Diversity and Ecology of Butterflies and Moths in Wadi Gaza, Gaza strip, Palestine


*Msc Microbiology
**Msc Limnology

Abstract- Butterflies and moths were studied in regions of Wadi Gaza, extending from Salahe El-deen bridge west to Wadi Abo-Qatron near Wadi Gaza village to the east. The research is based on studying the diversity of butterflies and moths in terms of taxa diversity, Genera compositions, and family abundance.

In terms of family abundance, the survey showed that all recorded butterflies are belonging to five main families (Pieridae, Hesperiidae, Lycaenidae, Nymphalidae, Papilionidae). The recorded moths are also belonging to five families (Arctiidae, Crambidae, Geometridae, Noctuidae, Sphingidae).

In terms of species and genera compositions and diversity, the survey revealed that butterflies are more abundant concerning diversity and richness than moths. The five families of butterflies are consisting of (19 genera) and (25 species) while the five families of moths are consisting of only (10 genera) and (11 species). The butterflies represented (69 %) of recorded species in the area of study while the moths were represented in (31 %) of the findings.

The most abundant family of butterflies is Pieridae with (36%) of all recorded butterflies, followed by Lycaenidae (32%). As for moths, the abundant families are Noctuidae, Geometridae, and Crambidae which were each family was represented by (3 species), and they form (82%) of recorded moths. In this study all genera, in both moths and butterflies are represented only by one specie except six genera of butterflies and one genus of moths as each one is represented with two species, these six genera of butterflies are zizeeria, Vanessa, Colias, Pieris, Carcharodus, and Pointa and that genues of moths is Stemorrhages.

Index Terms- Moths ,Butterflies ,Pieridae,abundant , Lepidoptera, Lycaenidae

I. INTRODUCTION

Moths and butterflies have been divided more for convenience as the division is artificial, based on superficial differences. In the Lepidoptera group there are several smaller groups that differ from each other due to certain characteristics. Groups like skippers, swallowtails, whites, yellows, blues and Nymphalids have clubbed antennae and are called butterflies, while groups which do not have clubbed antennae are called moths. Though this division is not strictly scientific, it is not likely to be abandoned as it helps people to distinguish moths from butterflies (Kehimkar, 1997). Both butterflies and moths have many things in common, mainly scales that cover their bodies and wings. These scales are actually modified hairs. Butterflies and moths belong to the order Lepidoptera which means (Scaly wings). In spite of they belong to the same order with similar features, there are some different features between butterflies and moths as shown in table (1) (Carter, 1992). Of the 1.4 million species on the earth planet, over 53% are insects, while about 15,000-16,000 species of butterflies are known worldwide (Hassan, 1994).

Table (1): Difference between butterflies and moths:

<table>
<thead>
<tr>
<th>Bio/ecological feature</th>
<th>Butterfly</th>
<th>Moth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>Thin and smooth</td>
<td>Thick and fuzzy</td>
</tr>
<tr>
<td>Antennae</td>
<td>Rounded clubs on the ends</td>
<td>Thin or often feathery</td>
</tr>
<tr>
<td>Wings</td>
<td>Held vertically when resting</td>
<td>Held flat against body when resting</td>
</tr>
<tr>
<td>Pupal Stage</td>
<td>Chrysalis</td>
<td>Cocoon</td>
</tr>
<tr>
<td>Color</td>
<td>Colorful</td>
<td>Dull</td>
</tr>
<tr>
<td>Active</td>
<td>During the day</td>
<td>During the night</td>
</tr>
</tbody>
</table>

Butterflies and moths live in a variety of land habitats on all continents except Antarctica. Their distribution is dependent on their food source. Habitat must provide the appropriate host plants for the caterpillars and good nectar sources for the adults. Major families of Lepidoptera order are Nymphalidae (brushfooted butterflies), Papilionidae (swallowtails), Hesperiidae (skippers), Saturniidae (giant silk moths), Lymantriidae (tussock moths) and Noctuidae (loopers, owlet moths, and underwings) (Carter, 1992). Lepidoptera originated when flowering plants were beginning to proliferate and have developed in close association with them. The earliest moth estimated to be between 100 to 140 Million years old, where butterflies have fossils back to 40 Million years old. This study is considered the first one in the Gaza strip, it is going to focus on the taxonomy and ecology of Lepidoptera, where they have great functions for the ecosystems.

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In this article ecosystem and ecological prospective are considered, according to Wootton, (1993), the ecosystem value of butterflies and moths are:
- They are indicators of healthy functions of the ecosystem.
- They indicate a wide range of other invertebrates.
- They provide a wide range of environmental benefits, including pollination and natural pest control.
- They are important elements in the food chain (prey for birds, bats and other insectivorous animals).
- Butterflies have been widely used by ecologist as model organisms to study the impact of habitat loss and fragmentation, and climate change.

These values of Lepidoptera in terms of ecology is the primary goal of this article, but it has not gone in deepest because this study was the first and we made big effort to identify the butterflies and moths first, then introducing some comments about some of them.

The effect of Mediterranean, Irano-turanion and Sahro-Arabian can be observed in Wadi Gaza through the nature of flora and fauna observed there. Also the biodiversity richness contributes in the presence of insects in general and butterflies and moths in special. The previous factors are important for the insect diversity and can give an idea about their nature and their role in the health of the ecosystem.

II. METHODOLOGY

- **Area of Survey:**
This survey was done in the period from March, 2015 until the end of July 2015, this period is optimal to observe the butterflies and moths, these organisms are associated with flowering plants and high temperature and humidity.

The mentioned conditions typically exist in the study area at the study period. The survey has been taken in a part of Wadi Gaza located in the middle of Gaza strip, Palestine. This Wadi is dried and it extends from Hebron mountains in the east to the Mediterranean sea in the west, the length of the Part included in Gaza strip is 8 km. This part is rich in habitats, biodiversity and phytogeography. Figure (1) and Figure (2) shows the location of the Gaza strip in Palestine and the location of Wadi Gaza. Studies associated with this wadi showed the richness in ecosystem diversity, wetlands and swamps, terraces and slopes are exist, where the variety in biogeography are also exist (Madi, 2005). The survey included the part of Wadi Gaza starting from Salah el deen-bridge until Wadi Abo-Qatroon in the East.

**Figure(1) Location of the Gaza strip and Figure(2) shows the location of Wadi Gaza**

- **Methodology of this survey is based on three techniques:**
  1. Trapping of butterflies and moths.
  2. Natural Photography and behavior field observations.
  3. Data analysis using Ms Excel program.

III. RESULTS

The study recorded 36 species of Lepidoptera order of insecta, 25of them are butterflies and 11 of them are moths. The results showed that the recorded butterflies belong to five families (Hesperiidae, Lycaenidae, Nymphalidae, Papilionidae and Pieridae). The eleven recorded species of moths also belong to five families (Arctiidae, Crambidae, Geometridae, Noctuidae and Sphingidae).
Butterflies are recorded with more diversity in terms of species richness and genus while they are the same in terms of families as demonstrated in figure (3).

The complete list of recorded butterflies and moths is demonstrated in table (2). The table shows the taxa whether it is butterfly or moth, the genus-species, family and the common name.

**Table (2): The recorded Moths and butterflies in the study area.**

<table>
<thead>
<tr>
<th>Sp.NO</th>
<th>TAXA</th>
<th>FAMILY</th>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Butterfly</td>
<td>Hesperiidae</td>
<td><em>Carcharodus alceae</em></td>
<td>Mallow Skipper</td>
</tr>
<tr>
<td>2</td>
<td>Butterfly</td>
<td>Hesperiidae</td>
<td><em>Carcharodus flocciferus</em></td>
<td>Tuffed Marbled Skipper</td>
</tr>
<tr>
<td>3</td>
<td>Butterfly</td>
<td>Hesperiidae</td>
<td><em>Gegenes pumilio</em></td>
<td>Dark Hottentot</td>
</tr>
<tr>
<td>4</td>
<td>Butterfly</td>
<td>Hesperiidae</td>
<td><em>Pelopidas thrax</em></td>
<td>White Branded Swift</td>
</tr>
<tr>
<td>5</td>
<td>Butterfly</td>
<td>Lycaenidae</td>
<td><em>Deudorix livia</em></td>
<td>Pomegranate butterfly</td>
</tr>
<tr>
<td>6</td>
<td>Butterfly</td>
<td>Lycaenidae</td>
<td><em>Lampides boeticus</em></td>
<td>long-tailed blue</td>
</tr>
<tr>
<td>7</td>
<td>Butterfly</td>
<td>Lycaenidae</td>
<td><em>Leptotes pirithous</em></td>
<td>Common Zebra Blue</td>
</tr>
<tr>
<td>8</td>
<td>Butterfly</td>
<td>Lycaenidae</td>
<td><em>Lycaena thersamon</em></td>
<td>The Lesser Fiery Copper</td>
</tr>
<tr>
<td>9</td>
<td>Butterfly</td>
<td>Lycaenidae</td>
<td><em>Polyommatus icarus</em></td>
<td>The common blue</td>
</tr>
<tr>
<td>10</td>
<td>Butterfly</td>
<td>Lycaenidae</td>
<td><em>Pseudozizeeria maha</em></td>
<td>The Pale Grass Blue</td>
</tr>
<tr>
<td>11</td>
<td>Butterfly</td>
<td>Lycaenidae</td>
<td><em>Tarucus balkanicus</em></td>
<td>Little Tiger Blue</td>
</tr>
<tr>
<td>12</td>
<td>Butterfly</td>
<td>Lycaenidae</td>
<td><em>Zizeeria knysna</em></td>
<td>Dark Grass Blue</td>
</tr>
<tr>
<td>13</td>
<td>Butterfly</td>
<td>Nymphalidae</td>
<td><em>Melitaea ornata</em></td>
<td>Jerusalem fritillary</td>
</tr>
<tr>
<td>14</td>
<td>Butterfly</td>
<td>Nymphalidae</td>
<td><em>Vanessa atalanta</em></td>
<td>The Red Admiral</td>
</tr>
<tr>
<td>15</td>
<td>Butterfly</td>
<td>Nymphalidae</td>
<td><em>Vanessa cardui</em></td>
<td>The painted lady</td>
</tr>
<tr>
<td>16</td>
<td>Butterfly</td>
<td>Papilionidae</td>
<td><em>Papilio machaon</em></td>
<td>The swallowtail</td>
</tr>
<tr>
<td>17</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Anaphaes aurota</em></td>
<td>African caper white</td>
</tr>
<tr>
<td>18</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Ascia monuste</em></td>
<td>The Great Southern White</td>
</tr>
<tr>
<td>19</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Colias croceus</em></td>
<td>Common Clouded Yellow</td>
</tr>
<tr>
<td>20</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Colias philodice</em></td>
<td>Clouded Sulphur</td>
</tr>
<tr>
<td>21</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Euchloe belemia</em></td>
<td>The Green-striped White</td>
</tr>
<tr>
<td>22</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Pieris brassicae</em></td>
<td>The large white</td>
</tr>
<tr>
<td>23</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Pieris rapae</em></td>
<td>The small white</td>
</tr>
<tr>
<td>24</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Pontia glauconome Klug</em></td>
<td>Desert Bath White</td>
</tr>
<tr>
<td>25</td>
<td>Butterfly</td>
<td>Pieridae</td>
<td><em>Pontia daplidice</em></td>
<td>The Bath White</td>
</tr>
<tr>
<td>26</td>
<td>Moth</td>
<td>Arctiidae</td>
<td><em>Utetheisa pulchella</em></td>
<td>The Crimson-speckled Flunkey</td>
</tr>
<tr>
<td>27</td>
<td>Moth</td>
<td>Crambidae</td>
<td><em>Stemorrhages costata</em></td>
<td>The white palpita moth</td>
</tr>
<tr>
<td>28</td>
<td>Moth</td>
<td>Crambidae</td>
<td><em>Stemorrhages sericea</em></td>
<td>The large emerald pearl</td>
</tr>
<tr>
<td>29</td>
<td>Moth</td>
<td>Crambidae</td>
<td><em>Pleuroptya ruralis</em></td>
<td>The Mother of Pearl moth</td>
</tr>
<tr>
<td>30</td>
<td>Moth</td>
<td>Geometridae</td>
<td><em>Hypomecis punctinalis</em></td>
<td>The Pale Oak Beauty</td>
</tr>
</tbody>
</table>
Carcharodus alceae is widespread in the Palaearctic region: it occurs from the Sahara to Northern Germany and from Portugal to the Altai, Turkestan and Kashmir, from where it penetrates the Oriental region along the Southside of the Himalayas to Mussoorie; isolated from its main range where it occurs in Southwestern Arabia. Although it is a species of dry and warm localities, such as steppes, sunny slopes, dry meadows, etc., even flying in the semi-desert in Morocco, it ascends to 1600 m in the Alps (Kauffmann, 1951).

This butterfly is common and widespread on the coast from June onwards, with the autumn broods being by far the largest. It descends the Beqaa Valley from the Syrian desert, and in late autumn may be found to 1400 m NN in the mountains occasionally. It is probably permanently established in Lebanon, but is supplemented by migration from the south and attempts to colonies the mountains in autumn (LARSEN, 1974).
**Deudorix livia** is generally distributed in Saharan and Sub-Saharan Africa as far south as northern Kenya in the east. It is widespread in the Arabian Peninsula, reaching the Mediterranean Coast in Egypt, Palestine, Lebanon and Syria. It is an extremely polyphagous species with its larvae boring into the fruits of such diverse plants as *Acacia*, *Phoenix*, *Punica*, *Eriobotrya*, *Olea*, and even rice grains. Therefore, it is included in lists of potential or actual pests in some countries (MÜLLER et al., 2005).

The Long-tailed Blue is widely distributed in the Paleotropics from which it migrates into the Palaearctic region. It is found virtually in all types of habitats. Collecting dates suggest that two broods emerge annually, one in May and June and another in September and October (Katbeh et al., 2003). In the study area it was found feeding mostly on *Carduus argentatus* (Compositae) as seen in Photo(4) above.
In Africa *Leptotes pirithous* is a very common and widely distributed species, and probably occurs in every country, although it has not yet been reported from Mali. It also occurs on Madagascar. *Leptotes pirithous* in Africa and Asia are popularly known as Zebra Blues. *Leptotes pirithous* was on a single occasion in 1938 captured in southern Britain, where it was given a different name - Lang's Short-tailed Blue. The latter name is misleading, as the butterfly is only distantly related to other "Short-tailed Blues", which are members of the genus *Cupido* (Everes). (http://www.learnaboutbutterflies.com/Africa-%20-Leptotes%20pirithous.htm)

The Lesser Copper occurs from Italy and Austria to the Balkans, the Middle East Afghanistan. Larsen & Nakamura (1983) discussed the sub specific forms of this species; kurdistanica and omphale, and concluded that the later is a valid subspecies for the Levant. Adults prefer the flowers of *Eryngium creticum*, while larvae feed on *Rumex*, *Sarothamunus* and *Polygonum* (Katbeh et al., 2003).
World range: Widespread (North Africa and Europe to Afghanistan)  
Ecology: Meadows and open spaces up to 2000 m. Host-plants: Leguminous plants, probably Medicago. Two generations in most years, three in good years (Zalat, 2007) In the area of study it was found feeding on Heliotropium species (Boraginaceae) as seen in photo (7).

The genus Pseudozizeeria comprises of a single species maha. It is widely distributed across much of Asia from Iran and Pakistan to China, Korea and Japan.  
this species is found in open grassy habitats. It is most abundant on the plains, but also commonly occurs on savannah / woodland mosaics, Acacia scrub, and in forest glades and clearings. It can be found at elevations between sea level and about 800m.

http://www.learnaboutbutterflies.com/India%20-%20Pseudozizeeria%20maha.htm

In the study are it was found mostly feeding on Polygonum equisetiforme(Polygonaceae) and Glinus lotoides (Mullginaceae) as seen on photo (8) above.
World range: NW India and Afghanistan through the Middle East to the Balkans and Arabia, through the Sahel to Mauretania, Tunisia and Algeria. Ecology: Desert areas near host plant. Host-plant: Zizyphus spina-christi (Rhamnaceae). Three generations per year in Europe (Zalat, 2007)

Although it has been demonstrated the *M. ornata* is rather a Ponto-Mediterranean Turkestanic species than a ponto-Mediterranean one, there are many unanswered questions about its distribution still remaining. *Melitaea ornata* is a mono- or oligophagous species feeding on different Asteraceae, mainly on regionally different, sometime endemic *Centaurea* species (Russell et al. 2007) In the area of study it is rare observed and was found mostly feeding on *Capsella bursa-pastories* (Brassicaceae) as seen on photo (10)above.
The migrant *Vanessa atalanta* (L.) occurs throughout Europe and North Africa. In autumn, populations emigrate from northern and central Europe to the Mediterranean region to overwinter. In the spring, the northern range is recolonized by migrants from the south. The dynamics of the species in the winter range is poorly known. The complex phenology of *V. atalanta* in its southern range has evolved as a strategy to track larval resources through space and time. Autumn migration coincides with the greatest availability of the main food plant, *Verbesina encelioides* (Compositae) as seen in photo (11) and on *Parietaria Judaica* (Urticaceae).

It is a marked opportunist, capable of rapid colonization of vast area in the temperate parts of the world each year, as these areas become favorable in spring. Many of its hosts, including Asteraceae and Malvaceae, are also good nectar sources, which makes it an interesting species with respect to the conflict between searching for adult and larval feeding resources (Bernays, 1998).
These are the largest and among the most brilliantly hued of all butterflies. The family is named for the long tails than several species at the lower end of the hindwings. There are around 700 known species of the swallowtails (Cassie, 2004). In was found in the Wadi Gaza feeding on *Foeniculum vulgare* (Apiaceae) where this plant is widely present near Wadi Abo-Qatroom in the East.

The Caper white is a strong tropical migrant butterfly. (LARSEN & NAKAMURA (1983) referred to several occasions citing the migratory behaviour of this butterfly in Lebanon and Palestine. It feeds on *Capparis spinose* (Capparidaceae) and *Verbesina encetoides* (Compositae) as seen in photo (14).

World range: Narrow (Mediterranean basin and Middle East, a migrant to most of Europe)
Ecology: Cultivated areas. Hostplants: Mainly (Medicago and sativa). (Several generations per year (Zalat, 2007)

![Photo(16): Colias philodice (Pieridae), Taken by Zuhair Dardona]

This butterfly is often seen swarming around mud puddles. The larvae feed on clover related plants (Klass, 1956).

![Photo(17): Euchloe belemia (Pieridae), Taken by Zuhair Dardona]

World range: Narrow (Iberia to Iraq, with isolated populations in the Asir/Yemen mountains and in Ethiopia) Ecology: Rough places with flowers, in less arid places than *E. falloui*; with a pupal summer diapause. Host-plants: desert Cruciferae, although locally one species is usually preferred. Two or three generations per year (Zalat, 2007).
The Large White is found from North Africa via most of Europe and the Middle East to the Himalayas. It occurs in Chile and South Africa. It is a migrant species.

It feeds on several species of family Brassicaceae and *Capparis spinosa* (Capparidaceae) (Katbeh et al., 2003).

The small white is one of the best known and commonly encountered temperate area butterflies. Although native to the Palaearctic, it is now nearly ubiquitous in suitable disturbed habitats in North America, New Zealand, and Australia. It has been extensively studied in the agricultural, ecological, and physiological literature (Robbins & Henson, 1986).

The Desert White is an eremic species found in North Africa, Arabian and Middle Eastern deserts. Larvae feed mostly on *Zilla spinosa* L. (Brassicaceae) and *baccatus Del.* (Resedaceae) (Katbeh et al., 2003)
Until 30 years ago, *Pontia daplidice* was thought to represent a species with a vast distribution, from the Canary Islands in the west across most of the Palaearctic region to Japan in the east (John et al., 2013).

The moth has yellowish white forewings patterned with black and red markings. The hind wings is white with irregular white lines. Distribute in Mediterranean Europe to Africa and Middle East (Carter, 1992)
Phaiogramma faustinata occurs mostly in dry and warm lowland habitats. The larva feeds polyphagous in the herb layer. It occurs in North Africa (south to Sudan), the Canaries, southernmost Europe (coastal areas of southern Portugal, Spain and rarely also Southern France, Balearic Islands, Sicily, Malta, Crete, Cyprus and from the Near East to the Arabian Peninsula.

(http://www.pyrgus.de/Phaiogramma_faustinata_en.html)

Photo(24): Rhodometra sacraria (Geometridae), Taken by Zuhair dardona

The long thin caterpillar is pale brown or green. It feeds on Knotgrass, chamomile and other plants. A migrant species occurring throughout Europe, and ranging to North Africa and northern India (Carter, 1992).

(http://ukmoths.org.uk/species/pleuroptya-ruralis/)

Photo(25): Pleuroptya ruralis (Crambidae), Taken by Ayman dardona

One of the largest of Britain's so-called 'micro-moths'; in fact it is larger than many of the 'macro-moths', though this division is largely artificial. The moth rests with all four wings on display, which show a colourful rainbow-like lustre in certain lighting conditions, as the English name suggests. Common throughout most of Britain, the adults fly from dusk onwards, and are often attracted to light. The larvae feed on nettle plants, in a rolled-up leaf.
Photo(26): Noctua pronuba (Noctuidae), Taken by Zuhair dardona

This distinctive moth is variable in both sexes, the forewings of the males range in color from mild-brown to brownish black, while those of females vary from reddish brown to yellowish or grayish brown. The hind wings of both sexes are deep yellow with a black border. The caterpillar feeds on dock and grasses, and a minor pest of garden flowers and vegetables. It distributes in Europe ranging to North Africa to western Asia (Carter, 1992).

Photo(27): Theretra alecto (Sphingidae), Taken by Zuhair dardona

The hawk moths are medium to large-sized, heavy-bodied moths with characteristics of bullet-shaped bodies and long, blade-like wings. Hawk moths are strong fliers, which can reach 40-50 km/hr. Hawk moths are represented by about 1000 species all over the world (Carter, 1992). Out of 1000, 63 species are distributed in western Palaearctic Region in which Turkey is located (Pittaway, 1993).

IV. DATA ANALYSIS

Data were analyzed by Excel sheets, as the research is a survey, the distributions and biodiversity richness were considered, the frequency tool used to check the taxa compositions, family compositions and genus varieties.

2-1: Taxa compositions:

This survey shows that the butterflies are abundant where they form (69%) of the recorded species while the moths are (31%) as shown in figure (4).
2-2: Family compositions:

Data revealed that the recorded butterflies are belonging to five main families, the most frequently recorded is Pieridae family (36%) followed by Lycaenidae (32%) and Nymphalidae (12%). Figure (5) shows the family composition of butterflies.

Regarding moths, data revealed that the recorded moths in the study area are belonging to five main families. Noctuidae, Geometridae and Crambidae are represented with three species for each family while the other two families have only one species for each, see figure (6).

The previous analysis was done for each taxa separately, when the whole recorded (36 species) were analyzed data showed some significant figures indicating the abundance of butterflies with (25 species) and only (11 species) for moths. The most abundant family
for the recorded Lepidoptera in this study is Pieridae (9 species) followed by Lycaenidae (8 species), (4 species) for Hesperiidae and (3 species) for Nymphalidae, Noctuidae, and Geometridae, as seen in graph (7).

![Graph showing the distribution of butterfly families and their species counts.]

### 2-3: Genera compositions

The diversity in this spectrum indicates that there are (25 species) of butterflies belonging to (5 families) and (19 genera). Only six genera are represented with two species where each genus of them forms (8%) of the recorded butterfly genera while the others with one species, as seen in figure (8).

![Bar chart showing the representation of butterfly genera.]

The genera composition in case of moths are more simple, that there are only (10 genera) belonging to (5 families) and (11 species), only one genera are represented with two species (*Stemorrhages*), the rest are represented only with one species for each as seen in figure (9).
V. DISCUSSIONS

A total of 36 species of Moths and Butterflies were recorded from different ecological sites in Wadi Gaza, there is no published studies about butterflies and moths in Gaza so this study considered the first one. According to this study 69 % from the total recorded species are butterflies while the rest are moths, Though the number of butterflies is less than moths in nature, but during the time of this study in Gaza butterflies were abundant by (69 %) while moths are (31 %) only, this may because that ecological conditions were favorable for butterflies where the vegetation and flowering in spring attract these insects, also as the survey was done during daytime, where the activities of butterflies are more than the moths. Though some significant moths are recorded and documented in this time of survey.

Both taxa species (butterflies and moths) belong to five families for each, the richness in terms of family is the same in the two taxa, while there are significant diversity in terms of species and genera. The five families of butterflies are consisting of (25 species) and (19 genera) while the moths are only (11 species) and (10 genera). There are six genera in butterflies that have two species for each; these genera are (are zizeeria, Vanessa, Colias, Pieris, Carcharodus, and Pointa).

The most abundant family of butterflies was Pieridae with (36%) of all recorded butterflies, followed by Lycaenidae with (32%). As for moths, the abundant families are Noctuidae, Geometridae, and Crambidae were each family was represented by (3 species). Most recorded butterflies and moths are migrants from the Mediterranean region to the study area during the spring and summer as the study was carried out at this period.

Katbeh et al., (2003) studied the biodiversity of butterflies in Jordan, they recorded 91 species of butterflies, 19 of them were recorded in this study while 6 of the recorded butterflies in this study ( Gegenes pumilio, Pelopidas thrax, Pseudozizeeria maha, Anaphaeis aurota, Ascia monuste and Colias philodice) were not documented in Jordan. In another study carried out in Egypt by Zalat, (2007), 61 spices of butterflies were recorded, 19 of them were recorded in this study while 9 were not documented in Egypt ( Gegenes pumilio, Pseudozizeeria maha, Anaphaeis aurota, Colias philodice, Ascia monuste, Tarucus balkanicus, Carcharodus flociferus, Melitaea ornata and Papilio machaon).

According to the previous studies ( Gegenes pumilio, Pseudozizeeria maha, Anaphaeis aurota, Ascia monuste and Colias philodice) were recorded only in Gaza, but Pseudozizeeria maha is the most dominant species and it was noticed that it is associate with specific type of vegetation, especially Polygonum genus ( polygonaceae) and Glinus lotoids ( mullignaceae) these plants were very common in the area of study.

According to Zalat. (2007). Papilio Saharae and Tarucus Rosaceus were recorded in Egypt while Papilio machaon and Tarucus balkanicus were recorded in Gaza this can be explained by the deference's between Gaza and Egypt in both climate and vegetation. Finally it was noticed that butterflies are associated with several flora families, it is realized that the compositaea family was the most abundant in the study area, these plants usually dry in summer. The dried parts are good for moths.

REFERENCES


[17] Livia (Klug, 1834) in Europe (Lepidoptera, Lycaenidae). A talan ta (Juli 2 0 0 5 ) 3 6 (1/2): 1 0 9 -1 1 2 , W ü rz b u rg, IS S N 0 1 7 1 -0 0 7 9.


AUTHORS

First Author – Zuhair W. Dardona Msc Microbiology: Email:zuhair.dardona@gmail.com

Second Author – Ayman W. Dardona Msc Limnology: Email:dardonageo@yahoo.com

Third Author – Mohammed A. Albayoumi Msc Microbiology: Email:drmoh2002@yahoo.com