

BEE SPECIES OF THE SUPERFAMILY : APOIDEA, HYMENOPTERA AT ALEXANDRIA PROVINCE AND THEIR ALLIED REGIONS OF EGYPT

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ABSTRACT: *The diversity of non Apis bees is important for high quality production of seeds, vegetables, and fruit crops. Due to the fast increasing of the agricultural reclaimed lands in the Northern part of Egypt, it was necessary to study the biodiversity of solitary bee populations in Alexandria and some surrounding Areas. About 3000 specimens of bees were collected from different locations from common cultivated and wild plants. Some important crops were subjected for the study specially clover, broad bean, canola and wild weeds. Results of the study revealed to the identification of twenty-nine species of bees. With the exception of the Melittidae family, all the bee families were present in the examined regions. The total number of species of each family were 4, 4, 6, 7, and 8 species for Andrenidae, Colletidae, Halictidae, Megachilidae, and, Apidae, respectively.*

Key words: *Solitary bees, non Apis bees , biodiversity, pollination, Alexandria, Egypt*

INTRODUCTION

The superfamily Apoidea is a major group within the Hymenoptera, which includes two traditionally recognized lineages, the "sphecoid" wasps, and the bees.

Bees appear in recent classifications to be a specialized lineage of crabronid wasps that switched to the use of pollen and nectar as larval food, rather than insect prey; this presumably makes the Crabronidae a paraphyletic group. Accordingly, bees and sphecoids are now all grouped together in a single superfamily, and the older available name is "Apoidea" rather than "Sphecoidea" (which, like Sphecoformes, has been used in the past, but also defined a paraphyletic group and has been abandoned).

As bees (not including their wasp ancestors) are still considered a monophyletic group, it is still convenient to use a grouping between superfamily and family to unify all bees. A few recent classifications have addressed this problem by lumping all bee families together into a single large family Apidae, though this has

not met with widespread acceptance. The alternative classification in more common use is to unite all bees under the name Anthophila (Engel, 2005), which is equivalent to the obsolete name Apiformes (which meant 'bee-like forms' in Latin).

The study of Egyptian bee fauna started long time ago during 1970s. From that date very few studies carried out all over Egypt (Shebl *et al.*, 2013). There is a lack of information about biogeography and the diversity of bees in Egypt. The decline of bees is well documented all over the world (Gallai *et al.*, 2009) but in Egypt due to few studies there is no any clear data about this. Different field scurveys were conducted in Egypt (El-Berry , *et al.*, 1974 , El-Borollosy , *et al.*, 1975, Rashad ,1983, El-Ansary , 1998, Shaver *et al.*, 1989, and Shebl, 2007 ; 2013).

Alexandria and north coast are very important regions for agriculture production in the western desert. Many new reclaimed areas increased day by day. Therefore, pollinators and in particular bees are needed for increasing the agriculture production of different crops and fruits. So, the diversity and conservation of non *Apis* bees are big

challenges at that region. The area cultivated with many important agriculture crops and fruits. Here we try to address some questions about the diversity and abundance of non *Apis* bees at that area. A field survey of bees were conducted for two years on different cultivated and wild plants including clover, broad bean, canola, basil and some wild weeds.

MATERIAL AND METHODS

Bee collection

Several bee species were collected by sweep net from different locations of Alexandria Governorate (Fig. 1) during the years 2012 and 2013. A total collected number of specimens were 3000 adult insects. Bees were killed in normal cyanide jars, pinned and stored in wooden boxes at the Sabahia Research Station, Agriculture Research Center, Alexandria. Labels containing the collecting time and date, area of collection and scientific name of the host plant were attached to the specimens. The major cities and localities (Fig. 1) with their GPS co-ordinates were as follows:

Al Sabahia 12°82'45"N 9°21'10"E
Abiis Village 12°31'N 59°29'E
El Delenagte Village 30°49'36"N 30°31'43"E
El Helbawy Village 31°2'18"N 30°8'33"E
Abo Talat Village 31°73'04"N 29°99'55"E
El Hamam Village 30°50'29"N 29°23'43"E

Identification

Bees were examined by USP digital microscope and binocular for accurate identifications. Different keys were used published by (Prisner 1957, Michener, 2007), Insect collection, Agriculture Research Center, Insect collection of Entomology Dept. Collection, Faculty of Science, Ain Shams University and private collection of Mohamed Shebl at Dpet. of Plant Protection, Fac. of Agriculture, Suez Canal University.

RESULTS

About 29 species have been collected and identified around Alexandria governorate and some surrounding areas. These species are each summarized according to family, locality, flight range, and floral resources. All species are listed in Tables 1-5.

Most of collected species are common species all over Egypt. Most of the families are represented except for the Family of Melittidae.

The main bee families (Fig 2) were are as follows:

Family: *Apidae* (8 species),
Family : *Megachilidae* (7 species),
Family : *Halictidae* (6 species),
Family : *Andrenidae* (4 species)
Family : *Colletidae* (4 species).

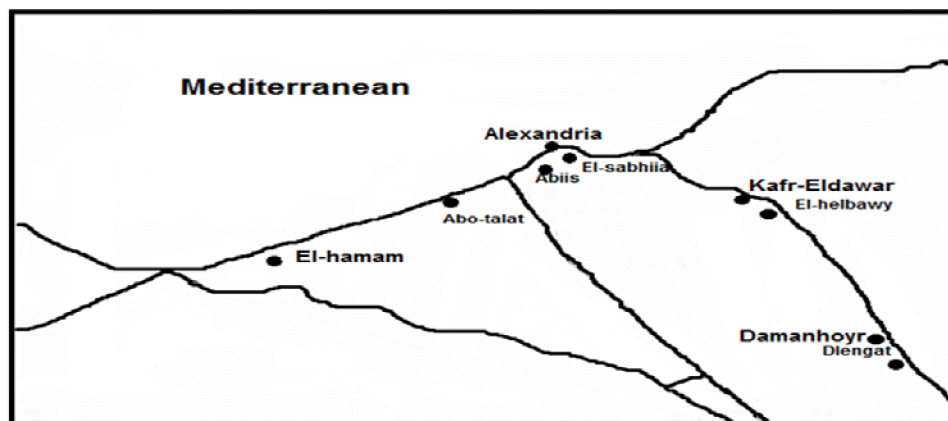


Fig. 1. Map of the collection sites at different locations under investigation.

Bee species of the superfamily : Apoidea, hymenoptera at Alexandria.....

Table 1 . List of location, flight range, and floral resources of the collected species of the family Andrenidae.

Species Fam.: Andrenidae	Location	Flight activity period	Floral resources
<i>Andrena ovatula</i> (Kirby, 1802)	Abiis vellage, El-behera, Sabahia	January – June	<i>Trifolium alexandrinum</i> L., <i>Carum carvi</i> , <i>Vicia faba</i> L., <i>Ocimum basilicum</i>
<i>Andrena fuscosa</i> Erichson, 1835	Abiis village	February-March	Wild plants of Fam.: Composite
<i>Andrena sp</i>	Sabahia	May-June	<i>Trifolium alexandrinum</i> L.
<i>Andrena vetula</i> (Lepeletier 1841)	Abiis village	February-March	Wild plants of Fam. :Composite
<i>Andrena savignyi</i> Spinola, 1838	Abiis village	February-March	Wild plants of Fam. :Composite

Table 2 . List of location, flight range, and floral resources of the collected species of the family Halictidea.

Species Fam.: Halictidae	Location	Flight activity period	Floral resources
<i>Halictus spp</i>	Sabahia, El- hamam, Abiis velliage	March-October	<i>Trifolium alexandrinum</i> L, <i>Ocimum basilicum</i> , <i>Malus domestica</i> , wild plants of Fam:Composite
<i>Laisoglossum vagans</i> (Smith, 1857)	Sabahia, El- hamam, Abiis velliage, El Behera	March-July	<i>Ipomoea batatas</i> , <i>Malus domestica</i> , <i>Carum carvi</i> , wild plants of Fam:Composite
<i>Laisoglossum sp</i>	Sabahia	May-October	<i>Trifolium alexandrinum</i> L, <i>Ocimum basilicum</i>
<i>Nomia sp</i>	Sabahia	May-July	<i>Trifolium alexandrinum</i> L, <i>Ocimum basilicum</i>
<i>Pseudapis sp</i>	Sabahia, Abiis velliage	May-October	<i>Trifolium alexandrinum</i> L, <i>Ocimum basilicum</i> , <i>Schinus molle</i>
<i>Sphecodes sp</i>	Sabahia	May	<i>Trifolium alexandrinum</i> L

Table 3. List of location, flight range, and floral resources of the collected species of the family: Colletidae.

Species Fam.: Colletidae	Location	Flight activity period	Floral resources
<i>Hylaeus sp.</i>	Sabahia, El- hamam, Abiis velliage	June – July	<i>Ocimum basilicum</i> , <i>Schinus molle</i> , <i>Malus domestica</i> , wild plants of Fam:Composite
<i>Colletes intricans</i> Spinola, 1838	Sabahia	May	<i>Trifolium alexandrinum</i> L.
<i>Colleteslacunatus</i> Dours, 1872	Abiis velliage	February – March	wild plants of Fam:Composite
<i>Colletes sp.</i>	Sabahia	Sept. - October	<i>Schinus molle</i>

Table 4 . List of location, flight range, and floral resources of the collected species of the family: Apidae

Species Family: Apidae	Location	Flight activity period	Floral resources
<i>Ameqilla</i> sp.	Sabahia, Abiis velliage	October-December	<i>Ocimum basilicum</i> , wild plants of Fam:Composite
<i>Ceratina tarsata</i> Morawitz, 1872	Sabahia	July	<i>Ocimum basilicum</i>
<i>Eucera nigrilabris</i> (Lepeletier, 1841)	Abiis velliage	January – March	Wild plants of Fam:Composite, <i>Brassica napus</i> L.
<i>Melecta</i> sp.	Sabahia	October – January	<i>Vicia faba</i> L., <i>Ocimum basilicum</i>
<i>Thyreus hyalinatus</i> (Vachal, 1903)	Sabahia	October	<i>Ocimum basilicum</i>
<i>Xylocopa pubescens</i> Spinola, 1838	Sabahia	January –October	<i>Vicia faba</i> L., <i>Ocimum basilicum</i> , <i>Trifolium alexandrinum</i> L., <i>Schinus molle</i>
<i>Anthophora hespanica</i> (Fabricius)	Sabahia	January – March	<i>Vicia faba</i> L.
<i>Anthophora aegyptiaca</i> (Difc)	Sabahia	January – March	<i>Vicia faba</i> L.

Table 5. List of location, flight range, and floral resources of the collected species of the Family: Megachilidae.

Species Fam. Megachilidae	Location	Flight activity period	Floral resources
<i>Anthidium</i> sp	Sabahia	June	<i>Trifolium alexandrinum</i> L.
<i>Chalicodoma siculum</i> (Rossi, 1792)	Sabahia, Delngate Velliage	January – March	<i>Vicia faba</i> L., <i>Petloselinum crispum</i> , <i>Citrus sinensis</i>
<i>Chalicodoma flavipes</i> Spinola, 1838	Sabahia	May – June	<i>Trifolium alexandrinum</i> , <i>Ocimum basilicum</i>
<i>Chalicodoma desrtorum</i> (Morawitz, 1875)	Sabahia	May – June	<i>Trifolium alexandrinum</i> , <i>Ocimum basilicum</i>
<i>Megachile</i> sp.	Sabahia, Abiis velliage	The whole year from March to October	<i>Ocimum basilicum</i> , <i>Trifolium alexandrinum</i> L., <i>Malus domestica</i> , <i>Malva sylvestris</i> , wild plants of Fam:Composite
<i>Osmia submicans</i> Morawitz, 1870	Abo Talaat	March	Wild plants of Fam:Composite

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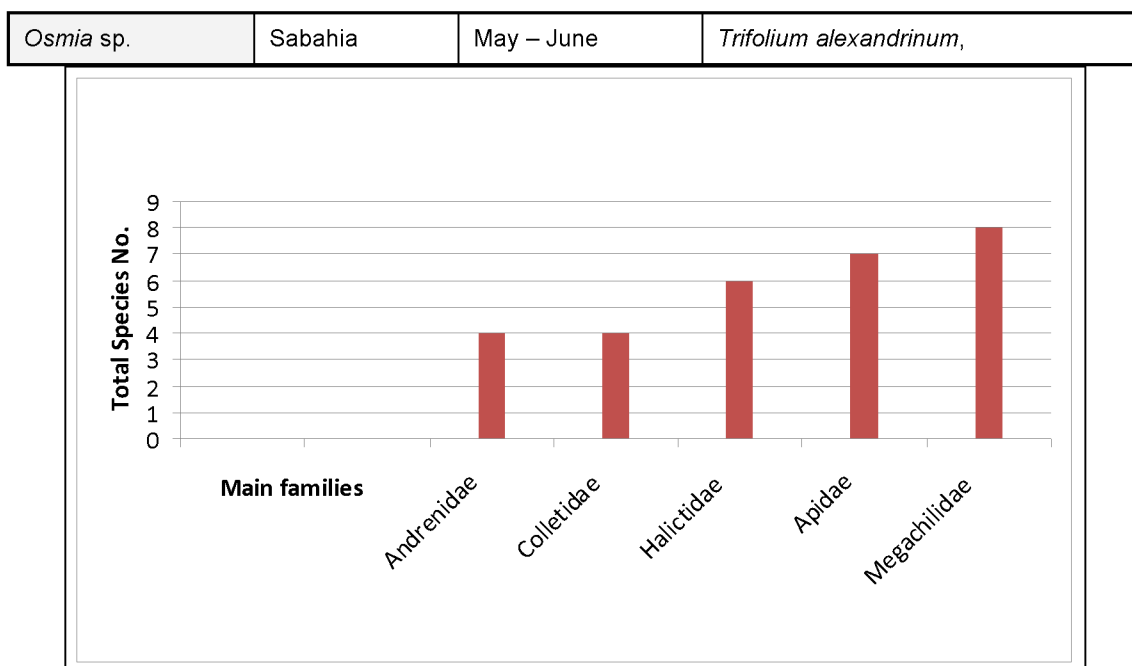


Fig. 2: The main bee families collected from Alexandria and their surrounding areas

DISCUSSION

The obtained results indicated that Alexandria locality and their surrounding areas have a moderate suitable conditions for the activity of non *Apis* bees insects , where six families were recorded and more than 30 none *Apis* species were recorded.

These results are in harmony with those conducted in Egypt by Wafa and Ibrahim (1959) who identified pollinators of the chief sources of nectar and pollen grain plants, in Egypt, Mazeed (1968) studied the biology and ecology of family Megachilidae in Egypt , Allam (1973) who studied the ecology and biology of certain pollinators in reclaimed land of Egypt, El-Hefny (1974) who studied the pollinators of the family Halictidae in Egypt , El-Badawy (1975) who studied the occurrence of fam. Megachilidae in the New Valley of Egypt. Abd El-moneim (1980) who studied the presence of the wild bees visiting some crops in the New valley Governorate of Egypt. Mazeed *et al.*, (1980) who observed solitary bees of Fam. Megachilidae in different Governorates of Egypt . Shoreit (1982) who studied on the wild bees of family Andrenidae in Egypt. Zannoon (1983) who surveyed some pollinators of Fam. Anthophoridae in

Kaliobia of Egypt. Ali (1985) who studied the ecology of some pollinators in newly reclaimed lands of Egypt. Recently , Khater *et al.*, (2003). determined the efficiency of honeybees and other insect pollinators in pollination of faba bean (*Vicia faba* L.). In addition, Shoukry *et al.*, (2004) studied the changes in the seasonal activity and nesting behavior of *Megachile uniformis* (A.) (Hymenoptera: Megachilidae) . Finally , these results are in agreement with those of Abd El-wahed and Mahmed (2013) who determined foraging activity of four species of insects on sesame flowers during two successive season in Ismailia Governorate , Egypt , and Kamel, et al., (2013) identified the most common insect pollinators on Sesame (*Sesamum indicum* L.) in Ismailia Governorate, Egypt. Furthermore , Mahfouz *et al.*, (2013) classified pollinators visiting sesame seed crop with reference to foraging activity of some bee species.

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أنواع النحل التابعة لفوق عائلة ابيوديا Superfamily: Apoidea في منطقة الإسكندرية وبعض المناطق المجاورة لها بمصر

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الملخص العربي

تم هذا الحصر في بعض المناطق الزراعية في محافظة الإسكندرية مثل قرية أبيس والصباحية وابوتلات والحمام وبعض المناطق المجاورة للمحافظة مثل كفر الدوار، الدالينجات، بمحافظة البحيرة وتم تعريف الملقحات الحشرية الغير تابعة لجنس *Apis* حيث وجد أن هذه الحشرات تتبع ١٨ جنس و ٣٠ نوع جميعهم يندرج تحت ٥ عائلات هي:

- ١- عائلة Apidae . تم تسجيل ٨ أنواع
- ٢- عائلة Mgachilididae. تم تسجيل ٧ أنواع
- ٣- عائلة Halictidae. تم تسجيل ٦ أنواع
- ٤- عائلة Andrenidae. تم تسجيل ٤ أنواع
- ٥- عائلة Collitidae. تم تسجيل ٤ أنواع

تم تعريف الحشرات الغير تابعة لجنس *Apis* الملقحة للبرسيم المصري وجد أنها تتبع خمس عائلات وجد عشرة أجناس وعشرة أنواع . هذه العائلات هي:

- ١- عائلة Apidae.
- ٢- عائلة Andrenidae.
- ٣- عائلة Mgachilididae.
- ٤- عائلة Collitidae.
- ٥- عائلة Halictidae.

أما نبات فلفل الزينة فوجد أن الحشرات الغير تابعة لجنس *Apis* تتبع ثلاث عائلات وخمسة أجناس هذه العائلات هي:

- ١- عائلة Apidae.
- ٢- عائلة Collitidae.
- ٣- عائلة Megachilidae.

أما نبات الريحان فقد وجد أن الحشرات الغير تابعة لجنس *Apis* تتبع خمس عائلات وعشرة أجناس وعشرة أنواع هذه العائلات هي:

- ١- عائلة Apidae.
- ٢- عائلة Megachilidae.
- ٣- عائلة Collitidae.
- ٤- عائلة Andrenidae.
- ٥- عائلة Halictidae.

أما نبات الفول البلدى فقد وجد أن الحشرات الغير تابعة لجنس *Apis* تتبع ثلاث عائلات هي :

- ١- عائلة Apidae.
- ٢- عائلة Andrenidae.
- ٣- عائلة Megachilidae.

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