gulf of Aden, from Egypt south to Eritrea, Yemen and northern Somalia. Recently it was recorded from Oman (Cassola & Rihane, 1996).

Local Distribution: Rare species, its distribution is limited to the coastal line of the Red Sea Coast: Ghoubbet El Bous (Suez Gulf).

Bionomics: inhabiting the seashores and occurring on sandy soils. It is found during June and July.

Lophyra MOTSCHULSKY, 1859

Lophyra (Lophyra) flexuosa (FABRICIUS 1787)

Cicindela flexuosa Fabricius, 1787. Mant. Ins. 1: 186.

Type locality: Spain littoral

Length 9-14 mm; width 3.5-5 mm (fig. 7). Dorsum usually coppery, pronotal sulcus, deep points of elytra and margins of elytral patterns usually darker blue green; elytral patterns coppery green. Ventrum blue or blue green; sides of thorax fiery coppery or purple; sides of thorax and abdomen, coxae and femora with a very dense white pubescence. Hind edge of eyes with strengthened, forward directed white setae (fig. 53); longstriped on the internal edge of eyes, very densely wrinkled on the middle of frons and vertex; genae and temple bare. Labrum (fig. 33) tridented in the middle of fore edge. First antennal segment (fig. 59) of male strongly setaceous, while of female provided with few setae. Pronotum (fig. 45) much broader than long, with an extremely densely wrinkled and crossed white pubescence, with a transverse sulcus at anterior and posterior bases, longitudinally grooved at middle. Elytra (fig. 20) rather short, very little widen backwards, very sharply serrate at the apex, little dense but rather strongly punctate, in front very clearly grained. The yellowish white drawings of elytra consist of: a rounded spot in the middle of base; 2 elongate spots near the suture, the smallest one of them behind the scutellum, the bigger one in the middle; humeral lunule in the first fourth of elytra, with its end widened; median cross band goes forwards and backwards to the outside making a short lateral stripe; this lateral stripe is in turn connected laterally with a hook-shaped band. Penis (fig. 70).

Global Distribution: A Palaearctic species, known to be distributed through North Africa from Morocco until Egypt, and extend eastwardly until Syria. It is also known from Portugal, Spain, south Italy, north France until England, Russia, and Caucasus.

Local Distribution: very common species and generally distributed along Mediterranean from Alexandria until Ras El Bar. In addition, it is southwardly spread via Nile Delta to Cairo, via Western Desert to Wadi Natroun and Khatatba, via Eastern Desert to Ismailia, and via Sinai to Wadi Gharandal.

Bionomics: It occupies nearly every kind of moderately humid soil, like clayey and sandy soils. The species is common from February to October.

Lophyridia RIVALIER, 1954

Key to species

1- Dorsum dark blue, ventrum and legs metallic blue ..... ***alboguttata*** **(KLUG)**

- With different colors **2**

2- Abdomen smooth in the middle, epipleuron of the elytron and palpi clear, not metallic ..... ***fimbriata*** **(DEJEAN)**

-Abdomen punctated in the middle, maxillary palpi metallic **3**

3- Abdomen blue or blue green. Hind femora lower down with 2 series of dense long white hairs (fig. 61). ..... ***littoralis aulicoides*** **(SAHLBERG)**

- Abdomen purple violet red, sometimes only posterior edges of the sternites bluish. Hind femora lower down with one series of white setae (fig. 60) ....***aulica*** **(DEJEAN)**

Lophyridia allboguttata **(KLUG 1832)**

Cicindela alboguttata Klug, 1832. Symb. Phys. Dec., 3: 2, nr. 3, Tab. 21, Fig. 3.
Cicindela euarabica Ali, 1978. Coleopterists Bulletin 31: 1-20.

Type locality: Red Sea coast: Arabian Desert.

Length 12 mm; width 4 mm (fig. 8). Dorsum of the body dark blue; 4 basal segments of antennae green, rest of antennae black, palpi yellowish white with last segments bronzy. Ventrum and legs dark blue. Head between eyes longstriped, punctate posteriorly; with cluster of hairs at anterior margin of eyes (fig. 54). Labrum (fig. 34) transverse, with a small dent at its anterior margin. Pronotum (fig. 46) subcylindrical, slightly longer than wide, finely rugosed transversely, laterally pubescent, anterior and posterior bases with a transverse sulcus, impressed longitudinally at middle. Elytra finely but densely punctate. Elytral markings (fig. 21) appearing as separated spots; humeral lunule interrupted, represented by 2 spots, the posterior one bigger than the anterior one; median transverse band short and connected to median spot near to the elytral suture; apical lunule interrupted. Penis (fig. 71).

Global Distribution: An Afrotropical element known from both sides of the Red Sea. It occurs in Egypt and Saudi Arabia, then spread southwardly to Sudan, Eritrea, Ethiopia, Djibouti, Somalia, Yemen.

Local Distribution: Very rare species recorded only from Eastern (Arabian) Desert along the Red Sea: Wadi Sharis

Bionomics: recorded during July.

Lophyridia aulica (DEJEAN 1831)

Cicindela aulica Dejean, 1831. Species Coléopt. 5: 250.

Cicindela hesperidum Wollaston, 1861. Ann. Mag. Nat. Hist. 7 (3): 92.

Cicindela littoralis var. *massaniensis* Dokht., 1887. Ann. Soc. Ent. Belg., 31:156.

Cicindela orienticola Tschitscherin, 1903. Horae Soc. Ent. Ross. 35:14.

Type locality: Senegal

Length 11.5 mm; width 4 mm (figs. 9:11). Color dark green, head, thorax, femora and the 4 basal segments of antennae green bronzy, rest of antennae red bronzy; legs red bronzy; ventrum purple violet red. Head strongly grooved between eyes. Labrum (fig. 35) transverse, yellowish white, unidented at anterior edge. Pronotum (fig. 47) slightly broader than long. Elytra densely punctate, very brilliant, with a red golden reflection. Elytral markings (figs. 22:24) with some individual variation. Hind femora lower down with one series of white setae. Penis (fig. 72).

Global Distribution: mostly Palaearctic element, distributed in North Africa from Tunisia to Egypt. It is widely dispersed southwardly from North Africa to Ethiopia, Somalia, Angola, Senegal and Cap. Also it is distributed eastwardly to the Middle East in Emirates, Oman, Bahrain and Yemen.

Local Distribution: Generally distributed and very common species. It is spread along Mediterranean from Marsa Matrouh until Zaranik Protectorate (N. Sinai). Besides, it is distributed to the south via Suez Canal along Red Sea line from Ghoubbet El Bous (Suez Gulf) and El Tor (Aqaba Gulf) southwardly to Abu Ghouson (South Marsa Alam). As well as it is distributed through Western Desert in Siwa and Kharga Oases, Wadi Natroun, and reaching the Fayoum Basin.

Bionomics: Halophilous species inhabits fresh or saline habitats such as saltpans and lagoons, and occurs on sandy soils. In Sinai it was found on the sea shores of Bardawil Lake at Zaranik, North Sinai. It is diurnal visual hunting, sun-loving beetle and predominant from February until October.

Lophyridia fimbriata (DEJEAN 1831)

Cicindela fimbriata Dejean, 1831. Species Coléopt. 5: 240

Cicindela dongalnisis Klug, 1832 Symb. Phys. Dec., 3: 2, nr. 6, Tab. 21, Fig. 6.

Type locality: Dongola, Sudan.

Length 11 mm; width 3.5 mm. It is very similar to *aulica* but deviating in the following respects: upper surface of the body dark coppery; antennae black with green base; palpi yellowish white with last segments bronzy black; legs bronzy green; underside and femora below gladly coppery. Head finely punctate and longstriped between eyes. Eyes big and prominent. Labrum transverse, with a small dent at its anterior margin, and with an obtusely dent at each side of median dent. Pronotum with head broad, finely punctate, laterally with white pubescence. Elytra elongate, with roughly little raised punctation; with acute serration at apex. Pale elytral markings consist of curved lunule at shoulders; transverse and abbreviate band at median; rounded spot at the posterior half; and reflexed lunule at apex.

Global Distribution: An Afrotropical species widely distributed in most of Africa. It is known to occur in Sudan, Ethiopia, Eritrea, Somalia, Republic of Central African, Kenya, Benin, Cameroon, Senegal, Guinea, Niger, Zaire Tanzania, Mozambique, Angola, Malawi, Zimbabwe, Rwanda and Burundi (Werner, 1993).

In 1993 Werner reviewed the Ethiopian tiger beetles and noted that this species is distributed in Upper Egypt. We think that Werner followed the same mistake of Junek (1910) and treated the type locality (Ambukohl) of *Cicindela dongalensis* KLUG 1832, as a part from Upper Egypt. Actually this type locality belongs to Nubian land of Sudan. Despite the fact that this species was described from Sudan and its enormous range in Africa, its occurrence in Egypt until now is still not confirmed.

Lophyridia littoralis aulicoides (SAHLBERG 1913)

Cicindela aulicoides Sahlberg (1912-13). Öfv. Finska Vet. Soc. Förh., 55 A (19): 3.

Type locality: Wadi El Nawaime on Jordan river, Jordan.

Length 11-14 mm; width 3.5-4 mm. In general habitus very similar to *aulica*, but the upper surface bronzy black, with reddish greenish reflections on head, pronotum and elytra. Both first segments of labial palps yellow, last segment black; maxillary palpi dark. Head little wider than prothorax; frons with a white pubescence, finely longstriped between eyes from each side. Labrum (fig. 36) little produced in the middle, with a small median dent. Pronotum (fig. 48) a little wider than long, onwards as wide as backwards, very finely and extremely densely granulate wrinkled, with a white pubescence. Elytra in male slightly widen backwards, in female clearly widened, very finely serrate at the posterior edge finely

and rather densely granulate on the upper side. Elytral (fig. 25) pattern with humeral lunule bow shaped, not interrupted. Hind femora lower down fringed with 2 series of densely distributed long white hairs. Penis (fig. 73).

Global Distribution: Subcosmopolitan species.

Local Distribution: Mediterranean coast from Abu Qir to Port Said; with sporadic distribution southerly in Eastern Desert (Ismailia and Helwan), Western Desert (Wadi Natroun), and Southern Sinai (El Tor).

Bionomics: it occurs in saline sandy soils, and found from February to October, but it is abundant during September to October.

Myriochile MOTSCHULSKY 1862

Myriochile (Myriochile) melancholica (FABRICIUS 1798)

Cicindela melancholica Fabricius, 1798. Ent. Syst. Suppl.: 63.
Cicindela aegyptiaca Dejean, 1825. Spec. Col., 1: 96.
Cicindela ludia Dejean, 1831. L.C., 5: 244.
Cicindela hopei Gistl, 1837. Syst. Ins., 1: 51.
Cicindela dentilabris Chaudoir, 1844. Bull. Moscou, 17: 417.
Cicindela hesperica Motschulsky, 1849. L.C., 22: 65.
Cicindela tantilla Boheman, 1860. Öfv. Vet. Akad. Förh. 6.
Cicindela vicina Wollaston, 1861. Ann. Mag. Nat. Hist., (3)5: 93.
Cicindela microsticta Klug, 1862. in Peters, Reise Mozamb. Zool., 5: 147.
Cicindela caucasicola Lutshnik, 1915. Bull. Mus. Cauc., 9: 25.

Type locality: Guinea

Length 9-13 mm; width 3.5-4 mm (fig. 12). Very characteristic because of its elongate and usually cylindrical body; elytra nearly parallel-sided or weakly widened towards angular sinuation before tip, impresopunctate. Dorsally dark bronzy; ventrally bronzy blue green; trochanter brown. Head slightly rough; frons between antennae smooth, shining green blue. Labrum (figs. 37, 38) unidentate anteriorly in male, tridentate in female. Mandibles black bronzy, with their bases pale. Palpi pale with last segment black bronzy. Antennae black, with 4 first segments bronzy. Pronotum (fig. 49) cylindrical, dorsally finely granulate, transversely bi-impressed, longitudinally grooved, blue in this groove, pubescent on both sides. Yellowish white elytral pattern (fig. 26) very fine; humeral lunule elongate, transversely oblique; median lunule transverse, thin, clavate-shaped at its

apex towards the internal; there are separate rounded spots, one at the anterior half of elytra, the second spot at the beginning of the 2nd half of elytra; the apical lunule reflexed externally to face the marginal lunule. Thorax, abdomen and legs with a white pubescence. Penis (fig. 74).

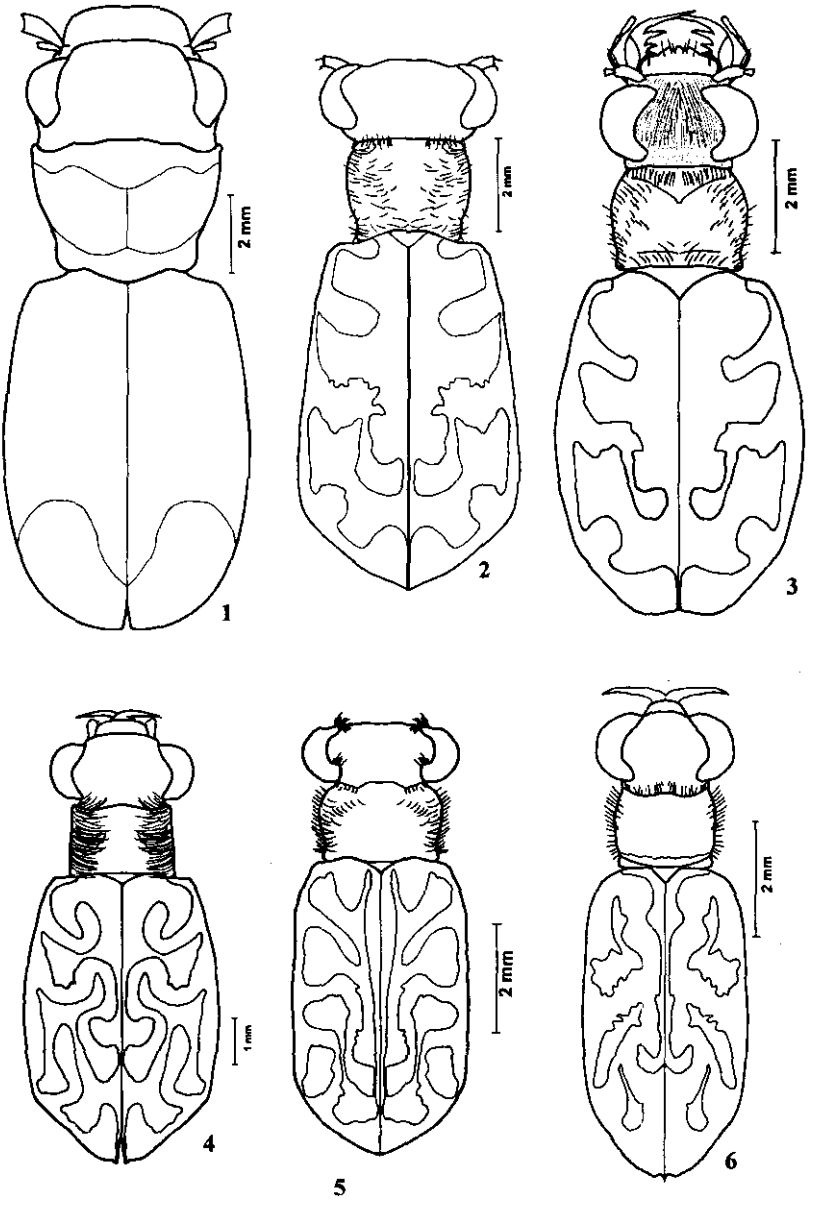
Global Distribution: spread throughout Africa and of southern Europe over the Middle East until Asia. It is common in North Africa from Morocco until Egypt, and extending eastwardly through Palestine, Syria, Arabia and Asia Minor until Persia. Also it was recorded from South Spain, South Italy, Sardinia, Sicily, Malta, Cyprus, Turkmenistan Tajikistan and Armenia.

Local Distribution: Generally distributed and very common species in Egypt. It invades our fauna through Africa from the south via Nile River. It spreads northwardly along the Nile Valley from Aswan to reach Nile Delta, and continues its distribution to Mediterranean from Marsa Matrouh till Arish. Moreover, it extends its range westwards through Western Desert to inhabit Siwa Oasis, Baharia Oasis, Wadi Natroun and Khatatba. Also it is extended eastwardly to reach the boarder of Eastern Desert, where it is recorded from W. Hoff and Belbis

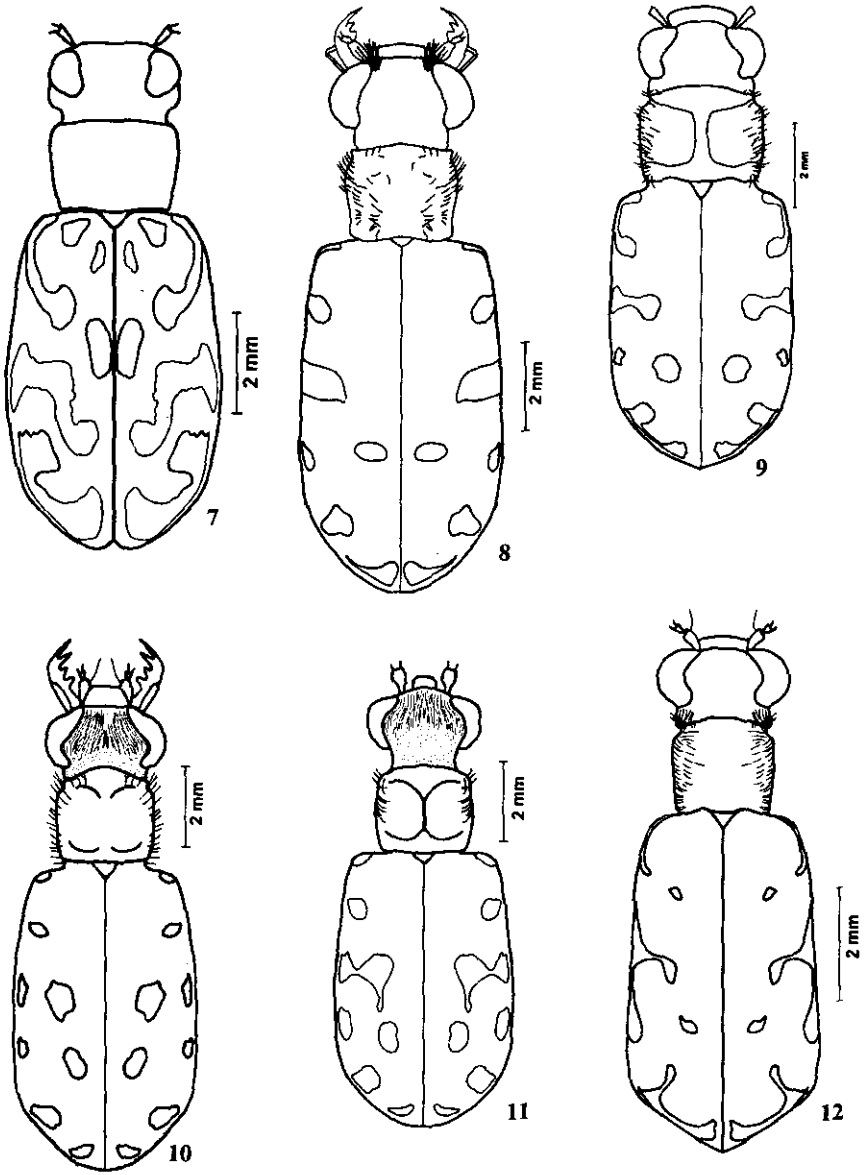
Bionomics: It inhabits almost every kind of moderately humid soils, like clayey and sandy soil with sparse vegetation. It occurs on the sides of lakes and Nile River and its branches as well as far from water. The species has one generation per year; and its activity starts during late spring and reaches its maximum during summer in July and August, then the population decreases to reach the lowest density by the end of December (Ismail, 1974). The beetles are attracted to light.

SUMMARY

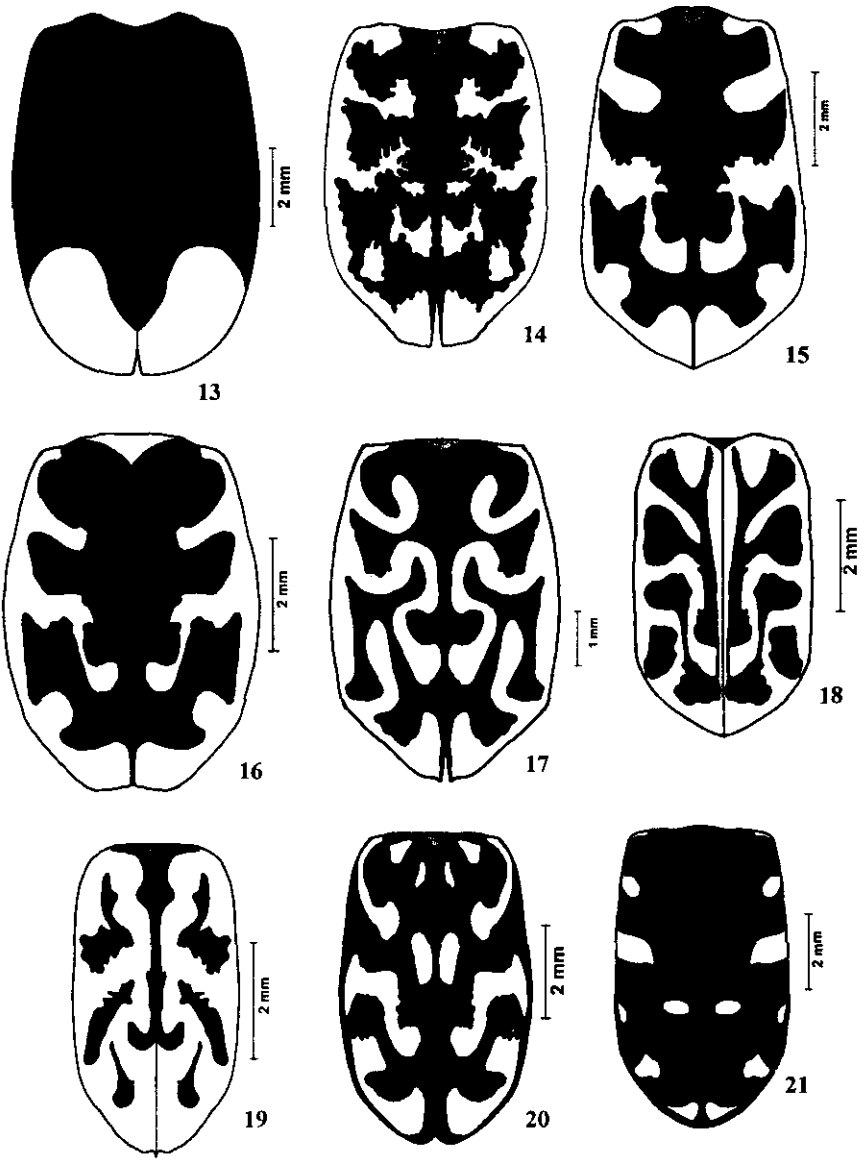
The thirteen Egyptian species and subspecies belonging to subfamily Cicindelinae are revised taxonomically, separated in keys and pertinent morphological features are illustrated. The diagnoses of species are supplemented by information of the main distribution throughout Egypt. Brief information on biology, as far as known, is outlined. One species *Lophyridia fimbriata* (DEJEAN 1831) is still unconfirmed to occur in our fauna.



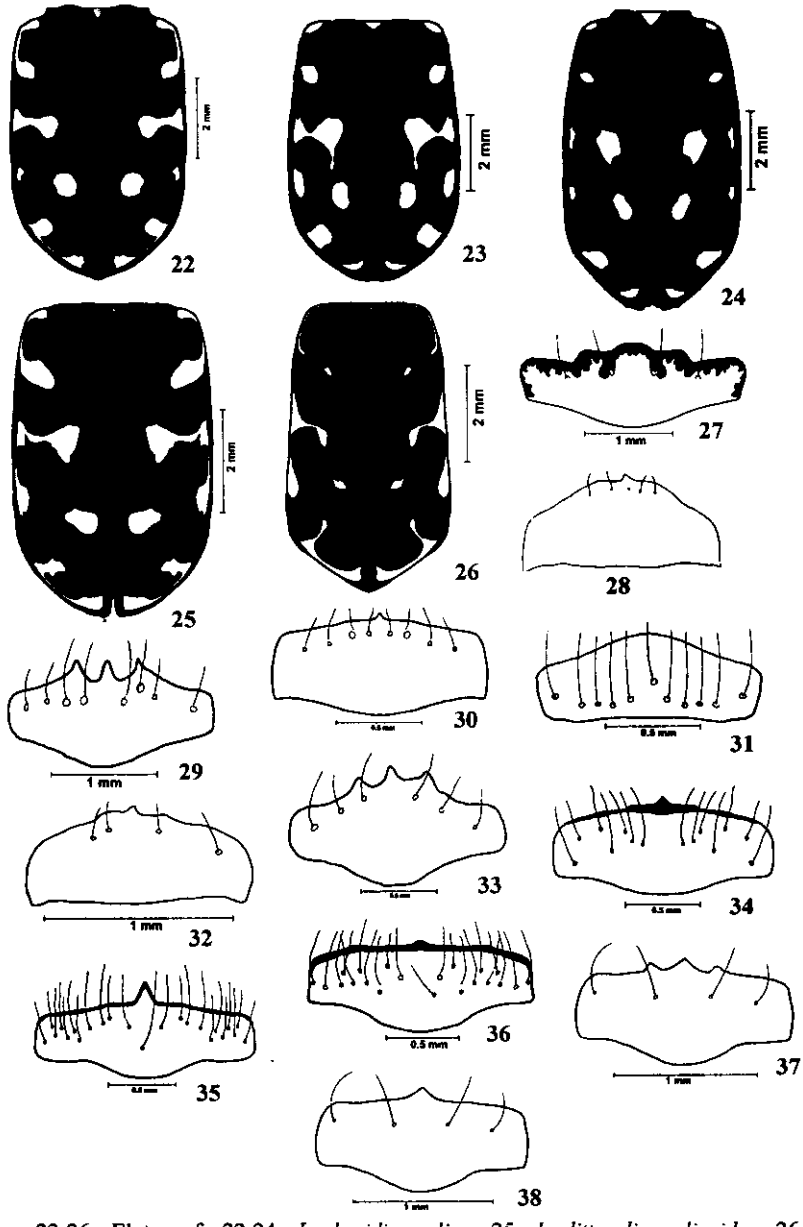
Habitus of: 1, *Grammnognatha euphratica*; 2, *Cephalota litorea*; 4, *C. tibialis*; 5, *Cylindera contorta*; 6, *Habrodera nilotica*.



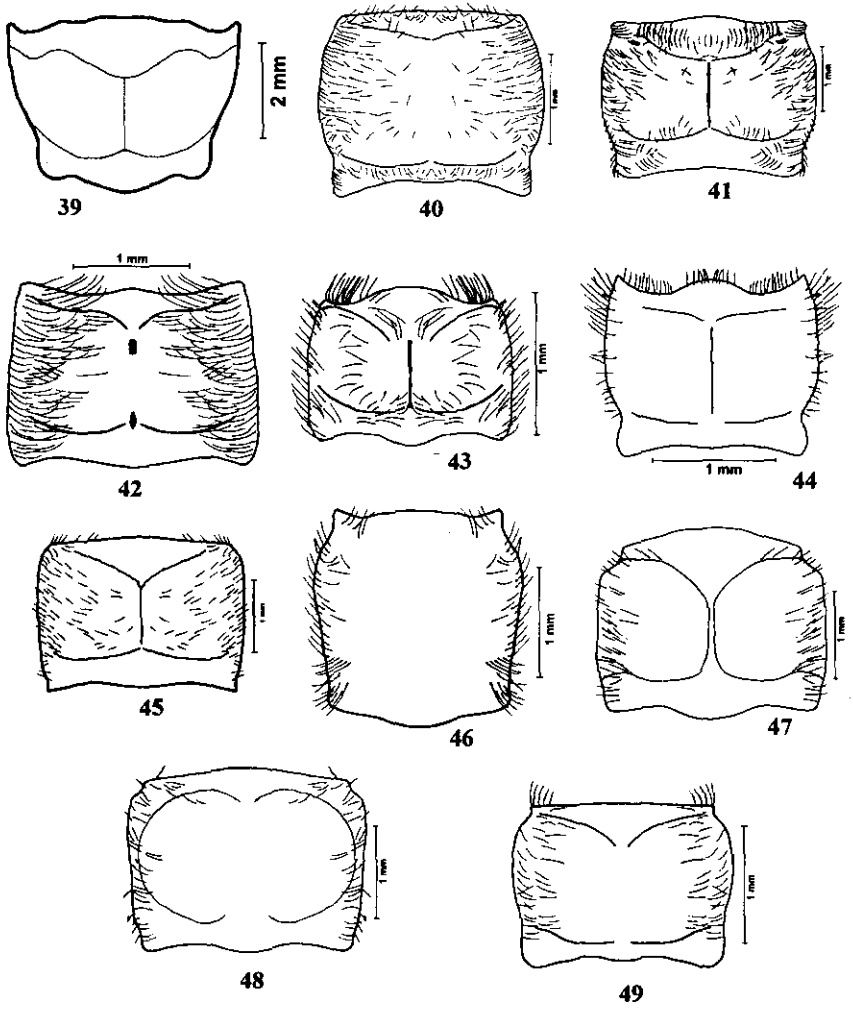
Habitus of: 7, *Hypaetha singularis*; 8, *Lophyra flexuosa*; 9, *Lophyridia alboguttata*; 10-12, *L. aulica*; 13, *Myriochile melancholica*.



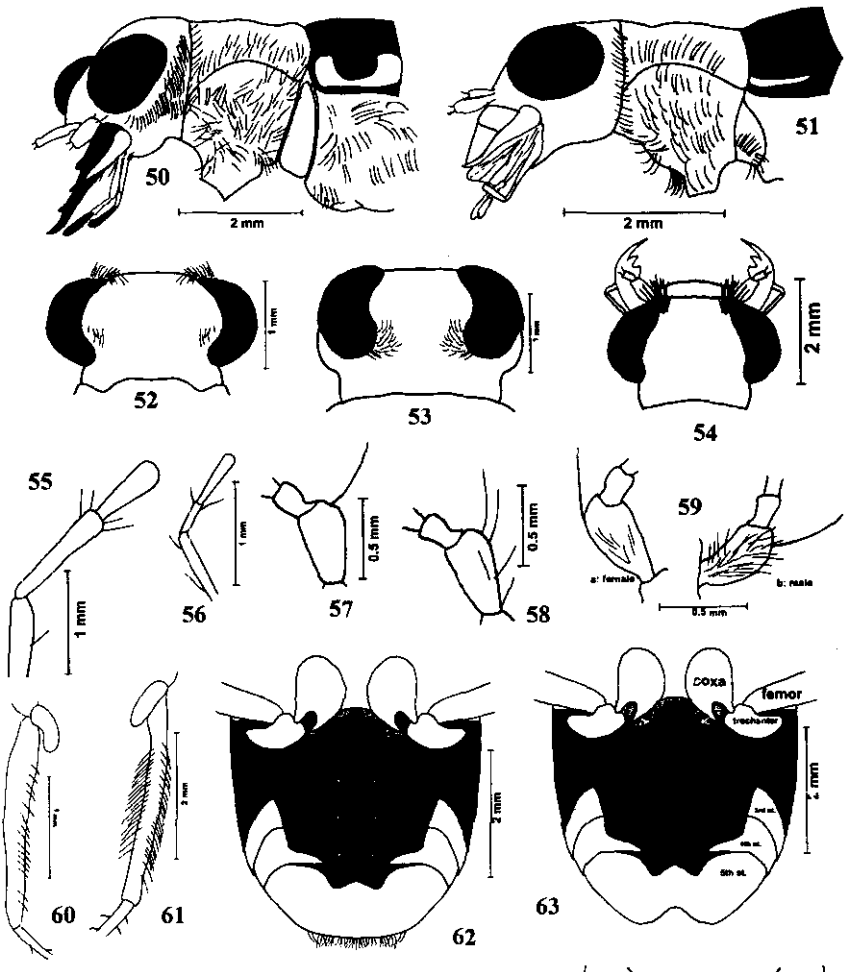
Elytra of: 13, *Grammnognatha euphratica*; 14, *Cephalota circumdata*; 15, *C. litorea*; 16, *C. tibialis*; 17, *Cylindera contorta*; 18, *Habrodera nilotica*; 19, *Hypaetha singularis*; 20, *Lophyra flexuosa*; 21, *Lophyridia alboguttata*.



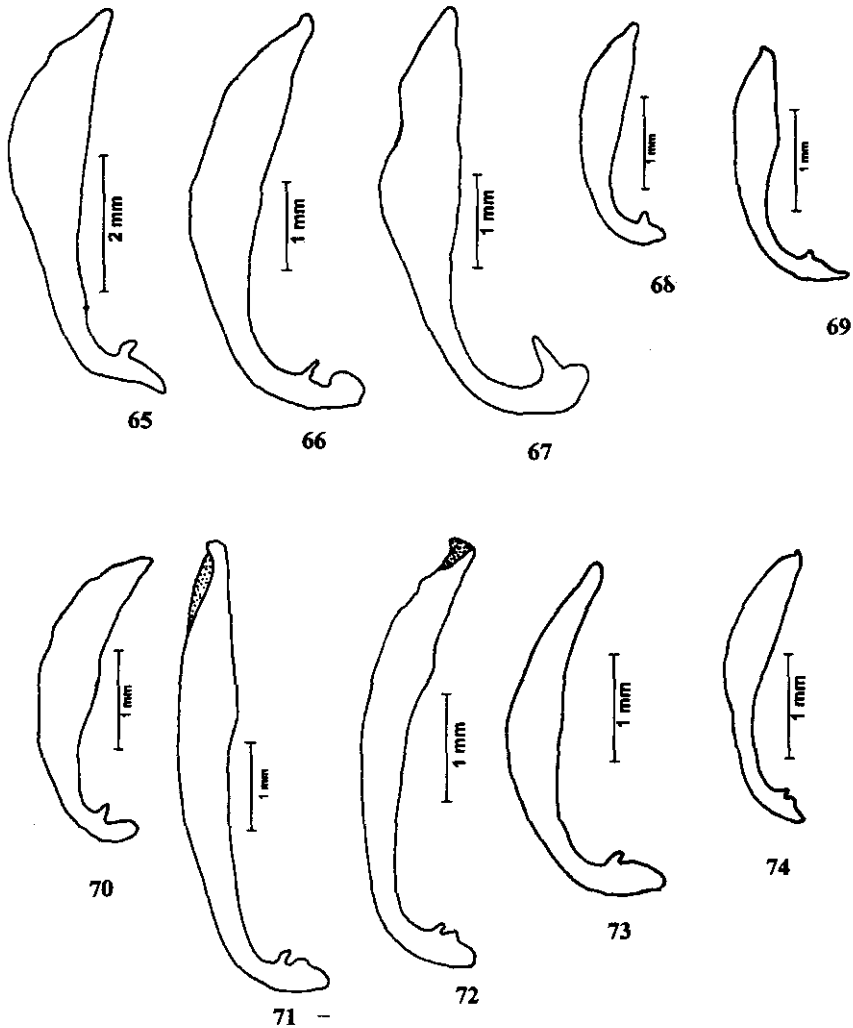
Figs. 22-26: Elytra of: 22-24, *Lophyridia aulica*; 25, *L. littoralis aulicoides*; 26, *Myriochile melancholica*. Figs. 27-38: Labrum of: 27, *Gran.::nognatha euphratica*; 28, *Cephalota litorea*; 29, *C. tibialis*; 30, *Cylindera contorta*; 31, *Habrodera nilotica*; 32, *Hypaetha singularis*; 33, *Lophyra flexuosa*; 34, *Lophyridia alboguttata*; 35, *L. aulica*; 36, *L. littoralis aulicoides*; 37-38, *Myriochile melancholica*, 37, female; 38, male.



Pronotum of: 39, *Grammnognatha euphratica*; 40, *Cephalota litorea*; 41, *C. tibialis*; 42, *Cylindera contorta*; 43, *Habrodera nilotica*; 44, *Hypaetha singularis*; 45, *Lophyra flexuosa*; 46, *Lophyridia alboguttata*; 47, *L. aulica*; 48, *L. littoralis aulicoides*; 49, *Myriochile melancholica*.



50-51: Lateral view of head and thorax: 50, *Lophyridia aulica*; 51, *Myriochile melancholica*. 52-54: Dorsal view of head of: 52, *Habrodera nilotica*; 53, *Lophyra flexuosa*; 54, *Lophyridia alboguttata*. 55-56: Maxillary palp of: 55, *Grammnognatha euphratica*; 56, *Cephalota litorea*. 57-59: First antennal segment of: 57, *Cephalota litorea*; 58, *Cephalota circumdata*; 59, *Lophyra flexuosa*. 60-61: lower down view of hind femor of: 60; *Lophyridia aulica;* 61, *L. littoralis aulicoides*. 62-64: Abdominal sternites: 62-63, *Grammnognatha euphratica*; 62, female; 63, male; 64, female *Hypaetha singularis*.



Lateral view of penis of: 65, *Grammnognatha euphratica*; 66, *Cephalota litorea*; 67, *C. tibialis*; 68, *Habrodera nilotica*; 69, *Hypaetha singularis*; 70, *Lophyra flexuosa*; 71, *Lophyridia alboguttata*; 72, *L. aulica*; 73, *L. littoralis aulicoides*; 74, *Myriochile melancholica*.

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