

# Taxonomical Studies on the Superfamily Scarabaeoidea of Al-Jabal Al-Akhder District (Libya)

## 1- Dung feeders

### (Fam. Geotrupidae, Scarabaeidae & Aphodiidae)

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## ABSTRACT

Coprophagous scarabaeids were collected in Al-Jabal Al-Akhder district (Libya) from July 2007 to October 2009. The captured beetles were identified and representing three families: Geotrupidae, Scarabaeidae and Aphodiidae. The family Geotrupidae was represented by two genera and one species to each. The family Scarabaeidae included four genera, each genus has one species. Whereas, the family Aphodiidae has three species belonging to the genus *Aphodius*. The taxonomical status of the superfamily Scarabaeoidea was discussed and the diagnostic characters of families, genera and species were described and illustrated. In addition, taxonomical keys were provided to designate the different taxonomical characters of categories

## INTRODUCTION

Scarabaeoidea is a large Superfamily of the order Coleoptera, which contain more than 30000 beetle species (Gillof, 2005)

Several authors dealt with the classification of the scarabaeids or lamellicorn beetles. Erichson (1848) divided them into two divisions Pleurosticti and Laparosticti according to the situation of the abdominal spiracles. Burmeister (1874) classified them according to the position of mesocoxae in relation to the meso - and metasternum

Leng (1920), Arnett (1962) and Borror *et al.*, (1989) indicated that the superfamily Scarabaeoidea is classified into three families: Lucanidae, Passalidae and Scarabaeidae. The Scarabaeidae was divided into fourteen subfamilies: Loprinae, Aegialiinae, Aphodiinae, Ochodaeinae, Hybosorinae, Geotrupinae, Pleocominae, Glaphyrinae, Acanthocerinae, Troginae, Melolonthinae, Rutelinae, Dynastinae and Cetoniinae.

Another Entomologists added three more families to the aforementioned families, i.e. Torgidae, Geotropidae and Acanthocoridae (=Ceratocanthidae) (Boving and Craighead, 1931; Edwards, 1949 & Britton, 1979). The latter author mentioned ten subfamilies, which found in Australia. Due to the expansion of knowledge, the number of families of the Scarabaeoidea increased to reach thirteen families (Booth *et al.*, 1990)

Baraud (1985) revised the fauna of scarabaeid beetles of North Africa. He considered the previous family, Scarabaeidae as a super-family Scarabaeoidea and elevated the subfamilies to families ranks. Up to now some taxonomists still deal with this super family as known before, i.e. Lucanidae, Passalidae, Scarabaeidae...and others (Scholtz, 1999 & Dedyukhin *et al.*, 2005 & Stemana and Smith, 2006 and Telnov *et al.*, 2007). Another taxonomists follow the classification of Baraud, 1985 (Hortal *et al.*, 2006 & Lobo and Hortal, 2006 & Dutto, 2008 and Kasic-Lelo and Lelo, 2009). In the present paper Baraud (1985) classification is followed.

In fact, survey studies on Coleopterous insects found in Libya (Zavattari, 1934 & Damiano, 1961) were not supplied with detailed description or taxonomical keys. Therefore, the aim of the present work is to study the collected species of Scarabaeoidea in Al-Jabal Al-Akhder district (Libya) from the taxonomical point of view. This paper is covering three families belonging to the superfamily Scarabaeoidea, the coprophagus beetles (dung feeders). After that, another paper for the same authors will cover other three families of the phytophagous beetles (plant feeders).

## MATERIALS AND METHODS

The present investigation was carried out in Al-Jabal Al-Akhder district (Libya) from July 2007 to October 2009. For sampling the scarabaeid beetles, the following methods were adopted:

- 1- Light traps, which were fitted with 250 watt bulbs either fixed on the ground or hanged near the plants.
- 2- Pitfall traps to collect crawling insects. It was made by putting a wide mouth jar under the soil surface and filling it with water and adding few drops of liquid detergent to lower the surface tension
- 3- Hand picking for slow moving beetles.

Collected beetles were killed and pinned with collecting information until sorting and identifying. Insects were examined with the aid of a stereoscopic binocular microscope. The taxonomic characters were studied and illustrated. Photos were taken by digital camera and some were quoted from different internet sites.

The taxonomic keys of Britton (1970), Baraud (1985), Borror *et al.* (1989), Booth *et al.* (1990) and Badr (1985, 1998) were used for identification of the collected insects. In addition the internet sites were used to know some features and information of the collected species.

## RESULTS AND DISCUSSION

### Diagnostic characters of the superfamily Scarabaeoidea

species of the superfamily Scarabaeoidea are usually stout bodied, characterized by having developed antennae, generally with strong club composed of 3 -7 lamellae fixed or articulated. Fore legs often fitted for digging, with dentate tibiae. Tarsus principally five-segmented with two claws. Abdominal stigmata of seven pairs. Nearly all species are active fliers, apterous forms are relatively few and although most frequent in female they may occur in both sexes. The head and thorax are often ornamented with remarkable cuticular outgrowths. Sexual dimorphism is very characteristic, so that in some cases the male and female of a species are so unlike that they have been considered as different genera. (Comstock, 1950).

The superfamily Scarabaeoidea has thirteen families worldwide. In the present study only six families were recorded i.e. Scarabaeidae, Geotrupidae, Aphodiidae, Melolonthidae, Dynestidae and Cetoniidae.

### Key to the families under study of the super family Scarabaeoidea

(modified from Borror, *et al.* 1989 and Baraud, 1985)

- 1- Abdomen completely covered by elytra; antenna 11segmented..  
.....**Geotrupidae**
- Abdomen not completely covered by elytra; antenna 8-10 segmented .....2
- 2 (1) Hind legs situated closer to tip of abdomen than to middle legs; abdominal spiracles covered by elytra; segments of antennal club usually hairy; dung feeders.....3
- Hind legs situated at about middle of body, closer to middle legs than to tip of abdomen; at least one of abdominal spiracles not covered by elytra; segments of antennal club smooth or only sparsely hairy; plant feeders.  
.....4
- 3(2) Hind tibiae with one apical spur; pygidium partly exposed ;middle coxae widely separated ;scutellum small and usually not visible.....  
.....**Scarabaeidae**
- Hind tibiae with two apical spurs; pygidium covered by elytra; middle coxae approxmited; scutellum well developed and visible.....  
.....**Aphodiidae**

4(2) Tarsal claws toothed; bases of antennae not visible from above; one pair of abdominal spiracles exposed below edges of elytra.....

**Melolonthidae**

- Tarsal claws simple; bases of antennae visible from above; at least two pairs of abdominal spiracles exposed below edges of elytra.....5

5(4) Front coxae transverse; body usually convex above; mandibles expanded, visible from above, males usually with large horns on head or pronotum; lateral margins of elytra without shallow emargination behind humeri..... **Dynestidae**

-Front coxae conical; body flattened above; mandibles covered by clypeus, not visible from above, no horns on head or pronotum; lateral margins of elytra with shallow emargination behind humeri ..... **Cetoniidae**

**1-Family: Geotrupidae**

**Diagnosis:**

Labrum and mandibles not hidden under clypeus, largely protruding. Antennae of eleven segments, with club of three segments. Eyes large, distinctly visible. Abdomen short of six ventrally free segments. Profemur on its internal face with cushion of hairs or with lines of satigerous holes. Meso- and metatibiae with two terminal spurs.

**Key to the genera under study of the Family Geotrupidae**

1- Elytra not fused together; base of anterior femur without a patch of yellow hairs on internal face; pronotum with horns or carina; posterior tibia with two or three transverse ridges on external face.....

***Bolbelasmus***

- Apterous, elytra fused, base of anterior femur with a patch of hairs on internal face; pronotum without horns or carina; posterior tibia with one transverse ridge on external face..... ***Thorectes***

**1-1 *Bolbelasmus bocchus* (Erichson) (Fig. 1A)**

Body length 13mm. Colour black, ventral side lighter with long yellow hairs. Head( Fig. 2A) with wide corn bifid apically in males, or with frontal carena medially interrupted in females. Labrum and mandibles protruding anteriorly. Clypeus round anteriorly, gena protruding with truncate sides.

Pronotum wide, roughly punctuated, with deep concave anterior margin, in male provided with sharp corn on each anterior side, disc medially provided with two diverged corns, contiguous basely. In females pronotum with transverse straight carina and small lateral tubercle on each side. Fore tibia(Fig. 2B) with four large dents and fifth small one. Meso and

metatibiae with two transverse ridges and an apical one. Scutellum large, impunctated. Elytra with sixteen punctured striae, interstriae smooth.

Zavattari(1934) recorded this species in his list of insects of Libya. Baraud,(1985) also recorded it in Egypt, Morocco, Algeria, Tunisia and Libya.

### **1-2-*Thorectes brullei* Jekel (Fig. 1B)**

Body convex, length about 15 mm., colour black. Head(Fig. 2C) roughly punctured, labrum and mandibles not hidden under clypeus, external margin of mandible not dentated. Head with small median tubercle just in front of frontoclypeal suture.

Antenna(Fig.2D) eleven segmented, with club of three segments not united together. Gena extend laterally in front of the large eyes. Pronotum wider than long, finally punctured, its anterior margin concave and its posterior margin straight, sides rounded posteriorly, with small depression on the middle of anterior side, and two lateral shallow pits.

Protibia(Fig.2E) with six external dents decreased in size from tip to base, internal face with dents which not present in females, apical dent bifid in male. Profemur with cushion of golden hairs on its internal side near articulation with coxa. Posterior tibia with one transverse ridge. Scutellum triangular and transverse. Elytra united, with no hind wings, punctures of elytra fine forming indistinct striation, lateral side of elytra raised and flattened near humeral angles. Abdomen very short, less than half length of thorax. Pygidium entirely covered by elytra .

Although, Zavattari (1934) did not recorded this species in his list, Baraud(1985) mentioned that this species occupy all the Mediterranean basin ,Algeria, Tunisia, and Libya. It has many subspecies, the subspecies represented in North Africa is *africanus*

## **2- Family: Scarabaeidae**

### **Diagnosis:**

The members of the family Scarabaeidae are known as dung beetles or thumble bugs .They vary greatly in size, colour and habits. The scarabs are heavy bodied, globular or elongate, usually convex beetles .Clypeus well developed, covering labrum and mandibles. Mouth parts with nearly membranous mandibles incapable of biting. Maxillary palpi slender and four segmented, the apical segment is the largest. Labial palpi with three segments.

In many groups, horns are well developed on head or pronotum some of them are fantastically large. Antennal club rarely more than 3 segments ,very short, pubescent and mat. Anterior coxa large, transverse,

prominent and conical. Apex of the posterior tibiae with a single spur; anterior tarsi wanting in some cases. Middle coxae relatively large, widely separated; posterior coxae flat and transverse .Pygidium and sometimes propygidium, not covered by elytra.

**key of Genera under study of the Family Scarabaeidae**

- 1- Base of pronotum with two foveae anterior to scutellum; scutellum visible or not.....**2**
- Base of pronotum without foveae or with one median impression; scutellum mostly invisible .....**3**
- 2(1) Scutellum visible;anterior tarsus absent in male,present in female.....**Cheironitis**
- Scutellum invisible;anterior tarsus absent in both sexes.....**Bubas**
- 3(1) Elytra with nine striae,distal segment of labial palp well developed;meso-and metatibiae short..... **Copris**
- Elytra with eight striae,distal segment of labial palp rudimentary;meso-and metatibiae normaly elongate .....**Euonthophagus**

**.2-1-Cheironitis irroratus (Rossi) (Fig.1C)**

Body dorsally flattened, length about 15 mm. colour reddish brown, sometimes with yellow patches on dorsal and ventral sides in male. Head dark brown in female, partly yellow in male with fine granules and with relieve borders, clypeus semicircular, slightly notched in front. Contrary to all Lamellicornia, the tubercle of the head more distinct and developed in female(Fig.2F) than in male(Fig.2G), vertex elevated, with posterior non graulated ridge. Gena markedly extended around eyes, genal suture distinct. Eyes completely divided into two unequal parts .Antennal club spherical (Fig.2H).Labial palp densely pilose, the distal segment reduced (Fig.2I).Maxillary palp glabrous.

Pronotum convex in front, depressed from back, lateral margins rounded, festooned, anterior and lateral sides with scattered punctures, the disc with distinct granulation, except in a middle short longitudinal line and surrounding sinuated elevated markings with no granules. Each lateral side of pronotum with a depressed pit, posterior margin with two sub triangular impressions in front of scutlfum. Scutillum dark brown, triangular, granulated,covered with fine pubescence, with rounded apex and concave sides. Elytra finely punctured, finely striated ,interstriae with brown dots. The first, fifth and eighth interstriae more elevated, seventh stria sunken, lateral border carinated and anteriorly sinuated. Apex of elytra with very short yellow pubescence. Pygidium exposed, rounded at apex and directed downward.

Ventral side black with short yellow hair. Fore tibia quadridentated externally. Sexual dimorphism very clear in anterior leg, which is longer and has no tarsus in male(Fig.2J), apex bifid, also the four dents on tibia far from each other, while in female(Fig.2K) the dents more close. Fore tibia of male with a dent on posterior surface between the second and third outer dents. Anterior femur globules with a tuft of yellow erected hairs on the inner side near coxa in both sexes, with a sharp spine on its anterior side in male (Fig.2J). Middle coxa longitudinal and widely separated, middle tibia with two apical spurs, while hind tibia with one spur. Mesosternum large, granulated with an elevated carina on the anterior quarter, ended at a diamond shaped glabrous area in the middle of a transverse suture. Abdomen with six visible convex sternites.

Zavattari (1934) recorded this species in his list, Baraud(1985) mentioned that this species is existed in Algeria, Tunisia, Morocco, Egypt and Libya.

#### **2 -2 *Bubas bubaloides* Janssens (Fig. 1D)**

Body compact and convex, length about 17 mm., Colour black ventral side covered with golden hair. Clypeus semicircular in male and ogival in female (Fig. 2L &M),coarsely punctured, with frontal carina very salient with two backwards directed diverged horns at its exrtemety in male. In female the frontal carina simple with one median tubercle behind frontal carina .Another incompleta carina on clypeus of both sexes . Antenna nine segmented(Fig. 2N), the three club segments rounded, and pointed at tips . Eyes rounded and divided into upper small part and lower big part. Labial palp with three segments , covered with golden erected long hair,apical segment very short, maxillary palp with four segments and smooth.

Pronotum large, wide with rounded sides, excavated anteriorly, the upper rim of excavation extended to from an anterior notched horizontal horn.This horn replaced in female by a salient and sinuate line. Basal sides of pronotum constricted laterally. Pronotum with two lateral pits and two median basal triangular foveoles in front of elytral suture, they extend anteriorly to from a slightly concave line. Scutellum indistinct Elytra dull black, slightly longer than pronotum, with eight striae and lateral carina. Pygidium short and directed downwards .Mesosternum very large with a deep longitudinal incomplete suture.Metasternum narrow. Prosternum form a conical obtuse tubercle. Anterior coxae conical and protuberant. Intermediate coxae longitudinal, strongly separated. Foreleg (Fig. 2O)lack tarsi in both sexes, protibia quadridentate ,with inner terminal spur in female,this spur replaced in male with a sharp tooth so the tibia appears biforcate . Internal side of profemora with tementose basal patch of golden erected hairs. Meso and metatibiae dilated apically with two apical spurs, and one apical spur, respectively.

Zavattari (1934) recorded this species in his list. Baraud(1985)mentioned that the genus *Bubas* is a small one,with only two species in North Africa.The species *bubaloides* was recorded in Libya in Garian,Tripoli and Tagiura districts.

**2-3-*Copris hispanus*( Linnaeus) (Fig. 1E)**

Body convex, about 28 mm. in length, colour shiny black. Clypeus semicircular,incised anteriorly fringed with short yellow hair, completely covering the mouth parts.Gena extends laterally in front of eye .Eye divide into two unequal parts. Front of male armed with a long backward curved horn while in female head with small tubercle (Fig. 3A &B). Antenna with nine segments, the three segments of club spherical (Fig. 3C) . Second segment of labial palp much shorter than the first segments, third always distinct .Pronotum large, punctured, anterior margin wavy, with large excavation in male, its anterior rim retuse, pronotum of female simple and convex. Scutellum indistinct. Elytra convex, provided with lateral carina and nine striae including that which border the carina.

Pygidium small and triangular directed downward. .Anterior coxae conical and prominent. The median pairs far from each other,longitudinal and sub parallel. Anterior legs provided with slender tarsi in both sexes .Anterior tibia tridentated (Fig. 3D) Middle and posterior tibiae short, strongly enlarged at tip, the posterior one with a cornea before apex and an apical small spine on the outer margin. The median and posterior tarsi with sub triangular segments, decreasing in size toward apex. Mesosternum large, with incomplete longitudinal suture. Abdomen very short, six segmented. The sexual dimorphism often very clear, the males with long horn on head and excavation on pronotum.

This species was recorded in Libya by Zavattari(1934).Baraud(1985) mentioned also that it is widely distributed in Algeria, Tunisia, Morocco, Egypt and Libya.

**2- 4. *Euonthophagus bedeli* (Reitter)(Fig.1F)**

Body 10mm.in length, black mat in colour .Head (Fig.3E) roughly punctured, vertex smooth. Female with two simple carina one on vertex and the other on front, while male has only vertical carina. Clypeus rounded, elevated anteriorly, slightly emarginated at middle. Antenna 9 segmented with club of 3 segments not compact (Fig. 3F). Apical segment of labial palp very small ,labrum and mandibles concealed under clypeus.

Pronotum large rounded on sides and constricted downward, roughly punctuated except a smooth fine middle line extends on the anterior half and small lateral protubescence on each side,with shallow basal impression. Lateral borders fringed with black hairs. Scutellum invisible. Elytra short, rounded posteriorly, with 8 obvious striae including the lateral



one. Anterior tibia with four teeth followed by three very fine ones ((Fig. 3G). Anterior tarsi present in both sexes. Middle legs far from each other, with elongate parallel coxa. Middle and hind tibiae apically extended and truncated, provided with apical spines. Middle tibia with two unequal spurs, outer one longer than first segment of tarsus. Metatibia with only one long spur. Tarsal segments elongate. Mesosternum long with fine longitudinal suture and basal depression. Metasternum very short. Pygidium exposed and convex.

Zavattari(1934) recorded this species under the genus *Onthophagus*, while Baraud(1985) classified it under a separate genus, i.e. *Euonthophagus*. He mentioned that the genus *Euonthophagus* has four species in North Africa. The species *bedeli* was recorded from Morocco, Tunisia, Egypt and Libya ( in Tripoli, Porto Bardia and Nahut).

### 3-Family: Aphodiidae

#### Diagnosis:

Hind legs situated nearer to tip of abdomen than to middle legs. Labrum and mandibles neither protruding nor visible from above, hidden under the margin of clypeus. Antennae nine segmented, culb pubescent. Median coxae ordinary approaching each other. Scutellum always distinct. Pygidium entirely or slightly covered by elytra.

#### Genus *Aphodius*

This genus is worldwide distributed, it is a small to moderate sized beetles.. They are elongate oval in shape and seldom show sexual dimorphism. The diagnostic characters of *Aphodius* are: Pronotum smooth without carina or impressions. Protibia tridentated (Fig. 3H), usually with an apical spur in male. Meso and Metatibiae with two transverse spiny carinas on outer surface and apex fringed with equal or unequal spines. Segments of meso and metatarsi elongated, never triangular. Elytra with ten striae, interstriae flattened, without tubercles. Pygidium entirely or slightly covered by elytra.

This genus contains many subgenera and species. In the present study, there are three collected species belonging to three different subgenera. They are identical in having small scutellum, posterior angles of pronotum rounded, clypeus not vertical, stieriation of elytra particularly seventh and eighth join together before the apex of elytra (Fig. 3J).

#### Key to the subgenera and species under study of genus *Aphodius*

1-Anterior margin of pronotum straight, not emarginated, except for the anterior angles; head roughly punctuated; frontal suture elevated laterally, with median tubercle.....(*Calamosternus*) *moltonii*

-Anterior margin of pronotum emarginated; head with fine punctuation; frontal suture either indistinct or tuberculated.....2

2(1)-Head smooth without carina or tubercle; body reddish-brown, unicolour, without patches.....(*Anomius*) *antii*

-Head trituberculated; body brownish-yellow with large dark patch on disc of pronotum and small one on each side.....(*Alocoderus*) *hydrochaeris*

### 3-1-*Aphodius* (*Calamosternus*) *moltonii* Schatzmayer(Fig. 1G)

Body about 6mm in length,convex,shiny,yellowish-brown in colour, disc of pronotum and head darker. Anterior margin of clypeus with shallow emargintion (Fig.3K).Head with rough punctuation. Frontal suture with median tubercle and elevated laterally. Gena protrude in front of eyes.

Anterior margin of pronotum straight, not emarginated, with extended anterior angles and rounded posterior ones, posterior margin slightly emarginated with rough punctuation. Scutellum pentagonal, narrow, not transverse. Steriation on elytra quite strong. Apical hairs on median and posterior tibiae short and equal in length. Basal segment of metatarsus as long as outer apical spure.

This species was not recorded in the list of Zavattari (1934). Baraud, (1985) mentioned that this species was recorded in Libya at Wadi Marasin and Tripoli.

### 3-2-*Aphodius*(*Anomius*)*antii* Gridelli(Fig. 1H)

Body smooth about 7mm.in length, reddish-brown in colour. Clypeus anteriorly emarginated, sides rounded, border elevated. Gena protruding laterally before eyes, fringed with yellow hairs. Head smooth without transverse carina or tubercle (Fig.3L). Head with fine punctuation.

Pronotum concave anteriorly with rounded anterior and posterior angles ,it's punctuation fine and sparse.Scutellum small, narrow triangular.Elytral striation fine,intersteria flat .Anterior tibia of male normally enlarged apically,outer side with small dents below the three big dents(Fig.3M).One of mesotibial spurs of male twice as long as the other one.Median and posterior tibiae with unequal apical hairs and with two transverse ridges on outer surface (Fig.3N).Outer spur of metatibia as long as basitarsus and the three following tarsal segments combined. Pygidium covered with elytra.

Zavattari(1934) recorded this species in his list.Baraud,(1985)mentioned that this species recorded in Libya in Oasis Giarabub on the Egyptian borders.

### 3-3-*Aphodius* (*Alocoderus*) *hydrochaeris* (Fabricius) (Fig. 1I)

Body oblong, convex, about 9 mm.in length, yellowish brown in colour. Pronotum with dark brown middle patch and two lateral spots.Head darker than body, clypeus emarginated anteriorly (Fig.3O), lateral sides of

emargination rounded, slightly elevated; gena rounded laterally; margin fringed with yellow hairs; frontoclypeal suture trituberculated, lateral tubercles small, median tubercle corn-shaped, medially emarginated in male while in female this suture slightly elevated, median and lateral tubercles of the same size. Antennal club spherical (Fig.3P).

Pronotum convex with rounded posterior angles, punctuation fine and mixed with sparse more thick ones. Scutellum small, triangular. Elytra nearly two-thirds of the body length, regularly striated with ten striae, small fine hairs present at base and laterally. Protibia tridentate with very small dents at base, apical spur present, meso and metatibiae with two unequal apical spurs, apical margin with crown-shaped short equal spines (Fig. 3I). Zavattari (1934) recorded this species in his list. This species is common in Egypt, Tunisia, Algeria and Libya (Baraud 1985).

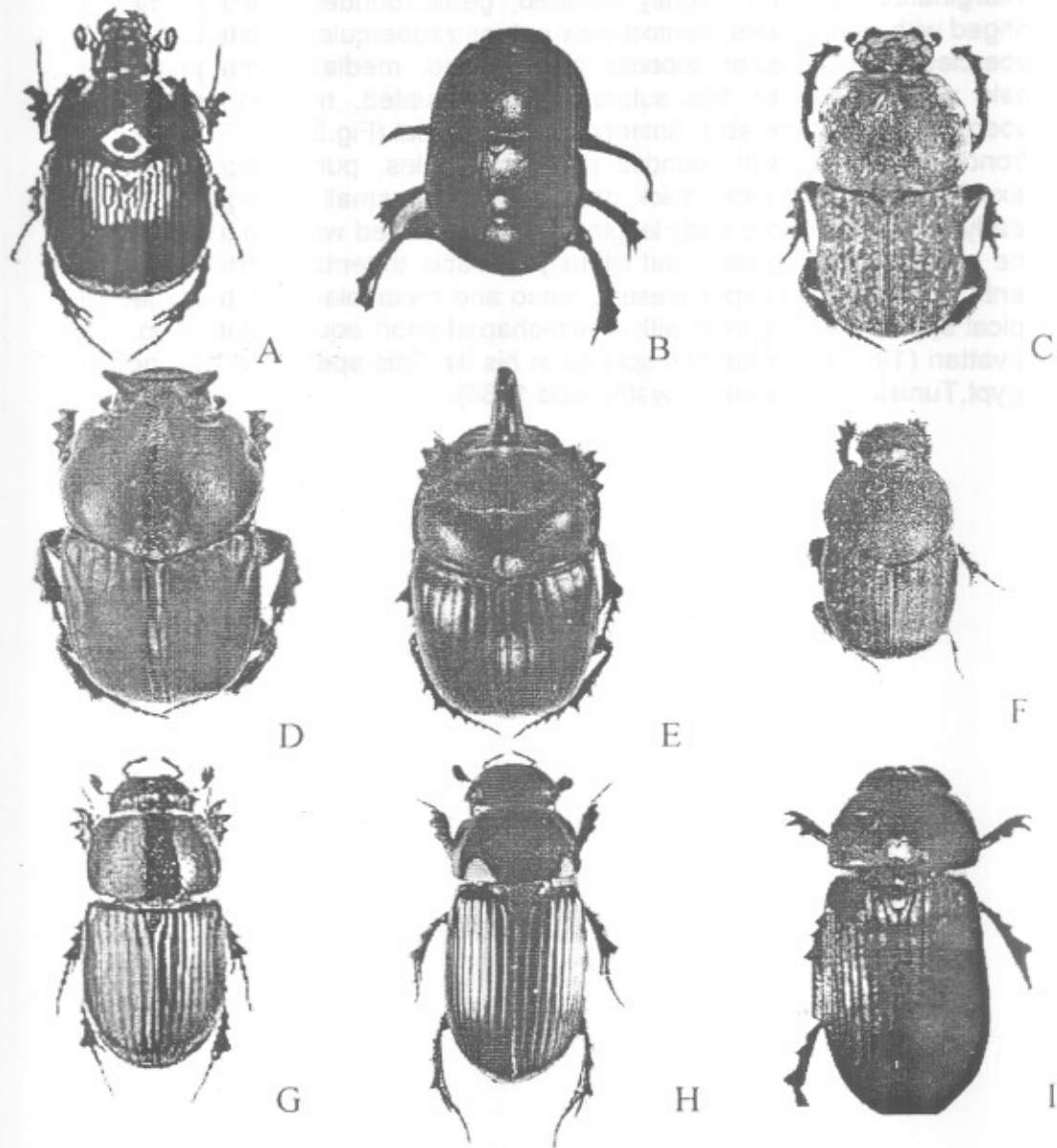
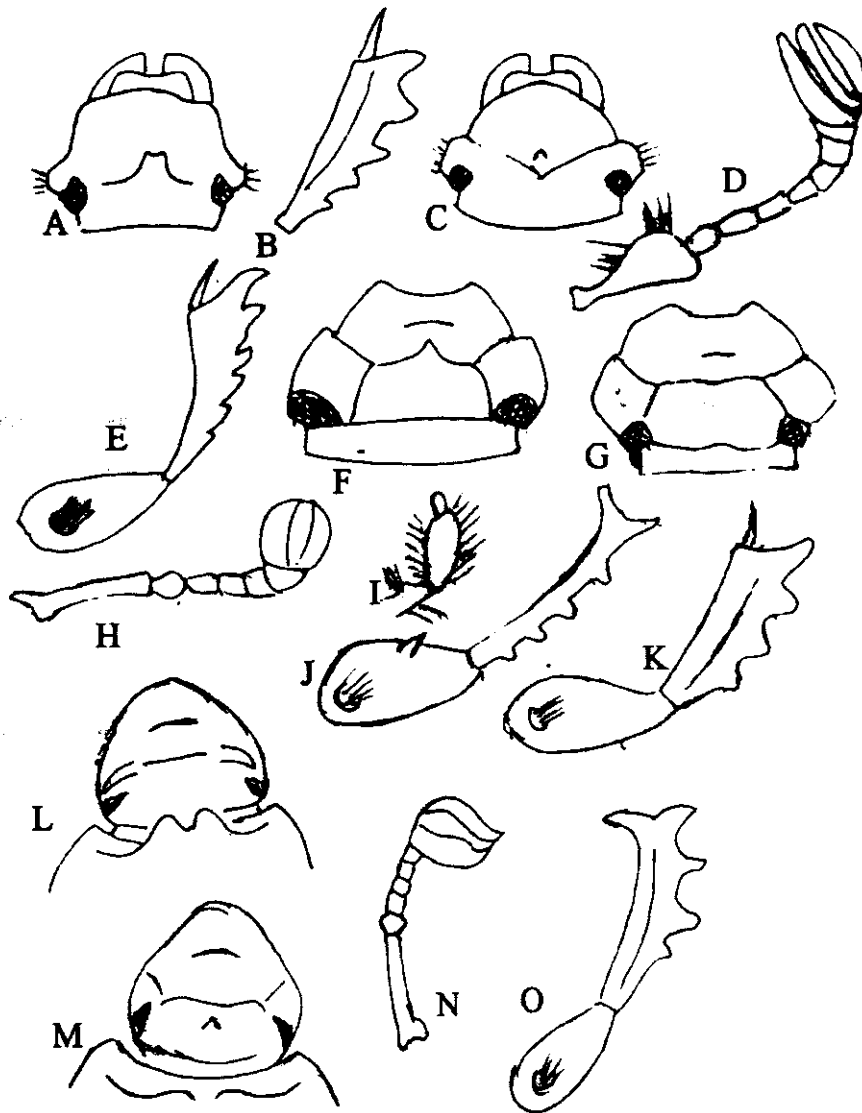


Figure (1)

- A- *Bolbelasmus buccus* (13 mm.)      B- *Thorectes brullei* (15mm.)  
 C- *Cheironetis irroratus* male (15 mm.)      D- *Bubas bubalooides* (17mm.)  
 E- *Copris hispanus* (28 mm.)      F- *Euonthophagus bedeli* (10mm.)  
 G- *Aphodius (Calamosternus) moltonii* (6mm.)  
 H- *Aphodius (Anomius) antii* (7 mm.)  
 I- *Aphodius (Alocoderus) hydrochaeris* (9mm.).



**Figure (2):**

- |                               |                                |                       |               |
|-------------------------------|--------------------------------|-----------------------|---------------|
| <i>Balbolasmus bocchus:</i>   | A- Head of male                | B- Fore tibia.        |               |
| <i>Thorectes brullei:</i>     | C- head                        | D- Antenna            | E- Fore tibia |
| <i>Cheironetis irroratus:</i> | F- Head of female              | G- Head of male       | H- Antenna    |
|                               | I- Labial palp                 | J- Fore leg of male   |               |
|                               |                                | K- Fore leg of female |               |
| <i>Bubas bubaloides</i>       | L- Head and pronotum of male   |                       |               |
|                               | M- Head and pronotum of female |                       | N- Antenna    |
|                               | O- Fore leg of male            |                       |               |

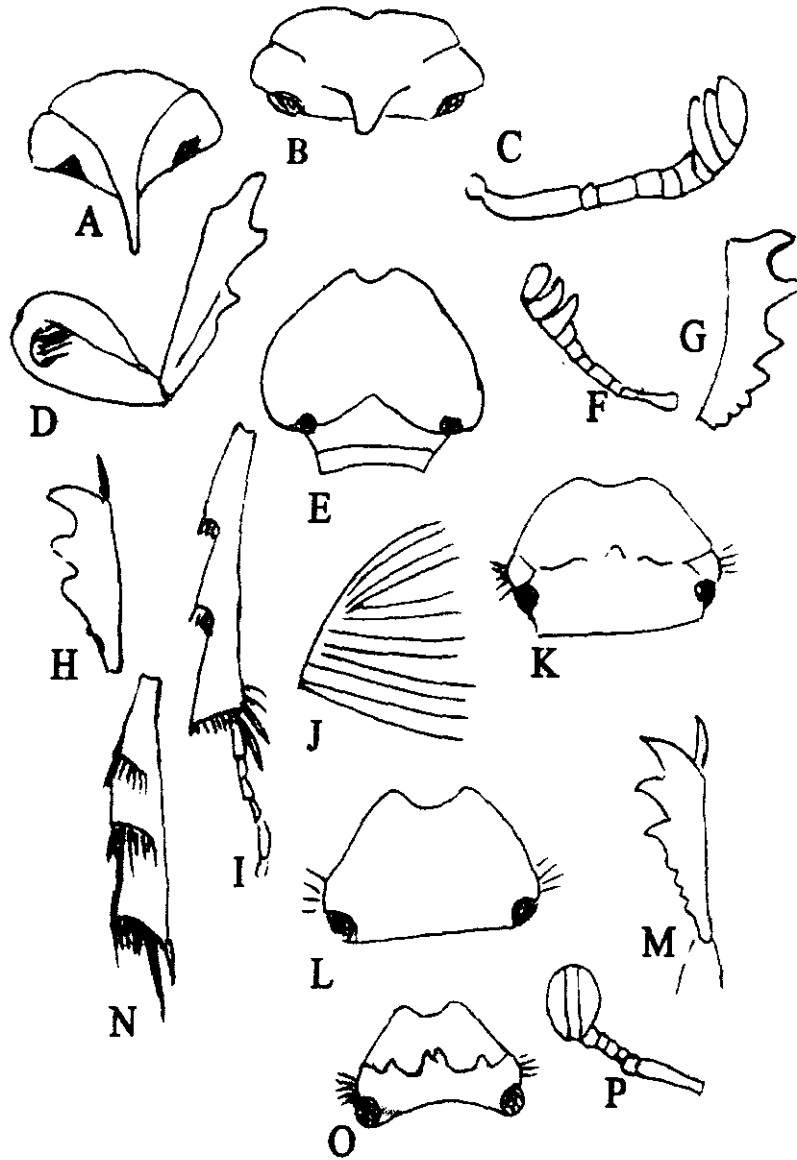


Figure (3):

*Copris hispanus*:

A- Head of male B- Head of female

C- Antenna

D- Fore leg

*Euonthophagus bedeli*:

E- Head

F- Antenna

G- Fore tibia

*Aphodius* spp:

H- Fore tibia

J- Stercuration of elytra

*Aphodius (Calamosternus) moltonii*:

K- Head

*Aphodius (Anomius) antii*:

L- Head

M- Fore tibia

N- Hind tibia

*Aphodius (Alocoderus) hydrochaeris*:

I- Hind leg

O- Head

P- Antenna

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## الملخص العربي

دراسات تقسيمية لحشرات من فوق فصيلة Scarabaeoidea بمنطقة الجبل

الاخضر بليبيا

I -I متغذيات الروث من فصائل

(Aphodiidae و Scarabaeidae و Geotrupidae)

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تم حصر بعض انواع الجعال التي تتغذى على الروث في منطقة الجبل الاخضر بليبيا خلال الفترة من يوليو 2007 الى اكتوبر 2009. وقد صنفت هذه الحشرات موضع الدراسة. اتضح انها تتبع ثلاث فصائل هي Geotrupidae و Scarabaeidae و Aphodiidae ويتبع فصيلة Geotrupidae جنسان كل منهما يتبعه نوع واحد اما فصيلة Scarabaeidae يتبعها اربعة اجناس كل منهم يتبعه نوع واحد وفصيلة Aphodiidae يتبعها ثلاثة تحت اجناس كل منهم يتبعه نوع واحد وقد اعدت مفاتيح تقسيمية للتمييز بين الفصائل والاجناس والانواع وكذلك وصف كامل للانواع موضع الدراسة موضحا ذلك بالرسومات والصور.