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A taxonomic review of the aquatic beetles (Hydraenidae: Coleoptera) from Egypt, with two new records

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ABSTRACT

The family Hydraenidae from Egypt is revised. As a result, 17 species belonging to the three genera: *Hydraena* Kugelann, 1794; *Limnebius* Leach, 1815 and *Ochthebius* Leach, 1815 and the two subfamilies: Ochthebinae and Hydraeninae are now recognized, including two new records, *Hydraena arabica* Balfour-Browne, 1951 and *Ochthebius micans* Balfour-Browne, 1951. Taxonomic keys are provided for the identification of the subfamilies, genera and species. In addition, a diagnosis, list of material examined, and both local and world distribution of each species are provided. Also, a map of species' distributions in Egypt, photographs of the habitus and genitalia of some species are included.

INTRODUCTION

The Hydraenidae (minute moss beetles) is a cosmopolitan family of aquatic beetles belonging to the suborder Polyphaga, infraorder Staphyliniformia, and superfamily Staphylinoidea **(Hansen, 1987)**. It is one of the oldest extant water beetle families **(Ponomarenko and Prokin, 2015)**. The Hydraenidae includes about 1600 species worldwide assigned to 42 genera of which about 800 species are recorded in the Palearctic region **(Jäch 2004)**. According to **Jäch and Balke (2008)** and **Epler (2010)**, about 1000 hydraenid species in 22 genera still remain to be described.

Members of the minute moss beetles are recognized by the following characters: Body length 0.8-3.4 mm; antennae consisting of 9 segments with a slightly prominent club; and maxillary palps longer or subequal in length to antennae.

The Hydraenidae have a variety of aquatic habitats. They are linked to both lentic and lotic waters, saline water, or even the frozen conditions of the Antarctic islands **(Jäch, 1998; Villastrigo, *et al*. 2018)**. Hydraenid larvae are usually riparian; some of them are adapted to a terrestrial lifestyle during the first larvae instar, but *Hydraena* are exceptional: while adults are aquatic, all larval instars are terrestrial **(Zwick, 1977)**.

Hydraenid adults and larvae live inside accumulations of algae or moist, dead leaves and twigs. The larvae feed on Protozoa, algae, parasites, bacteria, snails, worms and the larvae of other aquatic species, while adults feed exclusively on decomposed plant debris. Cannibalism may occur among larvae kept in captivity **(Hansen, 1987; Epler, 2010)**.

According to **Alfieri (1976)**, the Hydraenidae are represented in Egypt by only 11 species, but recently **Salah *et al.* (2014)** provided a checklist of the aquatic Polyphaga and stated that the family Hydraenidae includes 15 valid species in three genera, belonging to two subfamilies: Hydraeninae and Ochthebiinae.

In fact, no comprehensive work on the taxonomy of the Hydraenidae in Egypt has been published and this highlights the need to revise, update and clarify the taxonomic status of all the Egyptian taxa. Accordingly, the present paper revises the family Hydraenidae in Egypt and gives keys to identify the recognized taxa.

MATERIALS AND METHODS

The present study is based on specimens collected from different aquatic habitats during many field trips in 9 Egyptian governorates from December 2018 to March 2020 (Fig. 1) as well as on those preserved in the following Egyptian reference collections: Ain Shams University, Faculty of Science, Entomology Department Collection (ASUC); Cairo University, Faculty of Science, Entomology Department Collection (CUC); the Ministry of Agriculture, Plant Protection Institute, Section of Identification Collection (MAC); Alfieri collection in Al Azhar University, Faculty of Agriculture, Zoology Department (ALFC).

Samples were collected mainly by small aquatic nets and a small pore-sized strainer. A container was used to collect water from a stream which was then shaken or stirred to enable hydraenids to float up to the surface where they were then caught by a water dropper or paintbrush and dropped into a Falcon Tube. There is another efficient method of collecting a large number of small beetles and saving much time: using the aquatic net to collect all the debris where the beetles may be living and then placing this material in a plastic bag to examine later. The collected debris must be examined the same day to ensure that the beetles are alive. The collected specimens were killed with absolute or 96 % ethanol and then kept in the freezer. They were then examined under a trinocular microscope and identified according to the following literature: **Tonapi and Ozarkar (1969)**; **Jäch (1984, 1990, 1991, 1992c, 1993, 1998)**; **Delgado and Jäch (2007)**; **Jäch and Delgado (2008, 2017)**; **Ertorun and Tanatmış (2010)**; **Nilsson (2014)**. Nomenclature of the various taxa was updated according to **Jäch (2004) and Hansen (1998)**.

Figure 1. A map of Egypt showing the localities of hydraenid taxa.

The photographs were captured by Optika Camera Vision Lite 2.1. and further image processing was done using software Adobe Photoshop CS3.

The type-specimens of Egyptian species are located in the following museums:

AUB: American University, Beirut, Lebanon
BMNH: Beijing Museum of Natural History, China
DEI: Deutsches Entomologisches Institut, Müncheberg, Germany
HUB: Museum des Alexander Humboldt Universitäts, Berlin, Germany
ISNB: Institut National des Sciences Naturelles, Brussels, Belgium
MHNL: Muséum d'Histoire Naturelle, Lyon, France
MHNP: Muséum d'Histoire Naturelle, Paris, France
MZB: Museum de Zoologia, Barcelona, Spain
NHML: Natural History Museum, London, England
NHNL: National Herbarium of the Netherlands
NMW: Naturhistorisches Museum, Vienna, Austria
ZMUK: Zoological Museum of the University, Kiel, Germany

RESULTS

Key to the subfamilies and genera of the Hydraenidae

1 Pronotum with a median sulcus (Fig. 2H)..……Subfamily Ochthebinae (*Ochthebius*)
- Pronotum without a median sulcus (Fig.2M)……..……2.(Subfamily Hydraeninae)
2 Pronotum sides quite parallel, pronotum with deep punctures (Fig.3A)……..*Hydraena*

- Pronotum sides not parallel, pronotum without punctures (Fig.3B)……..…...*Limnebius*

Hydraenidae Mulsant, 1844

1. **Subfamily Hydraeninae**

1.1. Genus *Hydraena* Kugelann, 1794

Type species. *Hydraena riparia* Kugelann, 1794

Diagnosis: Head with no foveae, ocelli absent, labrum with a prominent emargination, maxillary palps much longer than antennae, antennae with 9 segments with a 5-segmented pubescent club. Pronotum and elytra with deep punctures. Legs long, slender.

Note: This genus is represented in Egypt by only one species.

1.1.1. *Hydraena (Hydraenopsis) arabica* Balfour-Browne, 1951

(Figs 2.a &3.a)

***Hydraena arabica* Balfour-Browne, 1951: 201**

Type Locality. Yemen ["Western Aden Protectorate"], River Tiban NW of Jebel Jihaf, NMW.

Diagnosis: Length: 1.6: 1.9 mm. Head black with prominent emarginated labrum, maxillary palps very long, with deeply impressed scattered punctures. Pronotum sides with undulating margins, pronotum edges yellow or pale yellow, pronotum centre dark. Elytra brown with 13-15 deeply punctured striations. Legs yellow to brown.

Sexual dimorphism: The female is larger than the male, and the labral emargination is deeper in females.

Distribution: Afrotropical and Palaearctic regions: Egypt, Oman, Saudi Arabia, Yemen.

Specimens examined: Aswan, Kom Ombo, Fateera, 24.X.2019 (1♂, 1♀) (ASUC). Cairo, El-Maadi, 10.VII.1933 (1♂, 1♀) (MAC); Cairo, El-Kobba Palace, 20.X.1959 (1♂, 2♀) (ALFC).

Remarks. This species is recorded from Egypt for the first time.

1.2. Genus *Limnebius* Leach, 1815

Type species. *Hydrophilus picinus* Marsham, 1802

Diagnosis: Body oval, head triangular with emarginated labrum, antennae and maxillary palps yellow to brown, maxillary palps slender, longer than antennae, head without foveae, ocelli absent; head and pronotum attached together, pronotum wider than long, without depressions. Elytra wide in the middle, posteriorly narrow. Legs long, slender.

Note: This genus is represented in Egypt by only one species.

1.2.1. *Limnebius sanctimontis* Jäch, 1993

(Figs 2.m &3.b)

***Limnebius sanctimontis* Jäch, 1993: 150**

Type Locality. Mount Moses (Djebel Musa), southern Sinai (Egypt), NMW.

Diagnosis: Length: 1.2: 1.4 mm. Body black or brown, oval. Head, pronotum, and abdomen hardly attached together. Head with a slightly emarginated labrum, long maxillary palps, fronto-clypeal suture slightly impressed, head without any foveae. Pronotum smooth, gently rounded, with no obvious punctures, pronotum and elytra with margins pale in colour. Elytra widened anteriorly to the middle, strongly narrowed posteriorly.

Distribution: Palaearctic region: Egypt (an Egyptian endemic species).

Specimens examined: Giza, Mansouriah, 4.VI.1933 (3♂, 2♀) (ALFC).

2. Subfamily Ochthebiinae Thomson, 1859

This subfamily is represented in Egypt by only one genus which includes 15 species.

2.1. Genus *Ochthebius* Leach, 1815: 95

Type species: *Helophorus marinus* Paykull, 1798

Diagnosis: Body oval, moderately convex, colour variable, the females of most species slightly larger than males. Head usually with 2 or 3 foveae, ocelli present, maxillary palps and antennae yellow to brown, slender, subequal to antennae. Pronotum with lateral membranes and with depressions. Abdomen with 6-7 visible sternites. Legs yellow to brown and slender.

Key to Species of Genus *Ochthebius*

1 Pronotum with median sulcus clearly obvious …….....2

- Pronotum with median sulcus confluent with the pronotum foveae ….....8

2 Pronotum with long spines; labral emargination deep or medium……..3

- Pronotum with short or no spines; labral emargination very small or absent…….4

3 Body length 2 mm; distal lobe swollen with a pointed, elongated end (Figs 2K, 3J & 3K)…..……..*Ochthebius salinator*

- Body length 1.5: 1.75 mm; distal lobe distinctly wide, evenly curved interiorly (Figs 2L, 3L).....……..…...……..……*Ochthebius thermalis*

4 Body shining black; elytra with short loose hairs; distal lobe apically widened, parameres originating near the phallobase (Figs 2I, 3E) ……..*Ochthebius micans*

- Body dull; elytral punctures and striae irregular, hairs long and dense ……....5

5 Body yellow to dark brown…….…….……..…..6

- Body black……...……....7

6 Elytra with rather long, rather thick, irregular, slightly dense hairs (Fig. 3G) …….. …….....***Ochthebius punctatus***

- Elytra with long, thick, dense, quite regular hairs (Fig. 3F) ……....*Ochthebuis pilosus*

7 Body with dense hairs; pronotum with lateral teeth not pointed; elytra with irregular punctures; parameres not distinctly separated from the main piece (Fig. 3.H) ….…….……..*Ochthebius quadrifoveolatus*

- Body with loose hairs; pronotum with pointed lateral teeth; elytra with quite regular punctures; parameres distinctly separated from the main piece (Fig.3I) ……..…….……..….*Ochthebius ragusae*

8 Head with 2 prominent foveae, elytra with faint edge……*Ochthebius viridescens*

- Head with 3 foveae, elytral edge not faint…….....9

9 Elytra with (2, 3, 5, 7) dark spots; terminal lobe cylindrical and evenly stretched (Figs 2H, 3D)…….……..……O*chthebius meridionalis*

- Elytra without spots; terminal lobe cone-like, i.e. cylindrical and evenly rounded (Fig. 2G, 3C)…… ……..…...…….*Ochthebius lividipennis*

2.1.1. *Ochthebius (Asiobates) abeillei* Guillebeau, 1896

(After Delgado & Jäch 2007)

Ochthebius abeillei Guillebeau 1896: 241.

Ochthebius maculatus Reiche, 1869: 27

Ochthebius maculatus var. infuscatus Sahlberg 1913: 56

Type Locality. Syria, MHNL

Diagnosis: Length: 1.8:2.2 mm. Head black with deep foveae, maxillary palps long. Pronotum brown or dark brown with distinct longitudinal median sulcus and foveae, and pronotum tooth. Elytra brown with regular punctures, and four pairs of dark spots

Aedeagus: Main piece distinctly enlarged near the insertion of parameres, parameres moderately wide and strong, apices widened. Distal lobe spatuliform, slightly longer than wide.

Distribution: Palearctic region: Egypt, Tunisia.

2.1.2. *Ochthebius (Asiobates) minervius semechonitis* Jäch, 1998

(After Jäch 1998)

Type Locality. Israel, NMW

Diagnosis: Body black with moderately wide brownish margins; Mandibular denticles large. Anterior margin of male labrum slightly emarginated; female labrum with prominent emargination; First three protarsal segments of male widened and densely covered with adhesive hairs on the underside.

Aedeagus: Main piece moderately large. Ventral margin of distal lobe not distinctly convex basally; apex moderately long, not strongly curved.

Distribution: Palearctic region: Egypt, Israel.

2.1.3. *Ochthebius (Ochthebius) corrugatus* Rosenhauer, 1856

(After Rosenhauer, 1856; Jäch 1992a)

Ochthebius corrugatus Rosenhauer, 1856: 53.

Type Locality. Sanlúcar, Andalucia (Spain).

Diagnosis: Head large, stretched, labrum not emarginated. pronotum heart shape with prominent curved spines, large deep foveae. Elytra covered with deep punctures, transparent membrane absent, legs delicate, yellow.
Distribution: Palearctic region: Egypt, Italy, Portugal, Spain, Tunisia.

2.1.4. *Ochthebius (Ochthebius) lividipennis* Peyron, 1858

(Figs 2B, 2G & 3C)

***Ochthebius lividipennis* Peyron, 1858: 405**

Ochhebius rugulosus Sahlberg, 1900: 197
Ochthebius sahlbergi Zaitzev, 1903: 344
Ochthebius niloticus Sharp, 1904: 9
Ochthebius guerryi Schatzmayr, 1908: 43
Type Locality. Tarsus (southern Turkey), AUB.
Diagnosis: Length: 1.4: 2 mm. Head black with three foveae, antennae and maxillary palps pale brown. Pronotum dark brown to black with a small membrane extending along both sides, mixed metallic coloured reflections, pronotum with median sulcus confluent with pronotum foveae. Elytra reddish-brown to dark brown, with 10 moderately or very deeply punctured striations. Legs pale brown.
Sexual dimorphism: The male is easily recognized by the presence of mandibular bristles.
Aedeagus: The main piece long, slender and not distally curved, with a prominent convexity. Terminal lobe cone-like, i.e. cylindrical and evenly rounded.
Distribution: Palaearctic region: Austria, Azerbaijan, Bulgaria, Croatia, Egypt, Greece, Hungary, Italy, Poland, Romania, Slovakia, Turkey, former Yugoslavia.
Specimens examined: Cairo, Tura, III-XII.1914 (5 specimens); Helwan, I-VI.1933 (1♂, 1♀); El- Maadi, 14.II.1913 (2♀); El- Maadi, 10.IX.1933 (1♂); Dakahlia, Mansourah, 7.V.1933; Barrage, 10.VIII.1933 (2 specimens); Giza, 14.XI.1916 (1 specimen), 18.XI.1924 (1 specimen), 12.II.1925 (1 specimen); Bahariya Oasis, 20.III.1925 (4 specimens); Ismailia, El- Kassasin, 9.X.1916 (4 specimens) (MAC); Alexandria, Abu Qir, 10.III.1922 (1♀); Abis, 4.VI.2019 (2♂, 4♀); Giza, Abu Rawash, 7.1953/I.1954 (10♂, 10♀); Saft Al Laban, 22.VII.2019 (1♀); Gharbia, Kafr El Zayat, 1.III.2012 (2♂, 2♀); Qalyubia,Tanan, 31.XII.2018/X.IX.2019 (14♂, 12♀); Balaqes, 3.VI.2019 (1♀); Mars Matruh, 1995 (1♂); Monofiya, Shatanof, III.VII.2019 (1♂, 1♀); Faiyum, Qaroun Lake, 1.IV.2019 (1♂, 2♀); Wadi El Rayan, 3.III.2020, (4♂, 3♀); Aswan, Kom Ombo, Fateera, 24.X.2019 (10♂, 10♀) (ASUC).

2.1.5. *Ochthebius (Ochthebius) meridionalis* Rey, 1885

(Figs 2C, 2D, 2E, 2F, 2H & 3D)

***Ochthebius meridionalis* Rey, 1885: 21**

Ochthebius pallidus Dejean, 1821: 50

Ochthebius margipallens Sturm, 1836: 61
Hydraena pallidipennis Castelnau, 1840: 42
Ochthebius marinus var. meridionalis Mulsant, 1844: 60 (ascribed to Dejean) (unavailable name, published in synonymy)
Ochthebius crimeae Kuwert, 1887: 385
Ochthebius deletus Kuwert, 1887: 386
Ochthebius marinus pallidipennis Ganglbauer, 1904: 193
Type Locality. Corfu (Greece), HUB.
Diagnosis: Length: 1.8: 2 mm. Head black with three foveae, antennae and maxillary palps pale brown. Pronotum dark brown to black with a small membrane extending along both sides, with metallic reflections and superficial obsolete depressions, pronotum with a median sulcus confluent with pronotum foveae. Elytra grey to brown with five black spots (2 anterolateral, 2 basolateral and one in the centre), with 10 moderately deep punctured striae. Legs pale brown.
Sexual dimorphism: The male is easily recognized by the presence of mandibular bristles.
Aedeagus: The main piece long, slender and gently curved distally. Terminal lobe cylindrical and evenly stretched.
Distribution: Afrotropical and Palaearctic regions: Austria, Azerbaijan, Bulgaria, Egypt, France, Greece, Hungary, Iraq, Italy, Morocco, Romania, Saudi Arabia, Spain, Tunisia, Turkey, Turkmenistan, former Yugoslavia.
Specimens examined: Faiyum, Wadi El Rayan, 3.III.2020 (4♂, 3♀); Alexandria, Abis, 21.VI.2019 (4♂, 3♀) (ASUC).
Note: This species is collected from hypersaline stagnant water, like *O. salinator*.

2.1.6. *Ochthebius (Ochthebius) micans* Balfour-Browne, 1951

(Figs. 2I & 3E)
***Ochthebius (Ochthebius) micans* Balfour-Browne, 1951: 198**
Ochthebius subdifficilis Jäch, 1984: 110
Type Locality: "Wadi at foot of Jebel Harir, c. 5000 ft", South Yemen, NHML.
Diagnosis: Length: 1.6:1.9 mm. Antennae and maxillary palps brown. Head with a clear, deep fronto-clypeal suture, with 2 or 3 very prominent foveae. Pronotum with a deep, wide, longitudinal sulcus and 6-8 isolated foveae, 2 at the anterolateral end, 2-4 at the posterolateral end and 2 basolateral foveae, pronotum with an undulating posterior margin, anterior 1/3 of pronotum margin gently rounded or straight, with obvious transparent pronotum membranes. Elytra black with about 10 moderately deep, regular, punctured striae. Legs brown.
Aedeagus: Main piece short, distally curved, the distal lobe apically widened, parameres originating near the phallobase.
Distribution: Afrotropical and Palaearctic regions: Egypt, Jordan, Saudi Arabia, Yemen.

Specimens examined: Sinai, Wadi El Haumur, 1.V.1994 (1♂, 2♀) (ASUC); Sinai Wadi-Tayebah and Wadi Gharandel, 30-31.V.1935 (2♀); Wadi- El Ghedeirat, 13.III.1937 (2♂, 4♀) (MAC); Wadi-Tayeb- Wadi Gharandel, 30-31.V.1935 (2♀); Wadi Feiran, 13.III.1937 (1♀); Wadi- El Ghedeirat, 13.III.1937 (1♂, 3♀) (ALFC).
Remarks. This species is recorded from Egypt for the first time.

2.1.7. *Ochthebius (Ochthebius) pilosus* Waltl, 1835

(Figs. 2N & 3F)

***Ochthebius (Ochthebius) pilosus* Waltl, 1835: 65**

Ochthebius sericeus Dejean, 1833: 132 - nom. nud.

Ochthebius (Bothochius) berbericus Ferro, 1985: 237

Type Locality. Andalusia (Spain), NMW

Diagnosis: Length: 2.3 mm. Body yellow to brown, antennae, maxillary palps brown. Head and pronotum slightly darker than elytra, covered with yellowish hairs, head foveae present. Pronotum with four isolated lateral foveae, and a deep median sulcus, anterior half of pronotum strongly rounded with a small membrane. Elytra brown with deep punctures and hairs. Legs brown.

Distribution: Palaearctic region: Algeria, Britain, Egypt, France, Italy, Morocco, Spain.

Specimens examined: Alexandria, Dekhilah, 8.III.1925 (1 specimen) (ASUC).

2.1.8. *Ochthebius (Ochthebius) punctatus* Stephens, 1829

(Figs 2J & 3G)

***Ochthebius punctatus* Stephens, 1829: 117**

Hymenodes punctatus (Stephens); Motschulsky, 1853: 13

Bothochius punctatus (Stephens); Ienistea, 1968: 772

Eocolpochthebius punctatus (Stephens); Ienistea, 1988: 228 (219)

Ochthebius hybernicus Curtis, 1829: (250)

Ochthebius impressifrons Dejean, 1833: 132 - nom. nud. (syn.: Mulsant, 1844: 73)

Ochthebous (Colpochthebius) villosulus Kuwert, 1887: 379

Type Locality. Bristol or Glamorganshire, Britain, NHML

Diagnosis: Length: 2.3: 2.4 mm. Body yellow to dark brown, antennae and maxillary palps pale brown. Head black with densely distributed whitish hairs masking the head foveae. Pronotum black with a small membrane filling the original gap after abruptly descending down sides of pronotum, leaving a prominent projection in the first third of pronotum, with a long, deep median sulcus, and four isolated foveae; the two anterolateral foveae small, the posterolateral ones slightly elongated. Elytra brown to dark brown with moderately deep punctures, whitish hairs. Legs pale yellow.

Distribution: Palaearctic region: Algeria, Britain, Croatia, Egypt, Ireland, Italy, Netherlands, Portugal, Slovenia, Spain.

Specimens examined: Sinai, Wadi El-Ghedeirat, 24.V.1935, 18.IV.1940 (7 specimens) (MAC); Sinai, Wadi El- Ghedeirat, 24.V.1935, 18.IV.1940 (7 specimens); South Sinai, Mount Catherine, 18.IV.1940 (3 specimens) (ALFC).

2.1.9. *Ochthebius (Ochthebius) quadrifoveolatus* Wollaston, 1854
(Fig. 3H)

***Ochthebius quadrifoveolatus* Wollaston 1854: 91**

Ochthebius detritus Rey, 1884: 269

Type Locality. Madeira (Portugal), NHML

Diagnosis: Length: 2.8 mm. Body black, covered with fine whitish hairs, with a shining, metallic reflection on head and pronotum, labrum slightly emarginate. Elytra with microreticulations and with dense punctures, pronotum with posterolateral foveae and lateral depressions slightly larger. Anterolateral foveae smaller than in *O. ragusae*, pronotum with a transparent membrane. Elytra with deep, dense punctures.

Aedeagus: Main piece usually short, straight and strongly curved in basal third.

Distribution: Afrotropical and Palaearctic regions: Algeria, Britain, Canary Islands, Egypt, Madeira, Morocco, Saudi Arabia, Spain, Tunisia, Turkey.

Specimens examined: Sharqia, 10th of Ramadan, 25.XII.1992 (1♀) (ASUC).

2.1.10. *Ochthebius (Ochthebius) ragusae* Kuwert, 1887
(Fig. 3I)

***Ochthebius ragusae* Kuwert, 1887: 377**

Type Locality. Sicily (Italy), MHNP

Diagnosis: Length: 2.6 mm. Body black, covered with fine whitish hairs, shining, with metallic reflections on head and pronotum, labrum slightly emarginate. Pronotum and elytra with microreticulations, but in *O. quadrifoveolatus* the microreticulation of pronotum and elytra more developed, pronotum with transparent membrane. Elytra punctures deep and dense.

Aedeagus: Main piece usually short, straight and curved in basal third, the parameres quite distinctly separated from the main piece of the aedeagus behind their bases.

Distribution: Palaearctic region: Britain, Canary Islands, Egypt, Madeira, Spain, Turkey.

Specimens examined: Sinai, Nakb Kaoua, Wadi Raba, Wadi Isla, Wadi Kohla, 18.IV.1940 (16 specimens) (ALFC).

2.1.11. *Ochthebius (Ochthebius) salinator* Peyerimhoff, 1924
(Figs 2B, 2D, 2F, 2K , 3J & 3K)

***Ochthebius salinator* Peyerimhoff, 1924: 160**

Type Locality: Tozeur (Tunisia), MHNP

Diagnosis: Head black with yellowish antennae and dark maxillary palps, labrum with 3 large deep foveae and deeply emarginated. Pronotum heart-like, with one deep,

longitudinal median sulcus, and four obsolete, isolated foveae; anterolateral two foveae small, posterolateral ones elongated. Elytra yellowish with 10 deep, punctured striations, with short whitish hairs all over the elytra. Legs yellow with long swimming hairs, especially on mesolegs.

Sexual dimorphism: The female is easily distinguished from the male by its large size and longer pronotum spines.

Aedeagus: Main piece long slender, gently curved near the phallobase but straight near the distal lobe, parameres long with a glabrous end and distal lobe swollen with a pointed and elongated end.

Distribution: Palearctic region: Canary Islands, Egypt, Morocco, Spain, Tunisia.

Specimens examined: Qalyubia, Tanan, 22.II.2019 (4♂, 2♀); Faiyum, Wadi El Rayan, 1.IV.2019 (20♂, 14♀) (ASUC).

Note: This species has been collected from different habitats, including slow-running and freshwater in Tanan but also in stagnant, brackish, and saline water in Wadi El Rayan.

2.1.12. *Ochthebius (Ochthebius) subpictus subpictus* Wollaston,1857

(After Jäch 1992b)

Ochthebius subpictus subpictus Wollaston,1857

Ochthebius latiusculus Sahlberg, 1900: 196

Type Locality. Porto Santo, Madeira (Portugal), MHNP

Diagnosis: Length: 1.6: 2 mm. Head black. Pronotum, wide, dark brown to black with a small membrane extending along both sides, metallic reflection and superficial obsolete depressions, pronotum median sulcus confluents with Pronotum foveae. Elytra yellow to brown with 3 or 5 or 7 black spots Legs pale brown.

Sexual dimorphism: Male is easily recognized by presence of mandibular bristles.

Aedeagus: Main piece Long, slender and gently curved. Distal lobe more or less spatuliform

Distribution: Palearctic region**:** Spain, Canary Islands, Egypt, Morocco, Madeira Archipelago, Tunisia

2.1.13. *Ochthebius (Ochthebius) thermalis* Janssens, 1965

(Figs 2D, 2F, 2L & 3L)

***Ochthebius thermalis* Janssens, 1965: 90**

Type Locality. Aidhipsos, Euboea, Greece, ISNB

Diagnosis: Head black, antennae and maxillary palps yellow, head with 3 rounded foveae and a deeply emarginated labrum. First third of pronotum sides semi-parallel then gently rounded inwards and finally becoming parallel again in the last third of pronotum, with a small marginal projection at each angle, a deep median sulcus, 4 distinct isolated foveae; the 2 anterolateral foveae small, rounded, the posterolateral ones elongated. Elytra silver to dark brown with 10 prominent deeply punctured striae.

Sexual dimorphism: Female with slightly elongated head, labrum with a less deep emargination.

Aedeagus: The main piece gently curved exteriorly, distal lobe distinctly wide, interiorly evenly curved.

Distribution: Afrotropical and Palearctic regions: Egypt, Greece, Lebanon, Saudi Arabia, Tunisia.

Specimens examined: Fayoum, Wadi El Rayan, 1.IV.2019, III.III.2020 (4♂, 3♀) (ASUC); Cairo, Helwan, 5.VII.1933 (2♂) (MAC).

Note: This species is collected from hypersaline stagnant water like *O. salinator, and O. meridionalis*.

2.1.14. *Ochthebius (Ochthebius) viridescens* Ienistea, 1988

Ochthebius obscurus Rey, 1885: 23 (primary junior homonym of *Ochthebius obscurus* Dalla Torre, 1877 and *Ochthebius obscurus* Sharp, 1882)

Ochthebius (Ochthebius) viridescens **Ienistea, 1988: 230**

Ochthebius viridis **"sp. 2" (sensu Jäch 1992b)**

Type Locality. Pyrénées-Orientales (Southern France), NHNL

Diagnosis: Length: 1.7mm. Head black with deep foveae, antennae pale brown, maxillary palps dark brown. Pronotum dark brown with a small membrane extending along both sides, and superficial obsolete depressions; head and pronotum with a faint coloured reflection, median sulcus of pronotum confluent with pronotum foveae. Elytra dark brown with 10 moderately deep punctured striations. Legs pale brown.

Distribution: Palaearctic: Algeria, Egypt, France, Italy, Malta, Morocco, Spain, Tunisia.

Specimens examined: Faiyum, Qaroun Lake, 31.II.1936 (1♀) (MAC).

2.1.15. *Ochthebius (Ochthebius) wewalkai* Jäch, 1984

(After Jäch 1984)

Ochthebius wewalkai Jäch, 1984: 111

Type Locality. Israel, NHMW

Diagnosis:

Length: 1.8-2.1 mm.

Body black, oval. Head, pronotum with metallic reflection, labrum with rounded emargination, head with 3 deep foveae. Pronotum with prominent median sulcus, 4 pronotum foveae, the anterolateral 2 foveae small, the pronotum anterolateral margins with short teeth, pronotum transparent membranes present, the pronotum sides are semi-parallel. Elytra with deep striae.

Aedeagus:

Main piece long and slender, distinctly curved in basal third; distal lobe flat, parameres originate not immediately behind phallobasis.

Distribution:

Palearctic region: Egypt (Sinai. Ayun Musa, l.lV.1989), Israel (Dead Sea Area).

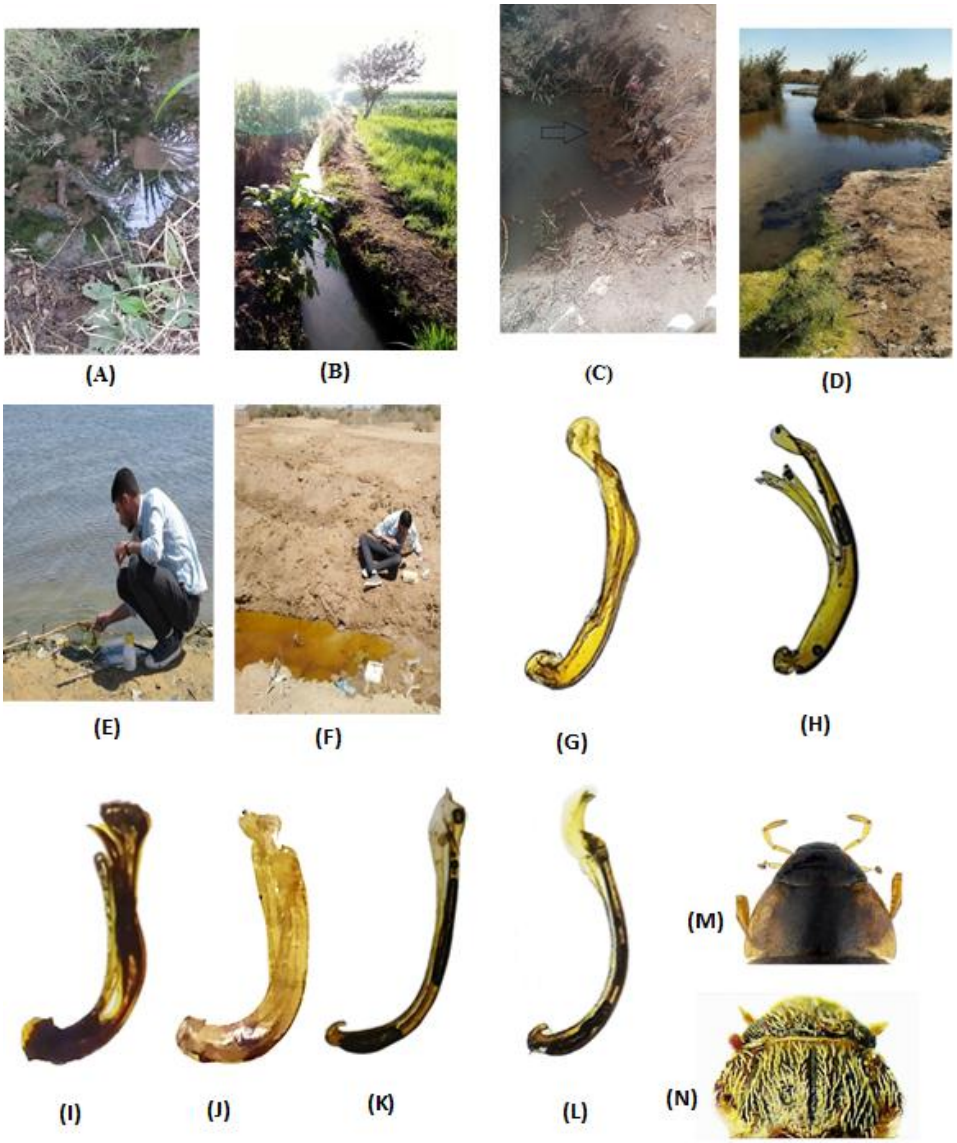

Figure (2): A-C. Fresh Water Habitat of: (A). *Hydraena arabica* (Aswan. Fateera), (B). *Octhebius salinator & O. lividipennis* (Qalyubia. Tanan), (C). *O.meridionalis* (Alexandria. Abis); d-f: Saline Water Habitat, (D). *O. meridionalis, O. thermalis, O. salinator* (Faiyum . Wadi El Rayan), (E). *O. meridionalis* (Faiyum. Qaroun Lake), (F). *O. meridionalis, O. thermalis*, O. salinator (Faiyum. Wadi El Rayan); G-K: Aedeagus of: (G). *O. lividipennis*, (H). *O. meridionalis*, (I). *O. micans*, (J). *Ochthebius punctatus*, (K). *O. salinator*, (L). *O. thermalis*; M-N: Magnified Head and pronotum. (M). *L. sanctimontis*, (N). *O. pilosus*. (Fig. 2M After Cédric, 2015)

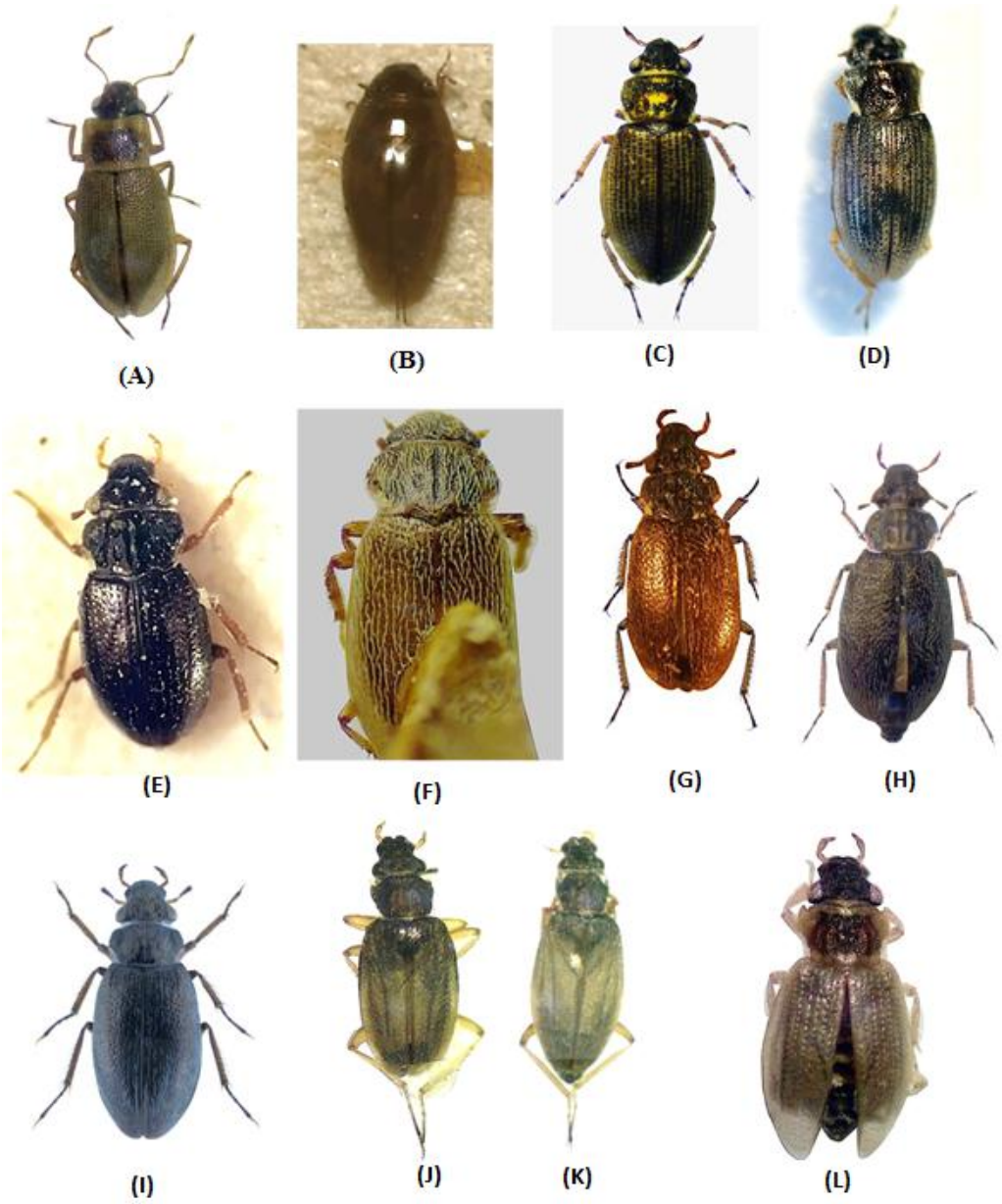

Figure (3): A-L. Habitus, dorsal view of: (A). *H. Arabica*, (B). *Limnebius sanctimontis*, (C). *O. lividipennis*, (D). *O. meridionalis*, (E). *O. micans*, (F). *O. pilosus*, (G). *O. punctatus*, (H). *O. quadrifoveolatus*, (I). *O. ragusae*, (J). *O. salinator* (male), (K). *O. salinator* (female), (L). *O.thermalis*, (fig. 3I after Schmidt, 2018).

DISCUSSION

According to the current work, the Egyptian fauna of the family Hydraenidae comprises 17 species belonging to three genera in two subfamilies, compared with 15 species in the annotated checklist of Egyptian Hydraenidae by **Salah *et al*. (2014)**. Two species, *Hydraena arabica* Balfour-Browne and *Ochthebius micans* Balfour-Browne, are recorded from Egypt for the first time.

The identification and classification within the family Hydraenidae are not easy due to the small body size and the lack of good characters in the available literature by **Mulsant (1844), Wollaston (1857), Rey (1885), Tonapi and Ozarkar (1969), Jäch (1984, 1990, 1991, 1992a, b, c, 1993, 1998), Delgado and Jäch (2007), Jäch and Delgado (2008, 2017) and Ertorun and Tanatmış (2010)**, which is mostly based on the characteristics of the aedeagus which exhibits a high degree of variation. In the present study the most important characters involved in the identification of hydraenids beetles are pronotum foveae, maxillary palps length, labrum, mandibles, elytral punctured striae, and genitalia.

During our field work, the two species, *O. salinator* and *O. meridionalis*, were collected from both fresh and saline water, which is inconsistent with the experience of **Jäch (1992 a, b)** who reported that these species are exclusively collected from saline water.

There is no evidence that the six following species are part of the Egyptian fauna: *Hydraena quadricollis* Wollaston, 1864, *Ochthebius difficilis* Mulsant, 1844, *Ochthebius minimus* Fabricius, 1792, *Ochthebius rugulosus* Wollaston, 1857, *Limnebius frontinalis* Balfour-Browne, 1951, and *Limnebius nitidus* Marsham, 1802 thus considered doubtful. This is in agreement with both World Catalogue of Insects (Hansen, 1998) and Catalogue of Palearctic Coleoptera (Jäch, 2004).

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