AN ANNOTATED CHECKLIST OF THE AQUATIC ADEPHAGA (COLEOPTERA) OF EGYPT. I. DYTISCIDAE: AGABINAE, COYMBETINAE, COPELATINAE, DYTISCINAE AND LACCOPHILINAE

Mohamed Salah1,2 & Juan Antonio Régil Cueto 2

1,2 Zoology and Entomology Department, Faculty of Science, Helwan University, 11795 - Helwan, Cairo (Egypt).

Abstract: Data from previous literature were used to compile a checklist of the fauna of aquatic Adephaga (Coleoptera) of Egypt. Five subfamilies of the family Dytiscidae were studied: Agabinae, Coymbetinae, Copelatinae, Dytiscinae and Laccophilinae. The checklist contains 31 valid species from 12 genera belonging to 9 tribes: Agabini, Coymbetylinae, Copelatini, Aciilini, Cybistrini, Dyniscini, Eretini, Hydaticini and Laccophilini. The present checklist provides notes concerning the type localities, type specimens, descriptors, new combinations and biogeographic distributions.

Key words: Coleoptera, Dytiscidae, Agabinae, Coymbetylinae, Copelatinae, Dytiscinae, Laccophilinae, checklist, Egypt.

Introduction

Beetles represent the world most speciose and most successful animal order. Although about 400,000 species have been described until today (representing about 38% of all species in 39 insect orders), some biodiversity experts estimate that millions of species may actually roam the earth (Jäck and Balke, 2008; Slipinski et al., 2011). The value of these animals to terrestrial ecosystems and to humankind is enormous, and thus, knowledge of their fauna is of particular importance (Tamtis et al., 2011).

Approximately 25 families in three of four suborders of Coleoptera are typically aquatic in some of their life stages (Balke, 2005). Among these, the Dytiscidae (predaceous diving beetles), with some 4223 described species represent the most speciose family of water beetles within the suborder Adephaga (Nilsson, 2013). They occur in most running and stagnant freshwater habitats in all zoogeographic regions of the world and show a broad range of ecological strategies, mainly reflected in different swimming behaviors and their associated morphotypes (Ribera and Nilsson, 1995; Balke, 2005). More details of the taxonomy, biology and morphology of diving beetles can, for example, be found in Balke (2005).

Family Dytiscidae includes 10 subfamilies. According to Nilsson (2013), approximately half of the species are included in the subfamily Hydroptorinae (nearly 2199 species) and the rest are distributed in the remaining nine subfamilies as follows: Copelatinae (648 species), Laccophilinae (416 species), Agabinae (405 species), Dytiscinae (376 species), Coymbetylinae (140 species), Lancetinae (22 species), Matinae (8 species), Coptomotinae (5 species) and Hydrodytinae (4 species).

The study of African diving beetles has received considerable attention from several European taxonomists, and there is a long history of research on the water beetles of Egypt. However, descriptions, taxonomic notes and distribution of most Egyptian species are found scattered in the old literature which are often available only with considerable difficulty. The most important old works dealing with the study of aquatic Coleoptera of Egypt were published by Klug (1834); Aubé (1838); Apetz (1854); Motschulsky (1855); Schum (1864); Walker (1871); Leprieur (1879); Sharp (1882) and Régerimbart (1895). The study of diving beetles from Egypt was continued by many other taxonomists during the 20th century in more scattered publications such as Sahlberg (1903a, 1903b, 1908, 1913); Peyerimhoff (1907); Ferrante (1908); Innes Bey (1908); Pic (1909); Reitter (1909); Ahlwarth (1910); Andres (1913a, 1913b); Alfieri (1916, 1917, 1957); Storey (1916); Ebner (1921); Bedel and Peyerimhoff (1925); Zimmermann (1930, 1931, 1933, 1934); Gschwendtner (1935, 1936, 1937, 1938); Omer-Cooper (1954); Guignot (1959a, 1959b, 1961). Alfieri (1976) (one of the most thorough collectors of insect specimens all over the country, especially in deserts, oases and other non-cultivated habitats) published the first work collecting all Egyptian beetles in a single memory. This work includes information about the distribution of beetles in Egypt, monthly occurrence, and some ecological and taxonomical notes.

Recently, Zalat et al. (2000) and Ahmed (2004) studied the diving beetles of Egypt and gave an account of the taxonomy and distribution of the families Dytiscidae and Noteridae.
The aim of this study is to compile an annotated list of the Egyptian diving beetles of the subfamilies Agabinae, Colymbetinae, Copelatinae, Dytiscinae and Laccophilinae of the family Dytiscidae, integrating all published sources and bringing together all the scattered literature on the family, thereby providing a summary that can serve as the basis for future progress in the knowledge of the group.

Materials and Methods

Biogeography of Egypt:

Egypt occupies the north-eastern corner of the African continent, with a surface area of just over one million square kilometers (1,019,600 km²). The country lies at the centre of the largest and driest desert region on the globe. Average temperatures are high (mean: summer 20–30°C, winter 10–20°C) and the mean annual rainfall over most of the country is less than 10 mm (Baha El Din, 2001). We can divide Egypt into 6 ecological zones (Hoath, 2003):

1- Nile Valley and Delta (NV): Perhaps the most significant feature of Egypt’s landscape is the Nile river, which is the largest and most important source of fresh water in the country. The Nile divides Egypt into two parts, east and west of the river. The Delta is formed by the division of the branches of the River Nile as it flows south through the valley formed by the Nile in Upper Egypt. The river branches spread out in a V-shaped fan and make their way towards the Mediterranean through Lower Egypt. The Delta begins north of Cairo.

2- Eastern Desert (ED): The Eastern Desert is very different from its western counterpart. It broadly consists of a range of sedimentary mountains that separate the Nile Valley from the Red Sea, the northernmost extension of which are the Muqattam Hills east of Cairo. The area is essentially uninhabited. There are no oasis or cultivation centers.

3- Western Desert (WD): The vast expanse of Egypt west of the Nile Valley and south of the north coast is collectively known as the Western Desert. This Biogeographic zone is characterized by the presence of oases scattered along fossil watercourses. Among these are Siwa, Bahariya, Farafra, Dakhla, Kharga, and Wadi El-Natrun. El Fayoum is not strictly speaking an oasis but rather nowadays a dead-end branch of the Nile.

4- Northern coastal strip (CS): Stretching from the border with Libya to Alexandria, the coastal desert’s distinctive feature is the relatively high, and more consistent, rainfall and low temperature compared to the rest of Egypt.

5- Sinai Peninsula (SI): The Sinai Peninsula is of immense importance in any discussion of the fauna of Egypt. It is an inverted triangle of land, with a northern shoreline on the Mediterranean and its southern sides defined by the Gulfs of Aqaba and Suez of the Red Sea. It is the land connection between Africa and Asia and, at the same time, the land barrier. It is the land connection because in pre-historic times, i.e., until ten thousand years ago, the climate was such that there was a continuous band of non-desert vegetation across Sinai connection Asia Minor with the Nile Valley.

6- Gebel Elba (GE): The rocky massif of Gebel Elba in the very southeasternmost part of Egypt is of great faunal significance. Rainfall, largely orographic, makes this region far less hyper-arid than the Eastern Desert to its north.

Checklist arrangement:

The present checklist includes all valid names of extant beetle taxa belonging to the studied subfamilies of Dytiscidae known to occur in Egypt. The data have been extracted from published data from a variety of different sources, excluding all dubious and erroneous records. This paper follows the classification and nomenclature of the aquatic beetles suggested by Nilsson (2013) and Nilsson and Hájek (2013).

Information in the text is given in the following order: the present name of the taxon (the most recent combination) followed by the author name, year and page number of original citation are given; the type locality; the type specimen and the type depository; a reference in which the species is described in detail; past new combinations and geographic distribution (in both worldwide and Egypt) as given by Nilsson (2013), Nilsson and Hájek (2013), and the published works with reference to Egyptian material.

Type depository is given with the following acronyms that follow Nilsson (2013). Information given refers to current depository, which may differ from the one given in the original description. An “unknown” in this position means that the depository is not reported in the literature.

BMNH: The Natural History Museum, London, United Kingdom.
MNHN: Museum National d’Histoire Naturelle, Paris, France
MSNG: Museo Civico di Storia Naturale ‘Giacomo Doria’, Genova, Italy.
ZIN: Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia
ZMHB: Museum für Naturkunde der Humboldt-Universität, Berlin, Germany.
ZMUC: Zoological Museum, University of Copenhagen, Copenhagen, Denmark.
ZMUM: Zoological Museum, Moscow State University, Moscow, Russia.

The geographic distribution of taxa is indicated by a three letter abbreviation and given as presence in one or more of the following seven zoogeographical regions: (AFR) Afrotropical, (AUS) Australian, (NEA) Nearctic, (NEO) Neotropical, (ORI) Oriental, (PAC) Pacific, and (PAL) Palearctic. Distribution in Egypt is indicated by a two letter abbreviation and given as presence in one or more of the following six biogeographical zones (CS) Northern coastal strip, (ED) Eastern Desert, (GE) Gebel Elba, (NV) Nile Valley and Delta, (SI) Sinai Peninsula and (WD) Western Desert (Figure. 1).

Results

The following coleopteran checklist comprises 31 valid Egyptian species from 12 genera belonging to 9 tribes from the family Dytiscidae: Agabini, Colymbetini, Copelatini, Aciliini, Cybistrini, Dytiscini, Eretini, Hydaticini and Laccophilini. The list of species and their taxonomic position is summarized in Table (1).
Fig. 1: Map of the Egyptian bioregions. (CS) Northern Coastal Strip; (ED) Eastern Desert; (GE) Gebel Elba; (NV) Nile Valley and Delta; (SI) Sinai Peninsula; (WD) Western Desert.

Table I: List of species recorded from the studied subfamilies of the Egyptian Dytiscidae.

<table>
<thead>
<tr>
<th>Subfamily</th>
<th>Tribe</th>
<th>Species</th>
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</table>
| I. AGABINAE | Agabini | 1- Agabus (Gaurodytes) biguttatus (Olivier, 1795)  
2- Agabus (Gaurodytes) conspersus (Marsham, 1802)  
3- Agabus (Gaurodytes) dilatatus (Brullé, 1832)  
4- Agabus (Gaurodytes) nebulosus (Forster, 1771)  
5- Platambus lunulatus (Fischer von Waldheim, 1829) |
| II. COLYMBETINAE | Colymbetini | 6- Colymbetes fuscus (Linnaeus, 1758)  
7- Colymbetes piceus Klug, 1834  
8- Rhantus (Rhantus) consputus (Sturm, 1834)  
9- Rhantus (Rhantus) hispanicus Sharp, 1882  
10- Rhantus (Rhantus) includens (Walker, 1871)  
11- Rhantus (Rhantus) suturalis (Macleay, 1825) |
| III. COPELATINAE | Copelatini | 12- Copelatus enchansoi Guérin-Méneville, 1847  
13- Copelatus gestroi (Sharp, 1882)  
14- Copelatus ibrahimi Zalat, Saleh, Angus and Kaschef, 2000  
15- Copelatus pulchellus (Klug, 1834) |
| IV. DYTISCINAE | Aciliini | 16- Rhiantatus congestus (Klug, 1833)  
Cybistrini | 17- Cybister (Cybister) lateralis (De Geer, 1774)  
18- Cybister (Cybister) reichei Aubé, 1838  
19- Cybister (Cybister) tripunctatus africanus Laporte, 1835  
20- Cybister (Melanecestes) vulneratus Klug, 1834 |
| Dytiscini | 21- Dytiscus circumflexus Fabricius, 1801  
Eretini | 22- Eretes griseus (Fabricius, 1781)  
23- Eretes sticticus (Linnaeus, 1767)  
Hydaticini | 24- Hydaticus (Prodaticus) bivittatus Laporte, 1835  
25- Hydaticus (Prodaticus) decorus Klug, 1834  
26- Hydaticus (Prodaticus) leander (Rossi, 1790)  
27- Hydaticus (Prodaticus) ponticus Sharp, 1882 |
| V. LACCOPHILINAE | Laccophilini | 28- Laccophilus pictipes Sharp, 1882  
29- Laccophilus poecilus Klug, 1834  
30- Laccophilus sordidus Sharp, 1882  
31- Philodytes umbirinus (Motschulsky, 1855) |

The Checklist

Order COLEOPTERA Leach, 1815
Suborder ADEPHAGA Schellenberg, 1806
Family Dytiscidae Leach, 1815

I. Subfamily AGABINAE Thomson, 1867 (1 tribe)

Genus Agabus Leach, 1817 (4 spp.)
Subgenus Gaurodytes Thomson, 1859 (4 spp.)

1- Agabus (Gaurodytes) biguttatus (Olivier, 1795)

Type locality: Fréjus (France).
Syntypes: Unknown.

New combination: Aubé (1837:166).
Geographic distribution: PAL - ED NV SI.
References: Walker (1871); Sharp (1882); Régimbart (1895); Peyerimhoff (1907); Bedel and Peyerimhoff (1925); Zimmermann (1934); Guignot (1959b); Alfieri (1976); Ahmed et al. (2000); Zalat et al. (2000); Nilsson (2003); Ahmed (2004); Ghosh and Nilsson (2012); Nilsson and Hájek (2013).
2. Agabus (Gaurodytes) conspersus (Marsham, 1802)
   Dyttiscus conspersus Marsham, 1802:427.
   TYPE LOCALITY: Great Britain.
   SYNTYPES: Unknown.
   NEW COMBINATION: Hornung (1844:20).
   GEOGRAPHIC DISTRIBUTION: PAL - ED NV SI WD.
   REFERENCES: Omer-Cooper (1954); Alfieri (1976); Alfieri et al. (1982); Nilsson (2003); Ahmed (2004); Ghosh and Nilsson (2012); Nilsson and Hájek (2013).

Genus Rhantus Dejean, 1833
   (4 spp.)
   Subgenus Rhantus Dejean, 1833 (4 spp.)

3. Agabus (Gaurodytes) dilatatus (Brullé, 1832)
   Colymbetes dilatatus Brullé, 1832:127.
   TYPE LOCALITY: Greece.
   SYNTYPES: Unknown.
   DESCRIPTION: Zimmermann (1934:166).
   NEW COMBINATION: Aubé (1837:165).
   GEOGRAPHIC DISTRIBUTION: PAL - ED SI WD.
   REFERENCES: Bedel and Peyerimhoff (1925); Bodenheimer and Theodor (1929); Zimmermann (1934); Guignot (1959b); Alfieri (1976); Zalat et al. (2000); Nilsson (2003); Ahmed (2004); Ghosh and Nilsson (2012); Nilsson and Hájek (2013).

4. Agabus (Gaurodytes) nebulosus (Forster, 1771)
   Dyttiscus nebulosus Forster, 1771:56.
   TYPE LOCALITY: Anglia (England).
   SYNTYPES: Unknown.
   NEW COMBINATION: Wollaston (1854:84).
   GEOGRAPHIC DISTRIBUTION: PAL - ED SI.
   REFERENCES: Bedel and Peyerimhoff (1925); Bodenheimer and Theodor (1929); Zimmermann (1934); Guignot (1959b); Alfieri (1976); Nilsson (2003); Ahmed (2004); Ghosh and Nilsson (2012); Nilsson and Hájek (2013).

5. Platambus lunulatus (Fischer von Waldheim, 1829)
   TYPE LOCALITY: Caucasus.
   LECTOTYPE: Brancucci (1988:208) ZMUM.
   GEOGRAPHIC DISTRIBUTION: PAL - NV.
   REFERENCES: Zimmermann (1920); Gschwendtner (1935); Guignot (1947); Guignot (1959b); Nilsson (2003); Nilsson and Hájek (2012).

6. Dyttiscus fuscus (Linnaeus, 1758)
   Dyttiscus fuscus Linnaeus, 1758:411.
   TYPE LOCALITY: Europe.
   SYNTYPES: Unknown.
   NEW COMBINATION: Clairville (1806:201).
   GEOGRAPHIC DISTRIBUTION: PAL - CS SI WD.
   REFERENCES: Omer-Cooper (1954); Guignot (1961); Alfieri (1976); Zalat et al. (2000); Nilsson (2003); Ghosh and Nilsson (2012); Nilsson (2013); Nilsson and Hájek (2013).

7. Dyttiscus piceus Klug, 1834
   TYPE LOCALITY: Sinai (Egypt).
   LECTOTYPE: Zalat et al. (2000:38) ZMHB.
   DESCRIPTION: Gschwendtner (1936:91).
   GEOGRAPHIC DISTRIBUTION: PAL - ED SI WD.
   REFERENCES: Gemminger and Harold (1868); Walker (1871); Marsuel (1882); Sharp (1882); Peyerimhoff (1907); Ferrante (1908); Pic (1909); Storey (1916); Zimmermann (1920); Gschwendtner (1936); Alfieri (1976); Ahmed et al. (2000); Zalat et al. (2000); Nilsson (2003); Ahmed (2004); Nilsson (2013); Nilsson and Hájek (2013).

8. Rhantus (Rhantus) conspersus (Sturm, 1834)
   Colymbetes conspersus Sturm, 1834:83.
   TYPE LOCALITY: Speyer (Germany).
   HOLOTYPE: Unknown.
   DESCRIPTION: Gschwendtner (1936:70).
   GEOGRAPHIC DISTRIBUTION: PAL - ED NV WD.
   REFERENCES: Sahlberg (1903b); Zimmermann (1920); Gschwendtner (1936); Guignot (1947); Guignot (1961); Nilsson (2003); Nilsson and Hájek (2013).

9. Rhantus (Rhantus) hispanicus Sharp, 1882
   Rhantus hispanicus Sharp, 1882:622.
   TYPE LOCALITY: El Escorial, Valladolid (Spain).
   SYNTYPES: BMNH.
   DESCRIPTION: Gschwendtner (1936:71).
   GEOGRAPHIC DISTRIBUTION: PAL – NV.
   REFERENCES: Sahlberg (1903b); Zimmermann (1920); Gschwendtner (1936); Guignot (1947); Guignot (1961); Nilsson (2003); Nilsson and Hájek (2013).

10. Rhantus (Rhantus) includens (Walker, 1871)
    Colymbetes includens Walker, 1871:11.
    TYPE LOCALITY: Sinai, Wadi Feiran (Egypt).
    LECTOTYPE: Brancucci (1985:236) BMNH.
    NEW COMBINATION: Zimmermann (1920:202).
    GEOGRAPHIC DISTRIBUTION: PAL - CS SI WD.
    REFERENCES: Walker (1871); Peyerimhoff (1907); Zimmermann (1920); Gschwendtner (1936); Alfieri (1976); Brancucci (1985); Zalat et al. (2000); Nilsson (2003); Ahmed (2004); Nilsson (2013); Nilsson and Hájek (2013); Tawfik et al. (2013).

11. Rhantus (Rhantus) saturalis (Macleay, 1825)
    Colymbetes saturalis Macleay, 1825:31.
    TYPE LOCALITY: Java (Indonesia).
    LECTOTYPE: Balfour-Browne (1939a:109) BMNH.
    GEOGRAPHIC DISTRIBUTION: AUS ORI PAL - CS NV SI WD.
    REFERENCES: Schaum (1864); Sharp (1882); Régimbart (1895); Sahlberg (1903b); Andres (1913a); Andres (1913b); Sahlberg (1913); Bedel and Peyerimhoff (1925); Omer-Cooper (1954); Guignot (1961); Alfieri (1976); Zalat et al. (2000); Nilsson (2003); Ahmed (2004); Zalat et al. (2008); Ghosh and Nilsson (2012); Nilsson and Hájek (2013).

12. Copelatus erichsonii Guérin-Méneville, 1847
    Copelatus erichsonii Guérin-Méneville, 1847:51.
    TYPE LOCALITY: Ethiopia.
    SYNTYPES: Unknown.
    GEOGRAPHIC DISTRIBUTION: AFR PAL - NV.

13. Aglymbus gestroi (Sharp, 1882)
    Aglymbus gestroi Sharp, 1882:597.
    TYPE LOCALITY: Seiotel, Bogos region (Eritrea).
    HOLOTYPE: ZMHB.
IV. Subfamily Dytiscinae Leach, 1815 (5 tribes)

Genus Rhantaticus Sharp, 1880 (1 sp.)

16- Rhantaticus congestus (Klug, 1833)

Dytiscus congestus Klug, 1833:38.

TYPE LOCALITY: Madagascar.

LECTOTYPE: Angust (1803a:14) ZMHBL.

DESCRIPTOR: Guignot (1861:843).

NEW COMBINATION: Branden (1885:107).

GEOGRAPHIC DISTRIBUTION: AFR PAL - ORI.


17- Cybister (Cybister) lateralisimarginis (De Geer, 1774)

Dytiscus lateralisimarginis De Geer, 1774:396.

TYPE LOCALITY: Sweden.

SYNTYPES: NHRS.


NEW COMBINATION: Bedel (1881:255).

GEOGRAPHIC DISTRIBUTION: PAL - CS WD ED.

REFERENCES: Aube (1838); Petroff (1932); Omer-Cooper (1954); Guignot (1961); Schaum (1864); Alfieri (1976); Zalat et al. (2000); Nilsson (2003); Ghosh and Nilsson (2013); Nilsson and Hákaj (2013).

18- Cybister (Cybister) reichei Aubé, 1838

Cygister reichei Aubé, 1838:79.

TYPE LOCALITY: Senegal.


GEOGRAPHIC DISTRIBUTION: AFR PAL - NV.

REFERENCES: Schaum (1864); Marseul (1882); Sharp (1882); Régimbart (1895); Pic (1909); Zimmermann (1920); Echner (1921); Gschwendnner (1938); Mouchamps (1957); Nilsson (2003); Nilsson and Hákaj (2013).

19- Cybister (Cybister) tripunctatus africanus Laporte, 1835

Cygister africanus Laporte, 1835:99.

TYPE LOCALITY: Senegal.

SYNTYPES: Unknown.

DESCRIPTOR: Omer-Cooper (1967:52).

NEW STATE: Gschwendnner (1931:65).

GEOGRAPHIC DISTRIBUTION: AFR PAL - CS ED SI WD.

REFERENCES: Wewalka (1974); Walker (1871); Marseul (1882); Gschwendnner and Harold (1868); Régimbart (1895); Ferrante (1908); Pic (1909); Andrees (1913a); Sahlberg (1891); Storey (1916); Zimmermann (1920); Echner (1921); Gschwendnner (1938); Mouchamps (1957); Nilsson (2003); Nilsson and Hákaj (2013).
SYNTYPES: Unknown.

25- Hydaticus (Prodaticus) decorus Klug, 1834
Hydaticus decorus Klug, 1834: t. 33:5.
TYPE LOCALITY: Sinai (Egypt).
LECTOTYPE: Zalat et al. (2000:43) ZMHB.

26- Hydaticus (Prodaticus) leander Rossi, 1790
TYPE LOCALITY: Toscana (Italy).
SYNTYPES: Unknown.
NEW COMBINATION: Aubé (1836:81).
REFERENCES: Walker (1871); Marseul (1882); Sharp (1882); Régimbart (1895); Ghosh and Nilsson (2012); Nilsson (2013); Nilsson and Hájek (2013); Tawfik et al. (2013).

27- Hydaticus (Prodaticus) ponticus Sharp, 1882
Hydaticus ponticus Sharp, 1882:662.
TYPE LOCALITY: Mesopotamia.
LECTOTYPE: Wewalka (1979:131) BMNH.
REFERENCES: Apetz (1854); Schum (1864); Sharp (1882); Régimbart (1895); Peyerimhoff (1907); Ferrante (1908); Zimmermann (1920); Ghoshendtnér (1937); Guignot (1961); Alfieri (1976); Brancucci (1980); Ahmed et al. (2000); Zalat et al. (2000); Nilsson (2003); Ahmed (2004); Zalat et al. (2008); Nilsson (2013); Nilsson and Hájek (2013).

30- Laccophilus sordidus Sharp, 1882
Laccophilus sordidus Sharp, 1882:305.
TYPE LOCALITY: Al Hijaz (Saudi Arabia).
LECTOTYPE: Brancucci (1980:107) BMNH.
REFERENCES: Afifí (1976); Zalat et al. (2000); Nilsson (2003); Nilsson and Hájek (2013).

31- Philodytes umbrinus (Motschulsky, 1855)
Laccophilus umbrinus Motschulsky, 1855:83.
TYPE LOCALITY: Egypt.
SYNTYPES: ZIN.
NEW COMBINATION: Balfour-Browne (1939b:479).
REFERENCES: Schaum (1864); Gemminger and Harold (1868); Marseul (1871, 1882); Sharp (1882); Régimbart (1895); Schahberg (1903b); Ferrante (1908); Pic (1909); Andres (1913a); Schahberg (1913); Storey (1916); Alfieri (1916); Ferrante (1917); Zimmermann (1920); Ebner (1921); Zimmermann (1930); Peyerimhoff (1931); Guignot (1959b); Alfieri (1976); Zalat et al. (2000); Nilsson (2003); Ahmed (2004); Nilsson (2013); Nilsson and Hájek (2013).

Discussion
The present checklist includes 31 valid coleopteran species known from Egypt from 12 genera belonging to 9 tribes: Agabini, Colymbetini, Copelatini, Cybistrini, Dytsiscini, Eretini, Hydaticini and Laccophilini. Alfieri (1976) and Zalat et al. (2000) summarized all the available information on the studied taxonomic groups and their distribution in Egypt. Alfieri (1976) listed 18 valid species and 14 invalid species, while Zalat et al. (2000) listed 24 valid species and 2 invalid species. However, the studied taxonomic groups have undergone major revision, and are subject to change even today. In comparing the current study with the previous studies, we can summarize the following observations:

1- Subfamily Agabinae: It is a morphologically homogeneous group exhibiting few characters useful for systematic (Nilsson, 2000). They were traditionally considered a tribe within the subfamily Colymbetinae, and placed among the basal lineages of Dytiscidae. Phylogenetic analyses based on 18S rRNA sequences confirmed this basal placement, although the group did not form a monophyletic clade with Colymbetini (Ribera et al. 2002). This is consistent with the results obtained by Miller (2001) based on morphological characters, who accordingly raised Agabini to subfamily level (Ribera et al., 2004).

Agabinae is widely distributed with about 11 genera and 405 species worldwide (Nilsson, 2013). Of these, 2 genera (Agabus and Platambus) and 5 species have been reported from Egypt.

- Agabus (Gaurodytes) bipustulatus (Linneaus, 1767): This species was recorded by Zimmermann (1934) and Guignot (1959b). Alfieri (1976) considered our Agabus conspersus as belonging to Agabus bipustulatus.

- Agabus binotatus Aubé, 1837: This species was recorded in Sinai by Ferrante (1908). According to Franciscolo (1979) Nilsson (2013) and Nilsson and Hájek (2013), it is probably a doubtful record, where the species is known only from Sardinia (Italy), mainland Italy and Corse (France).
• Agabus (Gaurodys) nebulosus (Forster, 1771): This species was recorded in Egypt by Ferrante (1908), Bedel and Peyerimhoff (1925), Guignot (1959) and Alfieri (1976). Zalat et al. (2000) confirmed three species among the Egyptian fauna. A. biguttatus, A. dilatatus, and A. conspersus. He found that the study of the Egyptian records in BMNH (London) shows that the previous record of A. nebulosus may indeed correspond to A. biguttatus. According to Nilsson & Hájek (2013) A. nebulosus belongs to the Egyptian fauna, and it is also recorded from many nearby countries such as Libya, Israel, Algeria, Morocco, Tunisia, Jordan, Lebanon and Syria.

2- Subfamily Colymbetinae: It is widely distributed and contains 11 genera (c. 140 species) world-wide (Nilsson, 2013). Of these, 2 genera (Colymbetes and Rhantus) and 6 species have been recorded from Egypt.

• Rhantus (Rhantus) bistriatus (Bergsträsser, 1778): This species was recorded in Egypt by Ferrante (1908) and Alfieri (1916). According to Alfieri (1976) this record is erroneous and the species is absent from the Egyptian Coleoptera fauna.

• Rhantus punctatus Fourcroy, 1785 (as reported by Réginbart, 1895 and Alfieri, 1976): Misspelling of Rhantus punctatus Geoffroy, 1785. This species is a synonym of Rhantus saturalis (Macleay, 1825), which is a valid name known from Egypt.

• Rhantus (Rhantus) hispanicus Sharp, 1882: This species was recorded in Egypt by Sahlberg, (1903b), Zimmermann (1920), Guignot (1947) and Guignot (1961). Bedel and Peyerimhoff (1925) mentioned that the specimens of Rhantis hispanicus recorded from Egypt by Sahlberg (1903b) were Hydaticus leander (Rossi, 1790). According to Alfieri (1976) and Guignot (1961) the Egyptian records are very doubtful. In the recent version of the Catalogue of Palearctic Dryitiscidae of Nilsson & Hájek (2013) the species was reported as present in Egypt. However, this record needs confirmation, although this species was recorded from other North African countries like Algeria and Morocco.

• Rhantus notatus Fabricius, 1792: This species was recorded in Egypt by Gozis (1911:35) and it is of 1781 not 1792, and it is a synonym to Rhantus frontalis (Marsham, 1802). However, the species is completely absent not only in Egypt but in the entire Africa (Nilsson, 2013 and Nilsson & Hájek, 2013).

3- Subfamily Copelatinae: With about 7 genera and 648 species worldwide (Nilsson, 2013). Of these, 4 species from a single genus (Copelatus) have been recorded from Egypt.

• Copelatus erichsonii Guérin-Méneville, 1847: This species was recorded in Egypt by Nilsson & Hájek (2013). According to Guignot (1961), this species is common throughout continental Africa south of the Sahara and Egypt. We have not been able to verify the literature records of this species from Egypt.

4- Subfamily Dytiscinae: It is widely distributed and contains 19 genera (c. 376 species) world-wide (Nilsson 2013). Of these, 12 species belonging to 5 genera from 5 tribes - Aciliini, Cybistrini, Dytiscini, Eretini and Hydaticini- have been recorded from Egypt. The two tribes Aciliini and Dytiscini are represented by a single species (Table 1).

• Cystbister (Cystbister) reichei Aubé, 1838: This species was recorded from Egypt by Sharp (1882), Réginbart (1895), Pic (1909), Zimmermann (1920), Gschwendtner (1938) and Mouchamps (1957). Sharp (1882) mentioned that the record was undoubtedly from Upper Egypt, but Petroff (1932) mentioned that the record of this species in Egypt is doubtful. In addition, Alfieri (1976) mentioned that Cystbister reichei Aubé, 1838 reported by Pic (1909) in Sinai (Egypt), is actually Cystbister tripunctatus africanus Laporte, 1835. According to Nilsson & Hájek (2013) C. reichei belongs to the aquatic Coleoptera fauna of Egypt.

• Cystbister bipunctatus Bodenheimer and Theodor, 1929: Misspelling of tripunctatus Olivier (Alfieri 1976). This species is a synonym to Cystbister tripunctatus africanus, which is a valid name known from Egypt (Nilsson, 2013).

• Eretes griseus (Fabricius, 1781) and Eretes sticticus (Linnéa, 1767): The two species were recorded in Egypt by Miller (2002) in his revision to the Genus Eretes Laporte, 1833. However, the type locality of Eunectes succintus and Eunectes helvolus (which are considered as synonym to Eretes griseus and Eretes sticticus, respectively) was Ambukohl or “Ambikil”, which is located in Sudan (Alfieri, 1976 and Nilsson, 2013). Eretes griseus was recorded in Sinai by Ghosh and Nilsson (2012) and Nilsson and Hájek (2013).

5- Subfamily Laccophilinae: Contains 13 genera (c. 416 species) world-wide (Nilsson 2013). Of these, 4 species from 2 genera Laccophilus and Philodytes have been recorded from Egypt.

In Egypt, a large country with distinctly different geographical regions and different ambiances, the number of water beetle species must be expected to be much higher than has been recorded so far. New intensive studies of these insects are suggested.

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Literature Cited


