T.R.
SİİRT UNIVERSITY
INSTITUTE OF SCIENCE

STUDIES ON THE FAUNA OF PAPILIONOIDEA AND HESPERIOIDEA OF DUHOK (LEPIDOPTERA)

MASTER DEGREE THESIS

Student: NAJI TAHA SAID
(153104007)

Department of Biology

Supervisor: Asst. Prof Dr. Mustafa Cemal ÇİFTÇİ

September - 2017
SİİRT

THESIS ACCEPTANCE AND APPROVAL

Studies on the Fauna of Papilionoidea and Hesperioidea of Duhok (Lepidoptera) Prepared by "**Naji Taha SAID**" Thesis study 20/9/2017 Date of unanimity by the following jury/ Siirt University Institute of Science and Technology, Biology Department of Higher Education MASTER OF SCIENCE thesis.

Jury Members	**Signature**
President- Supervisor	
Asst. Prof Dr. Mustafa Cemal ÇİFTÇİ	
Member	
Asst. Prof Dr. Erdem SEVEN	
Member	
Asst. Prof Dr. M. Emre EREZ	

I confirm the above results.

Assoc. Dr..... .....
Director of Institute of Science
Doç.Dr. Koray ÖZRENK
Fen Bil. Enst. Müdürü

This thesis study ..... By ..... The project was supported by numbered.

ACKNOWLEDGEMENT

I wish to express my special thanks and appreciation to my supervisor Asst. Prof Dr. Mustafa Cemal Çiftçi who helped me to achieve this work. And thanks to Asst. Prof Dr. M. Emre Erez and Asst. Prof. Dr. Erdem Seven (Batman University), for his guidance during the course of this study, and for his patience, support and encouragement.

Special thanks go to Prof. Dr. Murat Erman President of University of Siirt for his help and support, special thanks to Assoc. Prof. Dr. Koray Özrenk Director of Institute of Science and Assoc. Prof. Dr. Veysi Okumuş Head of Biology Department at Siirt University.

I would like to express my deep thank to Dr. Mehmet Fidan Biology Department, University of Siirt for their help.

Finally, I would like to thank my friend and all family members for helping me to complete my study successfully.

NAJI TAHA SAID

SİİRT-2017

DEDICATION

To the soul of my parents.

To my wife for supporting me step by step

To my son bilind

To all my children.

To my sister and brothers.

To all my great teachers who taught me and brought me up to this level of knowledge.

CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

Page

ABBREVIATIONS LISTS

Abbreviation	Explanation
(ICZN)	**:** International Code of the Zoological Nomenclature
SSP	**:** Species
N^0	**:** North
E^O	**:** East
M	**:** Meter
Cesa	**:** Centre for Entomological Studies Ankara
ZW	**:** Females are the heterogametic sex
ZZ	**:** Males homogametic

ÖZET

YÜKSEK LİSANS TEZİ

'' Duhok'un Papilionoidea ve Hesperioidea Faunası Üzerine Araştırmalar (Lepidoptera)''

Naji Taha SAID

Siirt Üniversitesi Fen Bilimleri Enstitüsü
Biyoloji Anabilim Dalı

Danışman: Yrd. Doç. Dr. Mustafa Cemal ÇİFTÇİ

2017, 71 Sayfa

Bu çalışmada, Duhok, Kuzey Irak'taki kelebek türlerinin tespiti amaçlanmıştır. 2016-2017 yıllarında Duhok İlinden toplanan 1279 örnek ekolojik ve faunistik açılardan değerlendirilmiştir. Papilionoidea, Argynnidae(Nymphalidae), Pieridae, Lycaenidae, Hesperiidae, Satyridae ve Libytheidae familyalarından toplam 49 tür çalışma alanından kayıt edilmiştir.

Her türün geçerli ismi, sinonimleri, Kuzey Irak'taki yayılış durumu, habitat tercihleri, dikey dağılışları, fenolojik ve topografik özellikleri verilmiştir. Bilimsel isimlerin kullanımı Zoolojik Nomenklatür Kurallarına (ICZN) göre yapılmıştır.

Anahtar Kelimeler: Lepidoptera, Papilionoidea, Hesperioidea, fauna, Duhok, Irak.

SUMMARY

MSc THESIS

Studies on the Fauna of Papilionoidea And Hespreioidea Of Duhok (Lepidoptera)

Naji Taha SAID
The Graduate School of Natural and Applied Science of Siirt University
The Degree of Master of Science
In Biology Science

Supervisior: Asst. Prof. Dr. Mustafa Cemal Çiftçi

2017, 71 page

The present study was conducted in north of Iraq in Duhok to collect the butterflies species. In this study, 1279 specimens have been collected by the author in Duhok government district between 2016-2017 and evaluated from the ecological and faunistic standpoints. Totally 49 species belong to Papilionoidea, Argynnidae(Nymphalidae), Pieridae, Lycaenidae, Hesperiidae, Satyridae and Libytheidae have been recorded in the studied area.

For each species, valid scientific names, synonyms, distributional informantion within North of Iraq, as well as habitat preferences, distribution of altitude, phonological and topographical features were mentioned in thesis. The scientific names of species used in the text were adopted in accordance with the International Code of the Zoological Nomenclature (ICZN).

Keywords: Lepidoptera, Papilionoidea, Hesperioidea, fauna, Duhok, Iraq.

1. INTRODUCTION

1.1. Importance and Purpose of the Study

The purpose of this study is to know the number of species of butterflies in Duhok City, northern Iraq. The field has not previously been worked on and for such kinds of butterflies.This is the first comprehensive study in this field and this study is useful in the case of the extinction of butterflies in the study area, to know the habitat, physical characteristics of each butterflies and to know their distribution area.

In this study, 1279 butterflies samples were collected and 49 species were identified in the families: Papilionidae (4), Pieridae (9), Lycaenidae (11), Hesperiidae (7), Agynnidae (Nymphalidae) (7), Satyridae (11) and Libytheidae (1) from (Duhok, Zaxo, Amedi and Shikhan) in northern region of Iraq. The results of this study compared with (Ahmad *et al*., 1999) as a results of the examination of more than 3350 specimens which comprise 63 species of butterflies from the different ecological zones in Jordan. And also we compared our results with the result of the faunistic Study on Papilionoidea and Hesperioidea (Lepidoptera) of Göksu Valley in Mut, Southern Turkey (Yusuf, 2013). The specimens belonged to 131 species in five families, including Papilionidae (6species), Pieridae (16), Nymphalidae (42), Lycaenidae (53), and Hesperiidae (14).

1.2. General Information About Butterflies

The largest group of individuals and organisms in living organisms constitute insects. In the insect class, butterflies and moths are distinguished from other insects by the fact that their wings are covered with scales. Due to these characteristics butterflies and moths are examined under Lepidoptera team. One of the important differences that distinguish butterflies from security is the shape of their antennas. In the butterfly, the antenna always shows a ball-shaped thickening in the end zone. The ball is a cylindrical or flattened structure. The tip may be round or hook-shaped. On the gauze, the antenna is usually in the form of thread or comb, toothed, hairy, lamellar and so on (exceptions are Zygaenidae).

When butterflies are always active in the daytime, they often act as night shifts because they are sensitive to light. Very few are daytime actors. While many butterflies

choose to rest their wings closed and upright. The wings are open and flat. When butterflies come in one place, they collect their. Wings on top of their body, standing in position perpendicular to their position. The grooms open their wings by spreading their wings. Often butterflies have wings with striking colors and patterns, while the sterns have palecolors.

Butterflies are insects in the clade Rhopalocera from the order Lepidoptera, which also includes moths. They are beautiful, flying insects with large scaly wings. Like all insects, they have six jointed legs, 3 body parts, a pair of antennae, compound eyes, and an exoskeleton. The three body parts are the head, thorax (the chest), and abdomen (the tail end). The butterfly's body is covered by tiny sensory hairs. The four wings and the six legs of the butterfly are attached to the thorax. The thorax contains the muscles that make the legs and wings move. Butterflies have clubbed antennae.

Adults are characterized by their four scale-covered wings, which give the Lepidoptera their name (Ancient Greek λεπίς lepís, scale + πτερόν pterón, wing). These scales give butterfly wings their colour. (Vukusic *et al* 2000). Nearly all butterflies are diurnal, have relatively bright colours, and hold their wings vertically above their bodies when at rest. (Prum *et al*., 2006).

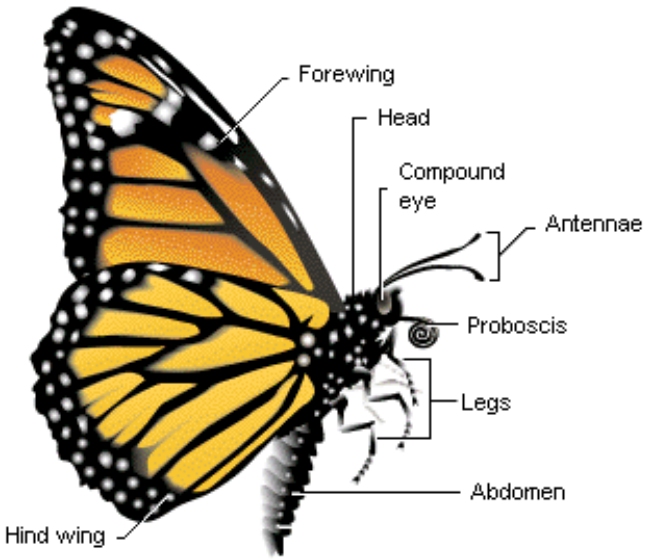


Figure (1.1) physiology of butterfly

Butterflies in their adult stage can live from a week to nearly a year depending on the species. Butterflies are living organisms that undergo holometabol (complete

metamorphism) and are carried out in four stages: eggs, caterpillars (larvae), pupae (cocoons) and butterflies. After mating, the female individual puts her fertilized egg on or near a suitable food plant. The reason for this is that the caterpillars that leave the egg must be selective in terms of the plant they feed on. In some species, the egg completes embryonic development in as little as a week, while in some species it sleeps through a long winter period.

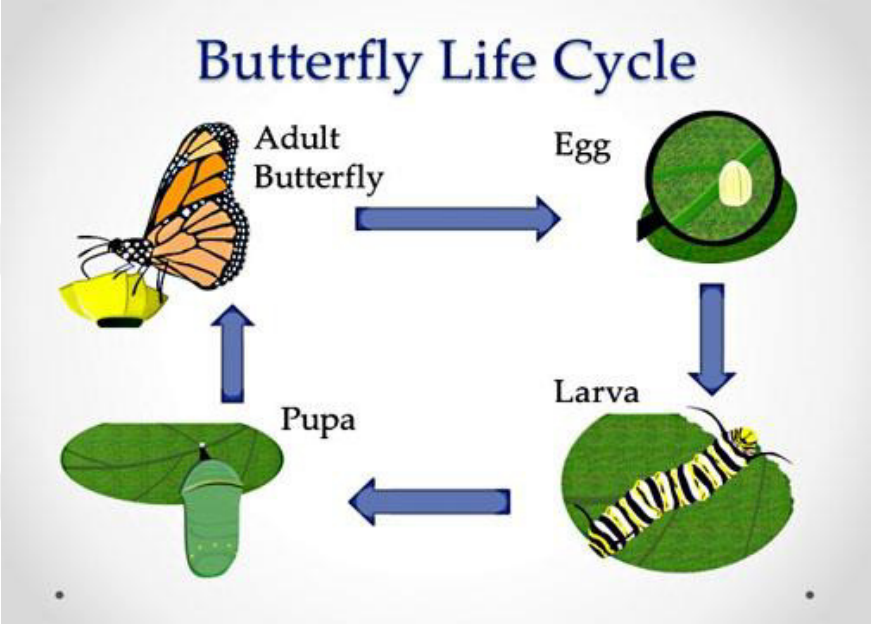


Figure (1.2) life cycle of butterfly

The system of butterflies is made according to characteristics such as antenna types, mouth parts, wing shape, vascular types, color and pattern formed by scales, morphological structure of legs, shape of genital organs, shape and pattern of egg. The young larvae grow out of maturing eggs and the heads, chest and abdomen are distinguishable from each other in these larvae. The caterpillars with cutter-chewing mouth parts on the head are fed with root, stem, flower, fruit and leaves of the plants. There are 3 segments in the chest area and a pair of walking shoes in each segment. There are 10 segments in the abdominal region and 2-4 pairs of pseudo-feet from these segments are distinctive characters for butterfly and moth caterpillars. Caterpillars complete their development in at least 5 stages. Leather in every phase.

And in the last stage it turns into a pupa by knitting a cocoon. In this phase, the individual is immobile and stops feeding. Pupada head, chest and abdomen can be

distinguished. The individual who matures in the pupa cracks the pupa sheath and exits and inflates its wings to form a mature individual. In the meantime, hanging in one place, the body of the body is provided and the individual becomes ready for flight. The features such as the shape of the cup, the environment it is in and the holding of the cup are of systematic importance.

Many are well camouflaged; others are aposematic with bright colours and bristly projections containing toxic chemicals obtained from their food plants. The pupa or chrysalis, unlike that of moths,is not wrapped in a cocoon. Many butterflies are sexually dimorphic. Most butterflies have the ZW sex-determination system where females are the heterogametic sex (ZW) and males homogametic (ZZ). (Gullan and Cranston,2014).

Different kinds of plants are used as food for butterflies such as: *Citrus sinensis, C.limon, C.reticulata, Quercus brantii, Q.infectoria, Q.ithaburnesis, Daphne mucronata, Triticum aestivnm, Sulix alba, Cucurbita pepo and Anethum graveoleus.* (Prum *et al*.,2006). Figures(1.3).

Citrus limon *Quercus infectoria* *Citrus sinensis* *Quercus branti*

Figures(1.3) Some photo of fruit and plant in study area

1.3. Geological Features and Geographical Location of the Study Area

North of Iraq namely Duhok City is a mountainous area situated at the northern and north eastern parts of Iraq, varying from some 500-800m in altitude in the lowest valleys to from 2000-3600m at the summits of the highest ranges, and it is with a cold winter and relatively high rainfall upwards to 800mm and the mountains above approximately the 1800m level are snowbound for several months and snow often falls

in the valleys while the summer though hot and dry, is comparatively of shorter duration than on the other parts of Iraq. (Guest and Alrawi, 1966).

Duhok City lies in the far north-west of Iraq and forms the western governorate in northern Iraq. It has a strategic location since it is considered to be a point of joint among three parts of northern Iraq (Syria-Turkey-Iraq).

It is lies in the portable area, which means between the wavy area and high mountainous area, the general shape of the governorate is an irregular rectangle and the longitude line almost divides it in (34) degree to the east into two halves and passes in the center of the governorate. It lies between the two lines of latitude (36.40) and (37.20) degree to the north, so it situates to the north of Equator in the northern Equinoctial area. (Guest and Alrawi, 1966).

Figure (1.4). Iraq map orange area indicate duhok region.

Figure (1.5). Duhok map that some area in duhok governorate.

The geographical location of the studied area lies between latitudes 34°42'N and 37°22'N and between longitudes 42°25' and 46°15' east. The region shares its borders with Syria in the west, Turkey in the north and Iran in the east (Mohamed, 2001).

The climate of northern Iraq region has been identified according to Koppen classification as arid and semi-arid climate (steppe-BSh and Mediterranean – Csa).it is hot and dry in summer and cold and wet in winter, with short spring and autumn seasons compared to summer and winter (Murat, 1996).

In winter, northern Iraq falls under the influence of Mediterranean cyclones that moves east to northeast over the region. The Arabian Sea cyclones move northward passing over the gulf carrying great amounts of moisture causing large amounts of precipitation over northern Iraq region.Occasionally, European winter cyclones move eastward to the southeast part of Turkey and over the mountainous region of northern Iraq, bringing substantial amounts of rain and snow (Murat, 1999).

In summer, the region falls under the influence of sub-tropical high pressure belts and Mediterranean anticyclones. The sub-tropical high pressure centers that moves from west to north and northeast passing over the Arabian Peninsula carrying sand and dust to the region. The maximum daily temperature may reach as high as 50^{o}C in hot summer periods, while the minimum daily temperature can drop to -10^{o}C in cold winters (Edward and Robert, 2006).

The limitation of this study was that during my work in collecting the butterflies I have got many troubles as some area were not safe to be in but we went to many unsaved area to collect butterflies.

1.4. Flora of the Study Area

In the study area few accounts of forest trees are available but no simple yet complete up to date field manual for entire trees and shrubs of north of Iraq has been available.(Shahbaz *et al*, 2002).

The flowering plants have been found on Duhok City (study area) are: *Rosaceae, Salicaceae, Boraginaceae, Malvaceae, Paeoniaceae, Araceae, Asteraceae, Brassicaceae, İridaceae, Liliaceae, Amaryllidaceae and Orchidaceae* families and listed in the table (1.1).

Table1.1 plant species in the study area.

Family	Species
Rosaceae	*Rosa foetida, R.gallica, R iberica, R.elymaitica, R heckeliana, R.phoenicea, R. xcentifolia*
Salicaceae	*Populus alba*
Boraginaceae	*Echium italicum, Anchausa strigosa*
Malvaceae	*Melva nicaeensis, M.neglecta, M.parviflora*
Paeoniaceae	*Paeonia mascula*
Araceae	*Arum italicum*
Asteraceae	*Astremisia herba-alba*
Brassicaceae	*Nastrurtium officinale*
İridaceae	*Crocus cancellatus subsp.damascenus*
Liliaceae	*Fritillaria imperialis, Tulipa kurdica*
Amaryllidaceae	*Narcissus tazzaetta*
Orchidaceae	*Ophrys bornmuelleri, O.sphegodes, O.umbilicata, O.schulzei, O.reinholdii, Anacamptis pyramidalis, Orchis anatolica, O.mascula,O.simia,O.punctulata, O.collina,O.coriophora*

2. LITERATURE REVIEW

The Lepidoptera is one of the main orders of insects, with 146.000 species in the world, spread through diverse habitats from cooler regions to tropical forests. In the Neotropical region, 31.4% of species were described, representing the highest diversity in global biomes (Heppner, 1991). Butterflies are organisms used in biogeography, and plant-insect interactions researches and as environmental bioindicators since they can indirectly assess environmental variations due to its sensitivity to climatic conditions, levels of lightness and proportion of vegetation cover (Brown, 1992).

In stable environments, adults can be found in any season of the year. Linnaeus (1758) recognized three divisions of the Lepidoptera, i.e., *Papilio*, *Sphinx* and *Phalaena*, with seven subgroups in *Phalaena*.

Wiltshire (1937) indicated that only with lepidoptera on the wing between late August and early October in a certain section of the Zagros range lying between Erbil and the (Persian) Urumiyah Plain.It has no claim to completeness, since much of the material is still undetermined. Continental collectors have been working recently in more western and northern parts of north of Iraq and Armenia; these notes are of interest as being, I think, the first made in recent years about the south-easterly section of northern Iraq, whose faunistic affinities, still predominantly Pontic-Turanian, show also a partial Farsi-Baluchi character: in a word we have deserted the Taurus and Anatolia, and are concerned with the Zagros and the edge of the great Iranian plateau.

Whiltshire (1957), presented in this study Lepidoptera of Iraq. The important topics covered in this study are: Species and forms new to science, Systematic order followed, Numbers of species in Families and Super-families, Ecological and phenological adaptations, Distributional analysis of the fauna, Foodplant groups of the woodland zone. Many butterfly species were listed on this list. The distribution of the species benefited from this work.

Carbonell (1991), has made taxonomic assessments on the literature on *Polyommatus* genus. This study was used to determine the species belonging to this genus in the study area.

Hesselbarth *et al.* (1995), presented Turkish butterflies with pictures and detailed information for each species.

Tolman (1997), photographs of the male and female parts of the butterflies were included in his work on British and European butterflies. This publication was used for the diagnosis of the collected samples.

Koçak and Kemal (2001), were presented the check-list of Iraqi butterflies. Number of the species recorded in Iraq are as follows; Papilionidae (7), Pieridae (20), Coliadidae (5), Libytheidae (1), Danaidae (1), Argynnidae (22), Satyridae (25), Lycaenidae (42) and Hesperiidae (22). The full list of 145 species are given with the information of original references and the codes of the elements, which belong to the special faunal regions. Butterflies as faunal elements are evaluated quantitatively. Totally 145 species of butterflies inhabiting in Iraq are the elements of the 37 faunal regions of the Holarctic and Palaeotropical Realms. In other words, The butterfly fauna of Iraq is composed of the elements of the 37 different faunal regions. A faunal comparison between Iraqi and Kazach butterflies is also given.

Koçak *et al.* (2006), presented the record and information on the behaviour of a migrant species *Princeps demoleus* Linnaeus in South East Turkey. A list of the species and subspecies of Papilionidae of Turkey are also given with synonyms, provincial distributions in Turkey and foodplants of caterpillars.

Benyamini *et al*. (2007), mentioned *Papilio demoleus* and its significant damage to citrus crops and also distribution areas. Among our samples, this species is available.

Koçak and Kemal (2007), indicated the Lepidoptera species hitherto recorded in the Şırnak Province in the South East Turkey. Totally 236 species are listed alphabetically under the relevant families. For each species, the scientific name, author, date of publication, synonyms, and distributional information in Turkey as provincial codes are given. Some species in our thesis about global distributional information were arranged according to this source.

Akın (2008), showed that 642 specimens have been collected by the author in Ceylanpınar district between 2004-2006 and evaluated from the ecological, faunistic and zoogeographical standpoints. Totally 33 species belong to Papilionoidea and Hesperioidea have been recorded in the studied area. Among them, 8 species are new to Fauna of Şanlıurfa. For each species, valid scientific name, original references,

synonyms, distributional information within Turkey and world, faunal elements, habitat preferences, phenological and topographical features are mentioned in the thesis.

Farzana (2008) presented 21 species from families *Namphalidae, Papilionidae* and Pieridae covering 33%, 10%, and 57% butterfly diversity the area, respectively. Family Namphalidae included: species *Argynnis hyperbius* Linnaeus, *Ariadne merione* (Cramer), *Cynthia cardui* (Linnaeus), *Junonia almanac* Linnaeus, *J. orithya* Linnaeus, *Phalantha phalantha* (Drury), and *Hipparchia parisatis* (Kollar). Representative family Papilionidae included *Papilio demoleus* Linnaeus and *P. polytes* Linnaeus. While Pieridae included: *Colias croceus* (Geoffroy); *Catopsilia pomona* Fabricius; *C.etrida* Boisduval, *Colotis protractus* Butler; *Eumera hecab* (Linnaeus), *Gonepteryx rhamni* (Linnaeus), *Ixias pyrene* Linnaeus, *Belenoi aurota* Bingham, *Pieris ajaka* Moore, *P.brassicae* Linnaeus, *P.napi* (Linnaeus), *P.rapae* Linnaeus. A detail study is required for further exploration of butterflies' fauna of Kohat.

Seven (2010), gave in this study, 2962 specimens were collected by the author in Şirvan district between 2008-2009 and evaluated from the ecological, faunistic and zoogeographical standpoints. Totally 115 species belong to Papilionoidea and Hesperioidea were recorded in the studied area. While 53 species new to Siirt Province, 100 species were new to Şirvan district. For each species, valid scientific names, original references, synonyms, distributional information within Turkey, as well as faunal elements, habitat preferences, altitudinal distributions, phenological and topographical features were mentioned. The scientific names of the species used in the text were adopted in accordance with the International Code of the Zoological Nomenclature (ICZN).

Kemal and Koçak (2011), gave in this article in the Lepidopterology, dealing with the checklist of the butterflies of the East Mediterranean countries, Turkey, Cyprus, Syria, Lebanon, Israel, Jordan, and Iraq. Totally 448 species in 9 families are listed synonymically. Range of each species and subspecies is explained as codes of the countries. Distribution of each species and subspecies in Turkey is mentioned with the official provincial numbers. All the information are based upon the info-system of the Cesa; therefore the basic text of this article is extracted from the database system arranged and maintained regularly by the authors. Images used are from the archive of the Cesa and photographed by the first author under natural conditions, in various years

and seasons. Identifications of all taxa including images belong to the authors. A selected bibliography of the butterflies of the seven countries is given alphabetically according to the names of the authors. It is also based upon the Library of the Cesa.

Koçak *et al.,* (2011), presented in this articlethe Lepidoptera fauna of Van Province (East Turkey). Totally, 1153 species of the 43 families are listed alphabetically. Synonymous names are arranged chronologically and added to each species. The families recorded in the province are given below alphabetically: *Adelidae,* Alucitidae, Arctiidae, Argynnidae, Autostichidae, Brachodidae, Brahmaeidae, Choreutidae, Cimeliidae, Coleophoridae, Douglasiidae, Elachistidae, Ethmiidae, Gelechiidae, Geometridae, Hepialidae, Hesperiidae, Lasiocampidae, Lecithoceridae, Libytheidae, Lycaenidae, Lymantriidae, Noctuidae, Notodontidae, Oecophoridae, Papilionidae, Pieridae, Psychidae, Pyralidae, Saturniidae, Satyridae, Scythridae, Sesiidae, Sphingidae, Thyatiridae, Tineidae, Tortricidae, Yponomeutidae and Zygaenidae.

Yusuf (2013), investigated the Lepidoptera fauna of Mut and to contribute to the knowledge of Lepidoptera species and their distribution in Turkey.

Saman *et al* (2013) tried to make a first step for making a new list for fauna and flora of northern Iraq in particular and Iraq in general. This is very important study of biodiversity of Iraq. They recognize 52 migratory and resident birds including *Alectoris chukar asoica* which is recently described.Also, 20 amphibians and reptiles including two snakes recently recorded *Zamenis hohenackeri and Platyceps ladacesis,* a new form of *Asaccus* sp. and sub-species of *Varanuns griseus caspeius* for the first time in Iraq, with many rare specimens.Thirteen different species of mammals were recognized, with comments on 5 species of freshwater fishes, 12 species of ticks and7 species of butterflies. For the flora, 8 wild large trees and 70 flowering plants identified including some rare and important species for the first time in this area.

Lahony *et al* (2013), gave some records from north of Iraq including; flora and fauna (birds, amphibians, ticks and insects). The species of butterflies offered are: Vanessa cardui, Brintesia circe, Gonepteryx farinosa and Cahazara prieuri.

Binoy *et al* (2014), presented the Lepidoptera of Iraq have only been studied since World War I. Even now, no complete collection of Iraqi Lepidoptera is to be found in the country, though small collections exist, as at Abu Ghuraib Experimental

Farm and the Bagdad Natural History Museum. The bulk of the material, on which the present list is based having been collected and studied by Europeans, reposes in Europe and has been describbed to a large extent in 2 The Lepidoptera Of Iraq scattered European and Indian publications.

Koçak and Kemal (2015a), were given annoted list of the Lepidoptera of Hakkari Province from southern Turkey neigbour to the northern Iran and Iraq. Totally 773 species of Lepidoptera belong to 32 families were listed alphabetically, together with chronologically arranged synonymous names, and global distributional information of each species as codes. Original references to almost all taxa were supplemented. Observational information of the authors were illustrated. Some species in our thesis about synonymous names and global distributional information that have been arranged according to this source.

Koçak and Kemal (2015b), recored totally 26111 species of the 332 families in 19 ptery got orders (excluding Lepidoptera) are recorded in the following countries with the number of the species: Turkey (18846), Caucasian countries (5429), Cyprus (1490), Syria (2204), Lebanon (1023), Jordan (1015), Israel (3782), Sinai (240), Saudi Arabia (808), Yemen(485), Arab Emirates (166), Oman (226), Bahrain (14), Qatar (46), Kuwait (24), Iraq (1161), Iran (4956), Turkmenistan (2083), Afghanistan (1671) and Pakistan (774).

Mohammed *et al*. (2015). Showed that during 2013-2015 fifty-four species were identified belonging to five families (Papilionidae, Pieridae, Lycaenidae, Hesperiidae, and Nymphalidae). The three most common butterflies observed and collected were the small White *Pieris rapae,* the Bath White *Pontia daplidice*, and the Common Blue *Polyommatus icarus*. Many species seemed rare and to be threatened by loss of habitats including *Archon apollinus*, *Zegris eupheme*, *Gonepteryx cleopatra taurica* and *Hipparchia fatua sichaea.*

Abusarhan *et al* (2016), indicted in their collected sample from 49 localities in the occupied West Bank of Jordan (Palestinian Territories). Fifty-four species were identified belonging to five families (Papilionidae, Pieridae, Lycaenidae, Hesperiidae and Nymphalidae) during 2013-2015. The three most common butterflies observed and collected were the small White *Pieris rapae,* the Bath White *Pontia daplidice*, and the Common Blue *Polyommatus icarus*. Many species seemed rare and to be threatened by

loss of habitats including *Archon apollinus*, *Zegris eupheme*, *Gonepteryx cleopatra taurica* and *Hipparchia fatua sichaea.* We suggest that the most significant threats to butterfly biodiversity in Palestine and the Arab World in general is habitat destruction and climate change. And stated that the distribution of species this in Iraq:

Archon apollinus (Herbst, 1798), *Colotis fausta fausta* (Olivier, 1804), *Pontia glauconome glauconome* (Klug, 1829), *Zegris eupheme* (Esper, 1804) and *Zizeeria karsandra* (Moore, 1865).

3. MATERIALS AND METHODS

3.1. Information about Field Studies

Field studies was done between 2016-2017 for collecting the butterflies. These tables show some information about dates and altitudes of collected butterflies.

Table 3.1. Coordinates, altitudes, dates and plants of the localities.

Locality	**Altitude**	**Studying dates**	**Coordinate**		**Plants**
1.Alkishki	1030m	06.05.2017	37°00’47, 75”N	43°11’15 , 28”E	*Rosaceae ssp, Citrus sinensis Daphne mucronata Citrus sinensis, Triticum aestivnm Paeoniaceae ssp,*
2.Amedi (Bari sili)	1385m	11.05.2017	37°07’00, 56”N	43°30’29, 41”E	*Salicaceae ssp, Daphne Citrus reticulata Herbaceous plants Ranuculus Cardaria draba*
3.Amedi (Diri)	1245m	18.07.2017	37°05’43, 62”N	43°31’23, 02”E	*Amaryllidaceae ssp Orchidaceae ssp Rosaceae ssp Punica granatum*
4.Badi	895m	19.05.2016	36°54’21, 77”N	43°05’40, 09”E	*Boraginaceae ssp, Citrus sinensis Citrus reticulata Rosaceae ssp, Herbaceous plants*
5.Bagira	870m	09.05.2017	36°57’29 , 33”N	43°09’56, 07 ”E	*Malvaceae ssp, sinensis Citrus reticulata Ranuculus Cardaria draba*
6.Bajilur	700m	22.05.2017	36°52’32 , 30”N	43°01’55, 26”E	*Salicaceae ssp, Daphne mucronata Citrus reticulata Triticum aestivnm*
7.Bamerni	1270m	22.05.2017 30.08.2017	37°07’10 , 71”N	43°16’14 , 34”E	*Araceae ssp, Rosaceae ssp, Paeoniaceae ssp Herbaceous plants*
8.Baxurnif	665m	27.04.2017	36°55’34, 79”N	42°58’56, 27”E	*Asteraceae ssp, Paeoniaceae ssp, Rosaceae ssp Herbaceous plants Citrus sinensis, Punica granatum*
9.Berashi	1330m	17.05.2017	37°00’13 , 86”N	43°15’48 , 38”E	*Brassicaceae ssp Asteraceae ssp,*

					Rosaceae ssp Herbaceous plants
10.Chamanki	895m	03.09.2016 19.08.2017	36°55’24, 26”N	43°26’48, 59”E	*İridaceae ssp, Rosaceae ss , Brassicaceae ssp, Herbaceous plants*
11.Daka mountain	580m	16.04.2017	36°46’04, 36”N	43°04’23, 98”E	*Liliaceae ssp, Brassicaceae ssp, Rosaceae ssp, Herbaceous plants Citrus sinensis, Punica granatum*
12.Dirgzhnik	970m	14.05.2017	37°00’20, 21”N	43°05’36, 36 ”E	*Amaryllidaceae ssp, Rosaceae ssp, Herbaceous plants*
13. Diralok	670m	20.07.2017	37°03’29, 61”N	43°38’57, 26”E	*Brassicaceae ssp, Rosaceae ssp Herbaceous plants,*
14.Duhok center	540m	20.04.2016 12.07.2017	36°51’47, 48”N	42°57’49, 31”E	*Orchidaceae ssp, Herbaceous plants Amaryllidaceae ssp, Rosaceae ssp,*
15.Dumiz	440m	25.03.2017	36°47’53, 13”N	42°54’52, 60”E	*Rosaceae ssp, Liliaceae ssp, Citrus sinensis , Punica granatum*
16.Ekmali	1155m	12.05.2017	37°10’16 , 88”N	43°25’59 , 85”E	*Salicaceae ssp, Amaryllidaceae ssp Rosaceae ssp, Herbaceous plants*
17.Etot	710m	17.04.2017	36°49’59, 49” N	43°05’08 , 31”E	*Boraginaceae ssp, Rosaceae ssp,*
18.Gali	645m	29.04.2016	36°53’05, 88” N	43°00’41, 66”E	*Rosaceae ssp*
19.Gali bazi	980m	13.05.2017	37°10’34 , 86”N	43°15’44 , 84”E	*Paeoniaceae ssp, Rosaceae ssp, Boraginaceae ssp,*
20.Gali riman	765m	03.05.2017	36°48’43 , 63”N	43°10’22 , 90”E	*Araceae ssp, Boraginaceae ssp, Rosaceae ssp,*
21.Gara mountain	1720m	17.05.2017	36°59’14 , 44”N	43°23’47 , 83”E	*Asteraceae , Malvaceae ssp, Rosaceae ssp, Brassicaceae ssp*
22.Germava	775m	08.06.2017	36°56’21, 68 ”N	42°59’19, 01 E	*Brassicaceae ssp, Citrus sinensis Daphne mucronata Orchidaceae ssp*
23.Hisi	1410m	12.05.2017	37°09’18 , 76”N	43°27’14 , 73”E	*İridaceae, Rosaceae ssp, Orchidaceae ssp*
24.Hujava	845m	16.05.2017	37°00’34 , 83”N	43°02’48 , 48”E	*Liliaceae, Rosaceae ssp, Orchidaceae ssp*
25.Kanigolan	570m	16.04.2017	36°46’27, 45”N	43°05’59, 64”E	*Amaryllidaceae, Rosaceae ssp Citrus sinensis, Punica granatum*

26.Kemeka	885m	15.05.2017	36°56’58 , 34”N	43°03’07, 50”E	*Rosaceae ssp, Paeoniaceae ssp, Herbaceous plants*
27.Kivila	565m	26.04.2016	36°53’24, 13” N	42°54’39, 20”E	*Citrus sinensis Daphne mucronata Rosaceae ssp, Herbaceous plants*
28.Kura	790m	09.05.2017	36°55’38 , 16”N	43°09’03 , 57”E	*Boraginaceae ssp, Paeoniaceae ssp, Rosaceae ssp, Herbaceous plants*
29.Linava	685m	27.04.2017	36°56’05, 50”N	42°58’28, 32”E	*Malvaceae ssp, Herbaceous plants Salicaceae ssp, Rosaceae ssp,*
30.Magilmaxti	1035m	06.05.2017	37°01’39 , 82”N	43°08’19 , 05”E	*Paeoniaceae ssp, Salicaceae ssp, Rosaceae ssp, Citrus sinensis , Punica granatum*
31.Mamani	900m	01.05.2016	36°56’46, 35”N	43°06’49, 09”E	*Araceae ssp, Rosaceae ssp, Paeoniaceae ssp Herbaceous plants*
32.Mangishki	965m	04.05.2017	37°02’08 , 44”N	43°05’38 , 41”E	*Asteraceae ssp, Paeoniaceae ssp, Rosaceae ssp Herbaceous plants*
33.Maten mountain	1400m	21.05.2017	37°09’30 , 24”N	43°11’00 , 77”E	*Brassicaceae ssp Asteraceae ssp, Rosaceae ssp, Herbaceous plants*
34.Nizarki	705m	25.04.2017	36°49’59, 33”N	43°04’29, 40”E	*İridaceae ssp, Rosaceae ssp, Brassicaceae ssp, Herbaceous plants*
35.Piromara	645m	27.04.2017	36°53’40, 68” N	43°59’31, 45”E	*Liliaceae ssp, Brassicaceae ssp, Rosaceae ssp, Herbaceous plants, Citrus sinensis, Punica granatum*
36.Public garden	565m	05.05.2017	36°50’53, 85”N	42°59’49 , 52”E	*Amaryllidaceae ssp, Rosaceae ssp, Herbaceous plants*
37.Qarqarava	855m	17.09.2016	36°55’53, 11”N	43°01’36, 53”E	*Orchidaceae ssp, Herbaceous plants Amaryllidaceae ssp, Rosaceae ssp,*
38.Rashanki	785m	20.04.2017	36°55’35, 29”N	43°09’53, 83”E	*Rosaceae ssp, Daphne mucronata Citrus reticulata Triticum aestivnm*
39.Sersenk	960m	24.05.2017 30.08.2017	37°02’59, 20”N	43°20’52 , 20”E	*Salicaceae ssp, Amaryllidaceae ssp Rosaceae ssp, Herbaceous plants*

40.Sindur	780m	10.05.2016	36°54’32, 44”N	43°03’42, 28”E	*Boraginaceae ssp, Rosaceae ssp ,*
41.Siyaratika	1180m	10.05.2017	37°00’26 , 95”N	43°13’30 , 78”E	*Rosaceae ssp, Herbaceous plants, Paeoniaceae ssp, Citrus reticulata Triticum aestivnm*
42.Spindari	1245m	18.05.2017	36°59’14 , 31”N	43°17’36 , 71”E	*Paeoniaceae ssp, Rosaceae ssp, Boraginaceae ssp,*
43.Talwa	860m	03.05.2017	36°49’59 , 33”N	43°04’29 , 40”E	*Araceae ssp, Boraginaceae ssp, Rosaceae ssp, Paeoniaceae ssp,*
44.Zawa mountain	810m	25.04.2016	36°50’11, 31”N	42°57’23, 48”E	*Asteraceae, Malvaceae ssp , Citrus sinensis Herbaceous plants*
45.Zawita	865m	16.05.2016 14.08.2017	36°54’19, 48”N	43°08’42, 72”E	*Rosaceae ssp, Herbaceous plants, Paeoniaceae ssp,*
46.Zaxo (Hasanava)	690m	30.04.2017	37°04’42, 94”N	42°40’04, 29”E	*Salicaceae ssp, Rosaceae ssp, Herbaceous plants Citrus reticulata Triticum aestivnm*

Figure 3.1. Studied localities in the area (modified from Google-Earth, 2017).

Table 3.2. Type of habitats.

Type of habitat	Localities
1. Located in valleys have a stream small of water and it is a mountain Localities this type of plant are existed: *Rosaceae ssp,Paeoniaceae ssp, Herbaceous plants, Malvaceae ssp , Salicaceae ssp, Citrus sinensis, Daphne mucronata, C. reticulata, Asteraceae ssp and Triticum aestivnm .*	Alkishki, Bagira, Magilmaxti, Mangishki, Rashanki.
2. Located in mountains and have a rivers and valleys.and very most cold region. this type of plant are existed: *Salicaceae ssp*, *Rosaceae ssp, Herbaceous plants, Amaryllidaceae ssp, Brassicaceae ssp, Paeoniaceae ssp, Citrus sinensis, Triticum aestivnm, Daphne mucronata ,C. Reticulata, Boraginaceae ssp, İridaceae and Orchidaceae ssp.*	Amedi (Bari sili), Bamerni, Ekmali, Gali bazi, Hisi, Maten mountain, Amedi (Diri), Diralok.
3. located in mountains and near to duhok dam in east-north have a forest trees and this type of plant are existed: *Paeoniaceae ssp, Salicaceae ssp, Rosaceae ssp, Quercus infectoria, Punica granatum, Sulix alba, Cucurbita pepo, Anethum graveoleus, Ranuculus and Cardaria draba.*	Badi,Bajilur, Gali, Qarqarava, Sindur, Zawita.
4.located in valley , mountains and behind the duhok dam approximate (15) Km, this type of plant are existed: *Asteraceae ssp, Paeoniaceae ssp, Rosaceae ssp, Herbaceous plants, Liliaceae ssp, Brassicaceae ssp, Orchidaceae ssp, Citrus limon, Quercus brantii, Q.infectoria, Punica granatum* and *Sulix alba.*	Baxurnif, Germava, Linava, Piromara.
5. located in mountain and valley have a rivers. this type of plant are existed: *Brassicaceae ssp Asteraceae ssp, Rosaceae ssp Herbaceous plants, Malvaceae ssp, İridaceae,Punica granatum Sulix alba, Cucurbita pepo, Anethum graveoleus and Quercus ithaburnesis.*	Berashi, Chamanki, Gara mountain, Sersenk, Siyaratika, Spindari.
6. located between two mountains (zawa- daka) and far approximaty (2) Km from (Musel dam) in north-east direction, this type of plant are existed: *Amaryllidaceae, Rosaceae ssp, Asteraceae , Malvaceae ssp, Brassicaceae ssp, Liliaceae ssp, Herbaceous plants, Citrus limon, Quercus brantii, Sulix alba, Cucurbita pepo, Anethum graveoleus and Q. ithaburnesis.*	Daka mountain, Dumiz, Kanigolan, Zawa mountain.
7. located in vally and mountains and have small pool aruond it .this type of plant are existed: *Araceae ssp, Rosaceae ssp, Paeoniaceae ssp, Herbaceous plants, Quercus infectoria, Punica granatum, Sulix alba , Cucurbita pepo, Anethum graveoleus and Q. ithaburnesis.*	Dirgzhnik, Hujava, Kemeka, Kura, Mamani.
8.located in mountain have valley pool and some revires. this type of plant are existed : *Boraginaceae ssp, Citrus limon, Quercus brantii, Q. infectoria, Punica granatum,Sulix alba, Rosaceae ssp, Araceae ssp and Paeoniaceae ssp.*	Gali riman , Talwa , Etot, Nizarki.
9.located in centre of duhok governorate : this type of plant are existed : *Amaryllidaceae ssp, Rosaceae ssp, Herbaceous plants, Salicaceae ssp, Orchidaceae ssp, Quercus infectoria ,Punica granatum, Sulix alba, Cucurbita pepo and Anethum graveoleus.*	Duhok center, Kivila, Public garden.
10.located near to small town (Zaxo) have vally and rivers and mountain this type of plant are existed: *Salicaceae ssp, Rosaceae ssp, Herbaceous plants, Citrus limon ,Quercus brantii , Q. infectoria, Punica granatum, Sulix alba, Triticum aestivnm and Anethum graveoleus.*	Zaxo (Hasanava).

1

2

3

4

5

6

7

8

9

10

11

12

13 **14**

Figure 3.2. Habitats in the study area: **1.** Duhok, Kura village, 790m, 09.05.2017, **2.** Duhok, Bagira village, 870m, 09.05.2017, **3.** Duhok, Nizarki village, 705m, 25.04.2017, **4.** Duhok, Etot village, 710m, 17.04.2017, **5.** Duhok, Piromara village, 645m, 27.04.2017, **6.** Duhok, Siyaratika village, 1180m, 10.05.2017, **7.** Duhok, Rashanki village, 785m, 20.04.2017, **8.** Duhok, Baxurnif village, 665m, 27.04.2017, **9.** Duhok, Hisi village, 1410m, 12.05.2017, **10.** Duhok, Ekmali village, 1155m, 12.05.2017, **11.** Duhok, Talwa village, 860m, 03.05.2017, **12.** Duhok, Bamerni village, 1270m, 22.05.2017, **13.**Duhok, Zawa mountain, 810m, 25.04.2016, **14.** Duhok, Bari sili village, 1385m, 11.05.2017 (Photos:Naji T.Said).

3.2. Collection, Stretching and Identification of Samples

3.2.1. Field studies

This study was done from March to September at 2016 and 2017. With field studies butterflies are collected by using these equipments:

1- Net
2- Forceps
3- Filter paper
4- Ethyl aceptate
5- Needle
6- Entomological pin
7- Countainer
8- Wet sponge

The first step was collecting the butterflies by net without hand touching and putting them into the ethyl aceptate for killig them with out any broking in their shape and structures and also for protecting them for keeping them for longer time.

3.2.2. Laboratory studies

The laboratory work or stretching was started after the collectig of the larg number of the butterflies then by using the pincer for taking out the butterflies from the ethyl acetate and put them in to filter paper. After that put this filter paper into the box in this box there is a wet sponge for (wet sponge for makig humedity). This process takes for 2 days.

The second step was stretching; butterflies was taked out the from the box and put them on this equipment figure (A) to stretched the butterflies body spcially their wings for that reason butterflies was pinned on their body for fixation after that kept on it for drying the body for 5 days. After that samples put on the insect boxes (figure B)

Figure (A) equipment for drying the body of butterfly.

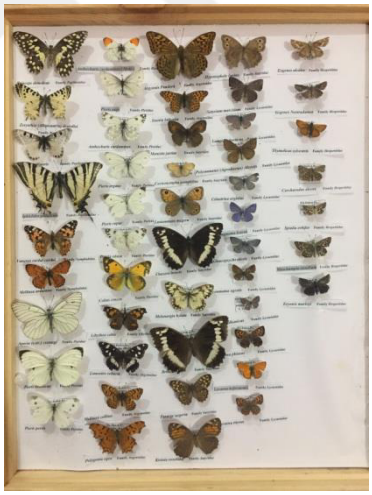


Figure (B)

Figure (3.3) Laboratory equipment

3.2.3. Identification procedures

After these procedures, for the identification of species Hesselbarth *et al* (1995), Tolman (1997) Koçak *et al*. (2006), Akın (2008) and Seven (2010) sources were used. Species were first classified according to the characteristics of families and genus groups and then diagnosed by taking into consideration morphological characteristics,

colors, distinguishing characteristics of male and female individuals, flight periods and distribution in Turkey.

The apple camera (12-megapixel 10 optical zoom) photographic machine was used to take photos of localities and butterflies during selected species and terrain.

After the diagnosis process, the samples were labelled with the scientific names written on them and the boxes containing the samples were naphthalenically stored in special cabinets.

4. RESULTS

4.1. Superfamily Papilionoidea

4.1.1 Family Papilionidae

4.1.1.1 Subfamily Parnassiinae

Zerynthia (Allancastria) deyrollei (Oberthür, 1869)

Ecological information: Natural and anthropogenic; The weather is hot, sunny, the plant. The habitat was well developed where the hatch was well developed.Vertical distribution: 580-1410m, Phenology: April-September.

Habitats: Located in valleys have a stream small of water and it is a mountain Localities this type of plant are existed: *Rosaceae ssp, Paeoniaceae ssp, Herbaceous plants, Malvaceae ssp, Salicaceae ssp, Asteraceae ssp, Araceae ssp* and *İridaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Etot village (12♂♀), 710m, 17.04.2017; Daka mountain (15♂♀), 580m, 16.04.2017; Zaxo (Hasanava) (8♂♀), 690m, 30.04.2017; Kemeka village (2♂♀), 885m, 15.05.2017; Qarqarava (6♂♀), 855m, 17.09.2016; Chamanki village (5♂♀), 895m, 03.09.2016; Hisi village (6♂♀), 1410m, 12.05.2017; Ekmali village (13♂♀), 1155m, 12.05.2017; Gali bazi (8♂♀), 980m, 13.05.2017; Nizarki village (22♂♀), 705m, 25.04.2017; Linava village (8♂♀), 685m, 27.04.2017; Gali (2♂♀), 645m, 29.04.2016; Mamani village (4♂♀), 900m, 01.05.2016; Alkishki village (7♂♀), 1030m, 06.05.2017; Siyaratika village (3♂♀), 1180m, 10.05.2017; Rashanki village (4♂♀), 785m, 20.04.2017; Diralok (6♂♀), 670m, 20.07.2017; Mangishki (2♂♀), 965m, 04.05.2017; Magilmaxti (3♂♀), 1035m, 06.05.2017.

Rear **front**

Figure 4.1. *Zerynthia deyrollei* in rear and front side

Archon apollinaris (Staudinger, 1892)

Ecological information: Natural habitat is the medium-developed mountain of vegetation. It has been observed that the patchmaker is active in the creek beds. Vertical distribution: 705-865m, Phenology: April-May.

Habitats: This type of plant are existed: *Boraginaceae ssp, Rosaceae ssp, Araceae ssp* and *İridaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Nizarki village (10♂♀), 705m, 25.04.2017; Etot village (8♂♀), 710m, 17.04.2017; Zawita village (6♂♀), 865m, 16.05.2016.

Rear **front**

Figure 4.2 *Archon apollinaris* in rear and front side

4.1.1.2 Subfamily Papilioninae

Princeps (s.str.) demoleus (Linnaeus, 1758)

Ecological information: The vegetation cover is well developed in the creek beds and the valley has been observed in hot, sunny weather. Vertical distribution: 540m, Phenology: July.

Habitats: This type of plant are existed: *Paeoniaceae ssp, Boraginaceae ssp, Herbaceous plants, Citrus limon, Quercus brantii, Q.infectoria* and *Punica granatum.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Duhok center (4♂♀), 540m, 12.07.2017.

rear **front**

Figure 4.3. *Princeps demoleus* in rear and front side.

Iphiclides podalirius (Linnaeus, 1758) New record for Iraq

Ecological information: Samples were collected from natural slopes and stream beds in natural and anthropogenic areas at times when the vegetation cover was moderately advanced. Vertical distribution: 785m, Phenology: April.

Habitats: This type of plant are existed: *Rosaceae ssp, Citrus sinensis, Daphne mucronata, C.reticulata, Asteraceae ssp, Triticum aestivnm, Liliaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follow: Duhok: Rashanki village (1♂), 785m, 20.04.2017.

rear **fron**

Figure 4.4. *Iphiclides podalirius* in rear and front side

4.1.2. Family Pieridae

4.1.2.1. Subfamily Pierinae

Aporia (s.str.) crataegi (Linnaeus, 1758)

Ecological information: In creeks with low height, vegetation cover Well-developed, hot and sunny weather. Vertical distribution: 790-1400m, Phenology: May.

Habitats: Located in mountain and valley have a rivers.this type of plant are existed: *Araceae ssp, Rosaceae ssp, Paeoniaceae ssp, Herbaceous plants, Quercus infectoria, Punica granatum*, *Sulix alba, Cucurbita pepo, Anethum graveoleus* and *Q.ithaburnesis.*

Examined materials: The distribution according to the collected localities are as follows: Duhok; Badi village (5♂♀), 895m, 19.05.2016; Hujava village (10♂♀), 845m, 16.05.2017; Kura village (24♂♀), 790m, 09.05.2017; Zawita (6♂♀), 865m, 16.05.2016; Mamani village (4♂♀), 900m, 01.05.2016; Maten mountain (8♂♀), 1400m, 21.05.2017; Siyaratika (6♂♀), 1180m, 10.05.2017; Kemeka (15♂♀), 885m, 15.05.2017.

Rear **front**

Figure 4.5. *Aporia crataegi* in rear and front side

Pieris (s.str.) brassicae (Linnaeus, 1758)

Ecological information: The weather is warm, sunny; Well-developed vegetation cover The samples were observed in stream beds. Vertical distribution: 440-1410m, Phenology: Mar-September.

Habitats: Located in mountain have valley pool and some revires. This type of plant are existed: *Boraginaceae ssp, Rosaceae ssp, Araceae ssp, Paeoniaceae ssp, Citrus sinensis* and *Triticum aestivnm.*

Examined materials: The distribution according to the collected localities are as follows: Duhok; Duhok center (7♂♀), 540m, 20.04.2016; Zawita village (6♂♀), 865m, 16.05.2016; Dumiz (7♂♀), 440m, 25.03.2017; Hisi village (2♂♀), 1410m, 12.05.2017; Nizarki village (5♂♀), 705m, 25.04.2017; Mamani village (6♂♀), 900m, 01.05.2016; Gali (6♂♀), 645m, 29.04.2016.

rear **front**

Figure 4.6. *Pieris brassicae* in rear and front side

Pieris (Artogeia) persis **(**Verity, 1922)

Ecological information: On the mountain slopes where it is concentrated; Warm, sunny-Cloudy was observed at times. Vertical distribution: 440-1180m, Phenology: March-September.

Habitats: This type of plant are existed: *Araceae ssp, Rosaceae ssp, Paeoniaceae ssp, Herbaceous plants ssp, Citrus sinensis, Daphne mucronata, C. reticulata, Asteraceae ssp* and *Triticum aestivnm.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Kivila village (4♂♀), 565m, 26.04.2016; Daka mountain (2♂♀), 580m, 16.04.2017; Zawita village (4♂♀), 865m, 16.05.2016; Chamanki village (3♂♀), 895m, 03.09.2016; Gali (1♂♀), 645m, 29.04.2016; Duhok center (3♂♀), 540m, 20.04.2016; Dumiz (2♂♀), 440m, 25.03.2017; Siyaratika village (5♂♀), 1180m, 10.05.2017; Public garden (2♂♀), 565m, 05.05.2017; Germava village (3♂♀), 775m, 08.06.2017; Piromara village (6♂♀), 645m, 27.04.2017.

rear **front**

Figure 4.7. *Pieris persis* in rear and front side

Pieris napi (L. ssp. p eudorapae Verity) New record for Iraq

Ecological information: In natural habitats, in the valley where plant cover is well developed Observed. Vertical distribution: 440-1180m, Phenology: April-September.

Habitats: Located in mountain have valley pool and some revires and some region located in centre of duhok governorate: this type of plant are existed: *Amaryllidaceae ssp, Rosaceae ssp, Herbaceous plants, Salicaceae ssp* and *Orchidaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Public garden (3♂♀), 565m, 05.05.2017; Chamanki village (2♂♀), 895m, 03.09.2016; Gali (6♂♀), 645m, 29.04.2016; Duhok center (6♂♀), 540m, 20.04.2016; Piromara village (3♂♀), 645m, 27.04.2017; Zawita village (3♂♀), 865m, 16.05.2016; Kivila village (6♂♀), 565m, 26.04.2016; Siyaratika village (7♂♀), 1180m, 10.05.2017; Dumiz (3♂♀), 440m, 25.03.2017.

Rear **front**

Figure 4.8. *Pieris napi* in rear and front side

Anthocharis cardamines (Linnaeus, 1758)

Ecological information: The vegetation cover is well developed in the creek beds and the valley has been observed in hot, sunny weather. Vertical distribution: 440 - 1400m, Phenology: March-September.

Habitats: Located in vally and mountains and have small pool aruond it .this type of plant are existed: *Araceae ssp*, *Citrus limon, Quercus brantii, Q.infectoria, Rosaceae ssp*, *Paeoniaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Piromara village (6♂♀), 645m, 27.04.2017; Nizarki village (4♂♀), 705m, 25.04.2017; Rashanki village (11♂♀), 785m, 20.04.2017; Dumiz (4♂♀), 440m, 25.03.2017; Zawa mountain (3♂♀), 810m, 25.04.2016; Sersenk (4♂♀), 960m, 24.05.2017; Bamerni village (3♂♀), 1270m, 22.05.2017; Chamanki village (2♂♀), 895m, 03.09.2016; Duhok center (5♂♀), 540m, 20.04.2016; Zawita village(3♂♀), 865m, 16.05.2016; Qarqarava village (5♂♀), 855m, 17.09.2016; Maten mountain (1♂♀), 1400m, 21.05.2017; Germava village (6♂♀), 775m,08.06.2017; Linava village (2♂♀), 685m, 27.04.2017; Zaxo(Hasanava) (2♂♀), 690m, 30.04.2017; Public garden (12♂♀), 565m, 05.05.2017; Gali riman (2♂♀), 765m, 03.05.2017.

rear **front**

Figure 4.9. *Anthocharis cardamines* in rear and front side

Pieris (Artogeia) ergane (Geyer, 1828)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed. Vertical distribution: 895m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.and very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp, Citrus limon, Quercus brantii* and *Q.infectoria.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (7♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.10. *Pieris ergane* in rear and front side

Pieris (Artogeia) rapae (Linnaeus, 1758)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed. Vertical distribution: 895m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.and very cold region. this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp*, *Citrus limon, Quercus brantii* and *Q.infectoria.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (6♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.11. *Pieris rapae* in rear and front side

Pontia edusa (Fabricius, 1777)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed. Vertical distribution: 895m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys. And very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp*, *Citrus limon, Quercus brantii* and *Q.infectoria.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (8♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.12.*Pontia edusa* in rear and front side

4.1.2.2 Subfamily Coliadinae

Colias (Eriocolias) crocea (Fourcroy, 1785)

Ecological information: Natural habitat is the medium-developed mountain of vegetation It has been observed that the patchmaker is active in the creek beds. Vertical distribution: 645-1720m, Phenology: April-May.

Habitats: Located in mountain have valley pool and some revires.this type of plant are existed: *Boraginaceae ssp, Rosaceae ssp, Araceae ssp, Paeoniaceae ssp, İridaceae ssp, Herbaceous plants, Daphne mucronata, Citrus reticulata, Asteraceae ssp* and *Triticum aestivnm.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Mamani village (3♂♀), 900m, 01.05.2016; Gara mountain (6♂♀), 1720m, 17.05.2017; Sindur village (1♂♀), 780m, 10.05.2016; Zawita village (4♂♀), 865m, 16.05.2016; Gali bazi (2♂♀), 980m, 13.05.2017; Piromara village (1♂♀), 645m, 27.04.2017; Kura village (3♂♀), 790m, 09.05.2017; Gali riman(4♂♀), 765m, 03.05.2017.

rear **front**

Figure 4.13. *Colias crocea* in rear and front side

4.1.3. Family Libytheidae

Libythea (s.str.) celtis (Laicharting, 1782)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed. Vertical distribution: 895m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.and very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp*, *Citrus limon, Quercus brantii* and *Q.infectoria.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (1♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.14. *Libythea celtis* in rear and front side

4.1.4. Family Argynnidae (Nymphalidae)

4.1.4.1. Subfamily Argynninae

Limenitis (Azuritis) reducta (Staudinger, 1901)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather. It was observed during the times when.Vertical distribution: 960m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys. this type of plant are existed: *Salicaceae ssp, Amaryllidaceae ssp, Rosaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Sersenk (9♂♀), 960m, 30.08.2017.

rear **front**

Fig 4.15. *Limenitis reducta* in rear and front side

Melitaea (Cinclidia) collina (lederer, 1861)

Ecological information: The weather is warm, sunny; Well-developed vegetation cover The samples were observed in stream beds. Vertical distribution: 645-1720m, Phenology: April-September.

Habitats: This type of plant are existed: *Rosaceae ssp, Paeoniaceae ssp, Herbaceous plants, Malvaceae ssp, Citrus sinensis, Daphne mucronata, C.reticulata, Asteraceae ssp* and *Triticum aestivnm.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (5♂♀), 895m, 03.09.2016; Gara mountain (3♂♀), 1720m, 17.05.2017; Nizarki village (8♂♀), 705m, 25.04.2017; Gali bazi (6♂♀), 980m, 13.05.2017; Piromara village (1♂♀), 645m, 27.04.2017; Bamerni village (4♂♀), 1270m, 22.05.2017; Hujava village (5♂♀), 845m, 16.05.2017; Alkishki village (7♂♀),

1030m, 06.05.2017; Bagira village (2♂♀), 870m, 09.05.2017; Linava village (7♂♀), 685m, 27.04.2017; Kura village (4♂♀), 790m, 09.05.2017; Etot village (7♂♀), 710m, 17.04.2017; Mangishki (2♂♀), 965m, 04.05.2017; Magilmaxti (3♂♀), 1035m, 06.05.2017.

rear **front**

Figure 4.16 . *Melitaea collina* in rear and front side

Polygonia (Comma) egea (Cramer, 1775)

Ecological information: The weather is warm, sunny, Well-developed vegetation cover the samples were observed in stream beds.Vertical distribution: 865m, Phenology: August.

Habitats: This type of plant are existed: *Paeoniaceae ssp, Herbaceous plants, Citrus reticulata, Asteraceae ssp, Triticum aestivnm ssp, C.sinensis* and *Daphne mucronata.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Zawita village (5♂♀), 865m, 14.08.2017.

rear **front**

Figure 4.17. *Polygonia egea* in rear and front side

Argynnis (Pandoriana) Pandora (Denis & Schiffermüller, 1775)

Ecological information: Natural and anthropogenic, habitat where plant cover is well developed Rubus sp.It is observed that the plant feeds. Vertical distribution: 885-1245m, Phenology: May-September

Habitats: Located in mountain and valley have a rivers. This type of plant are existed: *Rosaceae ssp, Herbaceous plants, Liliaceae ssp* and *Orchidaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Kemeka village (3♂♀), 885m, 15.05.2017; Amedi(Diri) (4♂♀), 1245m, 18.07.2017; Chamanki village (2♂♀), 895m, 03.09.2016.

Rear **front**

Figure 4.18. *Argynnis pandora* in rear and front side

Issoria lathonia (Linnaeus, 1758)

Ecological information: The vegetation cover is well developed in the creek beds and the valley has been observed in hot, sunny weather.Vertical distribution: 860-1410m, Phenology: May.

Habitats*:* *Asteraceae ssp, Paeoniaceae ssp, Rosaceae ssp, Herbaceous plants* and *Liliaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Kemeka village (8♂♀), 885m, 15.05.2017; Talwa (1♂♀), 860m, 03.05.2017; Spindari village (6♂♀), 1245m, 18.05.2017; Gali bazi (1♂♀), 980m, 13.05.2017; Ekmali village (2♂♀), 1155m, 12.05.2017; Amedi(Bari sili) (7♂♀), 1385m, 11.05.2017; Hisi village (1♂♀), 1410m, 12.05.2017.

Rear **front**

Figure 4.19. *Issoria lathonia* in rear and front side

4.1.4.2. Subfamily Nymphalinae

Vanessa (Cynthia) cardui (L. 1758)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed. Vertical distribution: 565-1720m, Phenology: May-June.

Habitats: Located in mountains and have a rivers and valleys.this type of plant are existed: *Salicaceae ssp, Rosaceae, İridaceae* and *Orchidaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Berashi village (2♂♀), 1330m, 17.05.2017; Kivila village (1♂♀), 565m, 26.04.2016; Zawita village (1♂♀), 865m, 16.05.2016; Badi village (2♂♀), 895m, 19.05.2016; Mamani village (12♂♀), 900m, 01.05.2016; Qarqarava (4♂♀), 855m, 17.09.2016; Chamanki village (2♂♀), 895m, 03.09.2016; Gara mountain (1♂♀), 1720m, 17.05.2017.

.

rear **front**

Figure 4.20. *Vanessa cardui* in rear and front side

Melitaea (s.str.) arduinna (Esper, 1783)

Ecological information: During the period when the vegetation cover is developed in the middle, it is sunny and tepid. Vertical distribution: 645-1410m, Phenology: April-June.

Habitats: Located in mountains and have a rivers and valleys, this type of plant are existed: *Salicaceae ssp* and *Rosaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Hujava village (7♂♀), 845m, 16.05.2017; Piromara village (4♂♀), 645m, 27.04.2017; Hisi village (4♂♀), 1410m, 12.05.2017; Ekmali village (8♂♀), 1155m, 12.05.2017; Linava village (4♂♀), 685m, 27.04.2017; Germava village (4♂♀), 775m, 08.06.2017; Amedi(Bari sili) (5♂♀), 1385m, 11.05.2017.

rear **front**

Figure 4.21 *Melitaea arduinna* in rear and front side

4.1.5. Family Satyridae

4.1.5.1. Subfamily Satyrinae

Maniola (s.str.) jurtina (Linnaeus, 1758)

Ecological information: The weather is warm, sunny; Well-developed vegetation cover the samples were observed in stream beds.Vertical distribution: 565-1720m, Phenology: April-September.

Habitats: *Asteraceae ssp, Rosaceae ssp, Herbaceous plants, Malvaceae ssp, İridaceae ssp, Brassicaceae ssp* and *Liliaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Qarqarava (2♂♀), 855m, 17.09.2016; Spindari village (7♂♀), 1245m, 18.05.2017; Zawita village (3♂♀), 865m, 16.05.2016; Bamerni village (1♂♀) ,

1270m, 22.05.2017; Sindur village (1♂♀), 780m, 10.05.2016; Amedi(Diri) (5♂♀), 1245m, 18.07.2017; Nizarki village (4♂♀), 705m, 25.04.2017; Germava village (7♂♀), 775m, 08.06.2017; Zawita village (12♂♀), 865m, 16.05.2016; Maten mountain (6♂♀), 1400m, 21.05.2017; Berashi village (4♂♀), 1330m, 17.05.2017; Gara mountain (5♂♀), 1720m, 17.05.2017; Bajilur village (6♂♀), 705m, 22.05.2017; Alkishki village (9♂♀), 1030m, 06.05.2017; Kemeka village (4♂♀), 885m, 15.05.2017; Hujava village (3♂♀), 845m, 16.05.2017; Ekmali village (8♂♀), 1155m, 12.05.2017; Public garden (1♂♀), 565m, 05.05.2017; Talwa(2♂♀), 860m, 03.05.2017; Dirgzhnik (2♂♀), 970m, 14.05.2017.

rear **front**

Figure 4.22*Maniola telmessia* in rear and front side

Coenonympha (s.str.) pamphilus (Linnaeus, 1758)

Ecological information: The vegetation cover is well developed in the creek beds and the valley has been observed in hot, sunny weather. Vertical distribution: 540-1410m, Phenology: April-May.

Habitats: Located in mountains and have a rivers and valleys.and very cold region.this type of plant are existed: *Salicaceae ssp, Rosaceae ssp, Herbaceous plants, Amaryllidaceae ssp, Brassicaceae ssp, Paeoniaceae ssp, Boraginaceae ssp, İridaceaea* and *Orchidaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Zawita village (3♂♀), 865m, 16.05.2016; Duhok center (2♂♀), 540m, 20.04.2016; Hisi village (5♂♀), 1410m, 12.05.2017; Bajilur village (4♂♀), 705m, 22.05.2017; Berashi village (1♂♀), 1330m, 17.05.2017; Ekmali village (12♂♀),

1155m, 12.05.2017; Amedi(Bari sili) (7♂♀), 1385m, 11.05.2017; Linava village (4♂♀), 685m, 27.04.2017.

rear **front**

Figure 4.23. *Coenonympha pamphilus* in rear and front side

Lasiommata megera (Linnaeus, 1767)

Ecological information: In natural habitats, in the valley where plant cover is well developed Observed.Vertical distribution: 710-1400m, Phenology: April-May.

Habitats: Located in mountains and have a rivers and valleys.and very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp, Salicaceae ssp, Brassicaceae ssp* and *Paeoniaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Maten mountain (6♂♀), 1400m, 21.05.2017; Etot village (8♂♀), 710m, 17.04.2017; Alkishki village (6♂♀), 1030m, 06.05.2017.

rear **front**

Figure 4.24. *Lasiommata megera* in rear and front side

Chazara (s.str.) briseis (Linnaeus, 1764)

Ecological information: The weather is warm, sunny; Well-developed vegetation cover the samples were observed in stream beds. Vertical distribution: 570-1400m, Phenology: May-September.

Habitats: This type of plant are existed: *Amaryllidaceae, Rosaceae ssp Asteraceae, Malvaceae ssp, Brassicaceae ssp, Liliaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Bajilur village (9♂♀), 700m, 22.05.2017; Qarqarava village (3♂♀), 855m, 17.09.2016; Badi village (5♂♀), 895m, 19.05.2016; Bamerni village (5♂♀), 1270m, 22.05.2017; Sersenk (6♂♀), 960m, 24.05.2017; Maten mountain (6♂♀), 1400m, 21.05.2017; Kanigolan (3♂♀), 570m, 16.04.2017; Dirgzhnik (3♂♀), 970m, 14.05.2017.

rear **front**

Figure 4.25. *Chazara briseis* in rear and front side

Melanargia (Turcargia) hylata (Geyer, 1828)

Ecological information: The vegetation cover is well developed in the creek beds and the valley has been observed in hot, sunny weather.Vertical distribution: 885-1400m, Phenology: May.

Habitats: Located in mountains and have a rivers and valleys, this type of plant are existed: *Salicaceae ssp, Rosaceae ssp, Herbaceous plants, Amaryllidaceae ssp* and *Brassicaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Kemeka village (1♂♀), 885m, 15.05.2017; Maten mountain (5♂♀), 1400m, 21.05.2017; Bamerni village (3♂♀), 1270m, 22.05.2017; Spindari village (2♂♀), 1245m, 18.05.2017; Badi village (4♂♀), 895m,19.05.2016; Sersenk (6♂♀), 960m, 24.05.2017.

rear **front**

Figure 4.26. *Melanargia hylata* in rear and front side

Brintesia circe (Fabricius, 1775)

Ecological information: The weather is warm, sunny, Well-developed vegetation cover the samples were observed in stream beds. Vertical distribution: 865m, Phenology: August.

Habitats: This type of plant are existed: *Paeoniaceae ssp, Herbaceous plants, Citrus reticulata, Asteraceae ssp, Triticum aestivnm ssp, C.Sinensis* and *Daphne mucronata.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Zawita village (5♂♀), 865m, 14.08.2017.

rear **front**

Figure 4.27. *Brintesia circe* in rear and front side

Pararge aegeria (Linnaeus, 1758)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed. Vertical distribution: 895m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys. and very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp, Citrus limon, Quercus brantii* and *Q.infectoria.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (7♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.28. *Pararge aegeria* in rear and front side

Kirinia (Melike) roxelana (Cramer, 1777)

Ecological information: The weather is warm, sunny, Well-developed vegetation cover the samples were observed in stream beds. Vertical distribution: 865m, Phenology: August.

Habitats: This type of plant are existed: *Paeoniaceae ssp, Herbaceous plants, Citrus reticulata, Asteraceae ssp, Triticum aestivnm ssp, C.sinensis* and *Daphne mucronata.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Zawita village (6♂♀), 865m, 14.08.2017.

rear **front**

Figure 4.29. *Kirinia roxelana* in rear and front side

Hyponephele (s.str.) lupina (Costa, 1836)

Ecological information: The weather is warm, sunny, Well-developed vegetation cover the samples were observed in stream beds. Vertical distribution: 865m, Phenology: August.

Habitats: This type of plant are existed: *Paeoniaceae ssp, Herbaceous plants, Citrus reticulata, Asteraceae ssp, Triticum aestivnm ssp, C.sinensis* and *Daphne mucronata.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Zawita village (4♂♀), 865m, 14.08.2017.

rear **front**

Figure 4.30. *Hyponephele lupina* in rear and front side

Hipparchia (Neohipparchia) statilinus (Hufnagel, 1766) New record for Iraq

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed. Vertical distribution: 1270m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.and very cold region. this type of plant are existed: *Araceae ssp, Rosaceae ssp, Paeoniaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Bamerni village (1♂♀), 1270m, 30.08.2017.

rear **front**

Figure 4.31. *Hipparchia statilinus* in rear and front side

4.1.6 Family Lycaenidae

4.1.6.1. Subfamily Theclinae

Satyrium (Nordmannia) marcidum (Riley, 1921)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed. Vertical distribution: 895m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.and very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp*, *Citrus limon, Quercus brantii* and *Q. infector.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (12♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.32. *Satyrium marcidum* in rear and front side

4.1.6.2. Subfamily Polymmatinae

Lampides boeticus (L. 1767)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather It was observed during the times when. Vertical distribution: 540–900m, Phenology: April-Sepember.

Habitats: Located in vally and mountains and have small pool aruond it.this type of plant are existed: *Araceae ssp, Rosaceae ssp, Paeoniaceae ssp, Herbaceous plants, Cucurbita pepo, Anethum graveoleus* and *Quercus ithaburnesis.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Gali (6♂♀), 645m, 29.04.2016; Mamani village (5♂♀), 900m, 01.05.2016; Chamanki village (11♂♀), 895m, 03.09.2016; Duhok center (8♂♀), 540m, 20.04.2016.

rear **front**

Figure 4.33. *Lampides boeticus* in rear and front side

Polyommatus (Agrodiaetus) Alcestis (Zerny, 1932)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather It was observed during the times when. Vertical distribution: 960m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys. this type of plant are existed: *Salicaceae ssp, Amaryllidaceae ssp, Rosaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Sersenk (4♂♀), 960m, 30.08.2017.

Rear **front**

Figure 4.34.*Polyommatus (Agrodiaetus) alcestis* in rear and front side

Celastrina argiolus (Linnaeus, 1758)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather It was observed during the times when.Vertical distribution: 960m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.this type of plant are existed: *Salicaceae ssp, Amaryllidaceae ssp, Rosaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Sersenk (7♂♀), 960m, 30.08.2017.

rear **front**

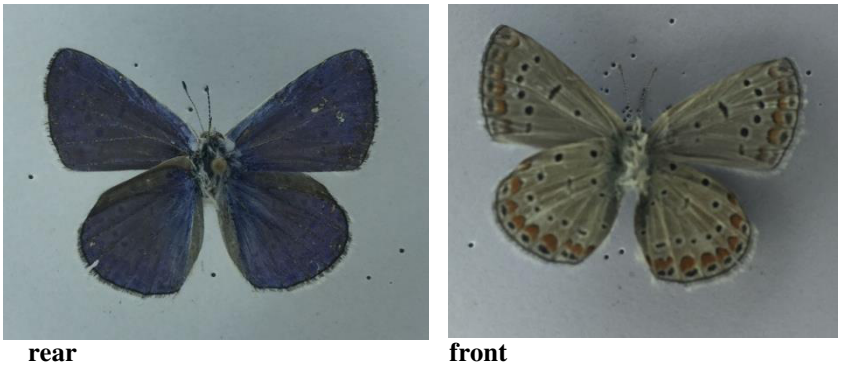
Figure 4.35. *Celastrina argiolus* in rear and front side

Polyommatus (s.str.) icarus (Rottemburg, 1775)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather It was observed during the times when. Vertical distribution: 960m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys. this type of plant are existed: *Salicaceae ssp, Amaryllidaceae ssp, Rosaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Sersenk (5♂♀), 960m, 30.08.2017.



rear **front**

Figure 4.36. *Polyommatus icarus* in rear and front side

Glaucopsyche (s.str.)alexis **(**Poda, 1761)

Ecological information: Natural and anthropogenic; The weather is hot, sunny, the plant The habitat was well developed where the hatch was well developed. Vertical distribution: 540-1410m, Phenology: April-September.

Habitats: Located in mountain have valley pool and some revires.this type of plant are existed: *Boraginaceae ssp, Salicaceae ssp, Rosaceae ssp, Herbaceous plants, Citrus limon, Quercus brantii, Q. İnfectoria* and *Punica granatum.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Gali (5♂♀), 645m, 29.04.2016; Duhok center (7♂♀), 540m, 20.04.2016; Qarqarava (2♂♀), 855m, 17.09.2016; Piromara village (5♂♀), 645m, 27.04.2017; Ekmali village (6♂♀), 1155m, 12.05.2017; Nizarki village (15♂♀), 705m, 25.04.2017; Rashanki village (4♂♀), 785m, 20.04.2017; Hisi village (4♂♀), 1410m, 12.05.2017; Chamanki village (6♂♀), 895m, 03.09.2016; Linava village (24♂♀), 685m, 27.04.2017; Bajilur village (11♂♀), 700m, 22.05.2017; Mamani village (3♂♀), 900m, 01.05.2016; Kura village (6♂♀), 790m, 09.05.2017; Zaxo(Hasanava) (11♂♀), 690m,30.04.2017.

rear **front**

Figure 4.37. *Glaucopsyche alexis* in rear and front side

Polyommatus (Aricia (s.str.)) agestis (Denis & Schiffermüller, 1775)

Ecological information: Natural and anthropogenic.The weather is hot, sunny, the plant The habitat was well developed where the hatch was well developed.Vertical distribution: 645-705m, Phenology: April.

Habitats: This type of plant are existed: *Paeoniaceae ssp, Boraginaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Nizarki village (9♂♀), 705m, 25.04.2017; Piromara village (13♂♀), 645m, 27.04.2017.

rear **front**

Figure 4.38. *Polyommatus agestis* in rear and front side

Tarucus (s.str.) balkanicus (Freyer, 1843)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed.Vertical distribution: 895m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.and very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp, Citrus limon, Quercus brantii* and *Q.infectoria.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (5♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.39. *Tarucus balkanicus* rear and front side

4.1.6.3. Subfamily Lycaeninae

Lycaena (s.str.) phlaeas (Linnaeus, 1761)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather It was observed during the times when. Vertical distribution: 960m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.this type of plant are existed: *Salicaceae ssp, Amaryllidaceae ssp, Rosaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Sersenk (8♂♀), 960m, 30.08.2017.

rear **front**

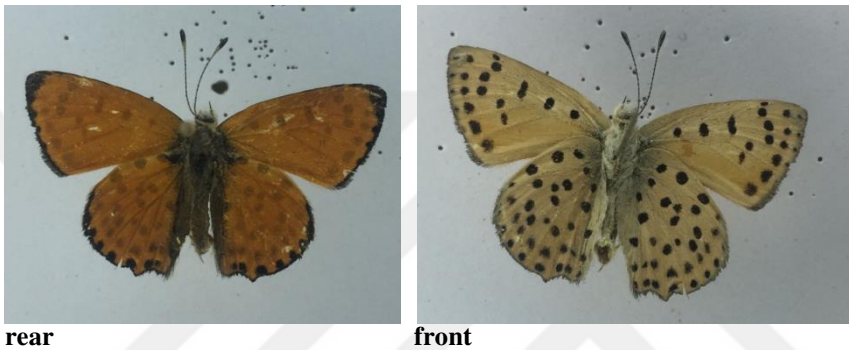
Figure 4.40. *Lycaena phlaeas* rear and front side

Lycaena (Thersamonia) kefersteinii (Gerhard, 1850) New record for Iraq

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather It was observed during the times when.Vertical distribution: 960m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.this type of plant are existed: *Salicaceae ssp, Amaryllidaceae ssp, Rosaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Sersenk (6♂♀), 960m, 30.08.2017.



rear **front**

Figure 4.41. *Lycaena kefersteinii* rear and front side

Lycaena (Loweia) tityrus (Poda, 1761)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed.Vertical distribution: 895 m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.and very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp, Citrus limon, Quercus brantii* and *Q.infectoria.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (11♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.42. *Lycaena tityrus* rear and front side

4.2. Superfamily Hesperioidea

4.2.1. Family Hesperiidae

4.2.1.1. Subfamily Hesperiinae

Eogenes alcides **(**Herrich-Schäffer, 1852)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather it was observed during the times when.Vertical distribution: 960m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.this type of plant are existed: *Salicaceae ssp, Amaryllidaceae ssp, Rosaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Sersenk (6♂♀), 960m, 30.08.2017.

rear **front**

Figure 4.43. *Eogenes alcides* rear and front side

Gegenes Nostradamus (Fabricius, 1793)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather it was observed during the times when.Vertical distribution: 960m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.this type of plant are existed: *Salicaceae ssp, Amaryllidaceae ssp, Rosaceae ssp* and *Herbaceous plants.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Sersenk (12♂♀), 960m, 30.08.2017.

rear **front**

Fig 4.44.*Gegenes nostradamus* rear and front side

Thymelicus sylvestris (Poda, 1761)

Ecological information: The weather is warm, sunny, Well-developed vegetation cover the samples were observed in stream beds. Vertical distribution: 540-1400m, Phenology: April-June.

Habitats: Located in mountain and valley having rivers.this type of plant are existed: *Brassicaceae ssp, Asteraceae ssp, Rosaceae ssp, Herbaceous plants, Malvaceae ssp and İridaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Hujava village (6♂♀), 845m, 16.05.2017; Gali (4♂♀), 645m, 29.04.2016; Berashi village (7♂♀), 1330m, 17.05.2017; Duhok center (2♂♀), 540m, 20.04.2016; Zawita village (5♂♀), 865m, 16.05.2016; Alkishki village (5♂♀), 1030m, 06.05.2017; Badi village (6♂♀), 895m, 19.05.2016; Spindari village (8♂♀), 1245m, 18.05.2017; Bajilur village (4♂♀), 700m, 22.05.2017; Germava village (8♂♀), 775m, 08.06.2017; Maten mountain (10♂♀), 1400m, 21.05.2017.

rear **front**

Figure 4.45. *Thymelicus sylvestris* rear and front side

Carcharodus (s.str.) alceae (Esper, 1780)

Ecological information: Natural-Anthropogenic habitat, warm, sunny-cloudy weather it was observed during the times when. Vertical distribution: 1245m, Phenology: July.

Habitats: Located in mountains and have a rivers and valleys.this type of plant are existed: *Rosaceae ssp, Citrus limon, Quercus brantii, Q.infectoria, Punica granatum*, *Amaryllidaceae ssp* and *Salicaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Amedi (Diri) (12♂♀), 1245m, 18.07.2017.

rear **front**

Figure 4.46. *Carcharodus alceae* in rear and front side

Spialia (Neospialia) orbifer (Hübner, 1823)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed.Vertical distribution: 895m, Phenology: August.

Habitats: Located in mountains and have a rivers and valleys.and very cold region.this type of plant are existed: *Rosaceae ssp, Orchidaceae ssp, Herbaceous plants, Amaryllidaceae ssp, Citrus limon, Quercus brantii and Q.İnfectoria.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Chamanki village (6♂♀), 895m, 19.08.2017.

rear **front**

Figure 4.47. *Spialia orbifer* in rear and in front side

Muschampia tessellum (Hübner, 1803) New record for Iraq

Ecological information: Natural habitat is the medium-developed mountain of vegetationIt has been observed that the patchmaker is active in the creek beds.Vertical distribution: 685-1400m, Phenology: April-September.

Habitats: Located near to small town (Zaxo) and located in vally and mountains and have small pool aruond it.This type of plant are existed: *Araceae ssp, Rosaceae ssp, Paeoniaceae ssp, Herbaceous plants, Punica granatum and Sulix alba.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Gali bazi (1♂♀), 980m, 13.05.2017; Ekmali village (6♂♀),1155m, 12.05.2017; Nizarki village (2♂♀), 705m, 25.04.2017; Mamani village (3♂♀), 900m, 01.05.2016; Qarqarava (1♂♀), 855m, 17.09.2016; Maten mountain (6♂♀), 1400m, 21.05.2017; Zaxo(Hasanava) (2♂♀), 690m, 30.04.2017; Linava village (5♂♀), 685m, 27.04.2017; Siyaratika village (4♂♀), 1180m, 10.05.2017; Alkishki village (2♂♀), 1030m, 06.05.2017; Amedi (Bari sili) (2♂♀), 1385m, 11.05.2017.

rear **front**

Figure 4.48 *Muschampia tessellum* in rear and front side

Erynnis (Hesperopegasus) marloyi (Boisduval, 1834)

Ecological information: Natural, habitats where plant cover is well developed Examples have been observed.Vertical distribution: 540-1720m, Phenology: April-June.

Habitats: *Herbaceous plants, Malvaceae ssp, Salicaceae ssp, Paeoniaceae ssp* and *Brassicaceae ssp.*

Examined materials: The distribution according to the collected localities are as follows: Duhok: Rashanki village (4♂♀), 785m, 20.04.2017; Etot village (2♂♀), 710m, 17.04.2017; Gara mountain (2♂♀), 1720m, 17.05.2017; Nizarki village (3♂♀), 705m, 25.04.2017; Duhok center (1♂♀), 540m, 20.04.2016; Germava village (5♂♀), 775m, 08.06.2017; Bagira village (3♂♀), 870m, 09.05.2017; Bajilur village (4♂♀), 700m, 22.05.2017; Zawita village (7♂♀), 865m, 16.05.2016; Maten mountain (4♂♀), 1400m, 21.05.2017; Gali riman (3♂♀), 765m, 03.05.2017; Spindari village (2♂♀), 1245m, 18.05.2017; Berashi village (2♂♀), 1330m, 17.05.2017.

rear **front**

Figure 4.49. *Erynnis marloyi* in rear and front side

Some photos of butterflies when collecting process:

1

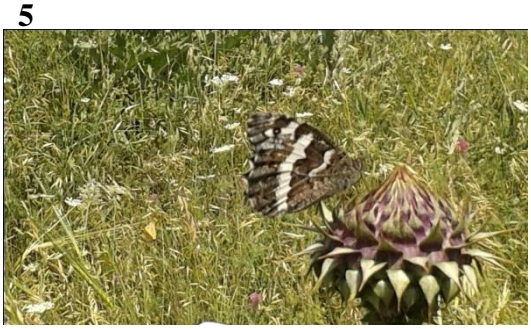
2

3

4

5

6



7

8

Figure 4.50. some photo of butterflies when collecting process**: 1.** ***pieris brassicae***, Duhok center (♂♀) ,540m, 20.04.2016, **2.** ***Aporia crataegi,*** Hujava village (♂♀), 845m, 16.05.2017, **3.** ***Zerynthia deyrollei*** ,Zaxo(Hasanava) (♂♀), 690m, 30.04.2017, **4.** ***Polygonia egea,*** Zawita village (♂♀), 865m, 14.08.2017, **5.*****Princeps demoleus,*** Duhok center (♂♀), 540m, 12.07.2017, **6.** ***Melitaea collina,*** Nizarki village (♂♀), 705m, 25.04.2017, **7.** ***Brintesia circe*** Zawita village (♂♀), 865m, 14.08.2017, **8.** ***Satyrium marcidum***, Chamanki village (♂♀), 895m, 19.08.2017. (Photos: Naji T.Said).

5. DISCUSSION AND CONCLUSION

5.1. Fauna

With this thesis, 49 species of butterflies have been identified with the field studies carried out in the northern Iraq.

Table 5.1. Numerical distribution of species by family in the study area and representation rates.

Family	**Number of species in this thesis**	**Representation rate of families (%)**
Papilionidae	4	%8.16
Pieridae	9	%18.36
Argynnidae	7	%14.28
Satyridae	10	%20.42
Lycaenidae	11	%22.44
Hesperiidae	7	%14.30
Libytheidae	1	%2.04
Total	**49**	%**100**

As shown in Table 5.1, the largest species with species is Lycaenidae (11) family.The species belonging to this family make up (%22) of all species in the region. However, this number is low when compared to other standards (Seven, 2010). The species belonging to this family make up 31.3% of all species in the region. The *Papilionidae* family (Koçak and Kemal, 2007) with 13 species in Turkey is represented by 5 species in the study area. In addition to natural environments, Pieridae species which are well adapted to anthropogenic areas and especially feed by plants of the *Brassicaceae* family are represented in the study area.

Table 5.2. Number of collected specimen according to families (Rates are calculated according to the collected 1279 samples).

Family	Number of collected specimen	% Rate
Papilionidae	165	%12.90
Pieridae	311	%24.34
Argynnidae	174	%13.60
Satyridae	232	%18.13
Lycaenidae	219	%17.12
Hesperiidae	177	%13.84
Libytheidae	1	%0.07
Total	1279	% 100

Number of collected samples according to families (Rates are calculated according to the collected 1279 samples). The Pieridae (%24.34) and Satyridae (%18.13) were the most common samples. And this may be due to specimens have not been collected in a certain time, with a plan to reach a certain number on species diversity. The diversity of the nutrient plant, which facilitates the spread of some species belonging to this family in compare with the lowest number of family was Libytheidae family the percentage rate was %0.07.

5.2. Ecology

Habitat preferences, phenology, vertical distribution, topography and nutrients are evaluated in terms of information gathered in accordance with the purpose of our work. Some of the ecological data obtained in this framework have been numerically evaluated below.

5.2.1. Habitat preference of species

Table 5.3. Distribution of the number of samples collected according to habitats (Rates are calculated according to the collected 1279 samples).

Types of Habitat	Number of species	% Rate
located in mountain have a revires *Salicaceae ssp*, *Rosaceae ssp, Herbaceous* plants	245	19.15
Fruite garden dominate *Citrus fruits* area: *C. Limon, C. sinensis, C. reticulata, Punica granatum*	432	33.77
Rare Platanus and *Salix* species on mountain slopes	47	3.67
Oak forest edges dominate *Quercus brantii, Q. ithaburnesis, Q. İnfectoria.*	182	14.24
plains area and grass dominate *Triticum aestivnm*	201	15.71
stream bed located in valleys, *Herbaceous* plants, *Malvaceae ssp , Salicaceae ssp.*	172	13.46

The highest number of collected samples as shown in Table 5.3 that is fruite garden dominate Citrus fruits area: *Citrus limon, C.sinensis, C.reticulata* and *Punica granatum* (33.77%).

Fruit horticultural gardens, which are rich in *Prunus*, are rich in *Fabaceae* and *Brassicaceae* plant species making this habitat particularly attractive for Pieridae species. It is rich in rocky, rocky, grassy areas, some outdoor areas preferred due to its rocky nature, habitats that many hot-loving Satyridae species like to enjoy.

The low number of specimens on the mountain slopes where rare *Platanus* and *Salix* species are found and the fact that the site conditions are not suitable for catching the sample, the individual levels of species in this habitat can not be reached to the desired level. Thus, the population rate was very low (3.67%) as seen in the Table 5.3.

The undisturbed oak forest openings are rich in plant diversity *Quercus brantii Q. ithaburnesis, Q.infectoria*, and at the same time are transitional areas of species, places where they have found common. For this reason, it is expected that the number of samples in this type of habitat is high. But as a matter of fact, the number of samples we collected at this locale during our studies is not much. This may be due to the low working rate in this habitat.So the rate of collected sample in our thesis was 14.24%.

5.2.2. Phenology

When the temperature of the zone is high the species show such a wide range of phenology. Numerical increase in the number of species is observed with the heating of the air. Normally, the highest number of species was observed in April, May, June and July in northern Iraq.While the highest rates were observed in April and May when our work area was hot.This is also important for the phenology of some species.

Table 5.4. Numerical distribution and representation ratios of the species in the months according to their families (total number of species:49).

Months	Papilionidae	Pieridae	(Argynnidae)	Satyridae	Lycaenidae	Hesperiidae	Libytheidae	Total
March	-	4 (%8.16)	-	-	-	-	-	4 (%8.16)
April	3 (%6.12)	6 (%12.24)	3 (%6.12)	4 (%8.16)	3 (%6.12)	3 (%6.12)	-	22 (%44.89)
May	2 (% 4.08)	6 (%12.24)	5 (%10.20)	5 (%10.20)	2 (%4.08)	3 (%6.12)	-	23 (%46.93)
June	-	3 (%6.12)	1 (%2.04)	1 (%2.04)	-	2 (%4.08)	-	7 (%14.28)
July	2 (%4.08)	-	1 (%2.04)	1 (%2.04)	-	1 (%2.04)	-	5 (%10.20)
August	-	3 (%6.12)	2 (%4.08)	5 (%10.20)	8 (%16.32)	3 (%6.12)	1 (%2.04)	22 (%44.89)
September	1 (%2.04)	3 (%6.12)	3 (%6.12)	3 (%6.12)	2 (%4.08)	1 (%2.04)	-	13 (%26.53)

In Table 5.4.butterfly species showed an increase in April, May and August, but decreased from July. The decrease in the number of butterflies in September is thought to depend on the drying of the food plants in their habitats.

Pieridae family is generally represented by a high number of species every month between March and May, while species belonging to Hesperiidae, Lycaenidae, Nymphalidae and Satyridae families show a significant increase in species numbers after June, when the air is warmed up well. It has been observed that some of the species are active during spring-autumn, while others are only active in spring or summer months. For example, while the Libytheidae speciese It was observed only in August.

According to flight periods for 49 species surveyed from the study area, the following are presented, 10 are spring, 24 are summer, 3 in spring and summer, 7 in spring and autumn, 5 is seen as active from the spring, summer and autumn. Species that have been observed and detected from spring to autumn have more than one generation per year depending on the climatic conditions in Turkey (Hesselbarth *et al*., 1995).

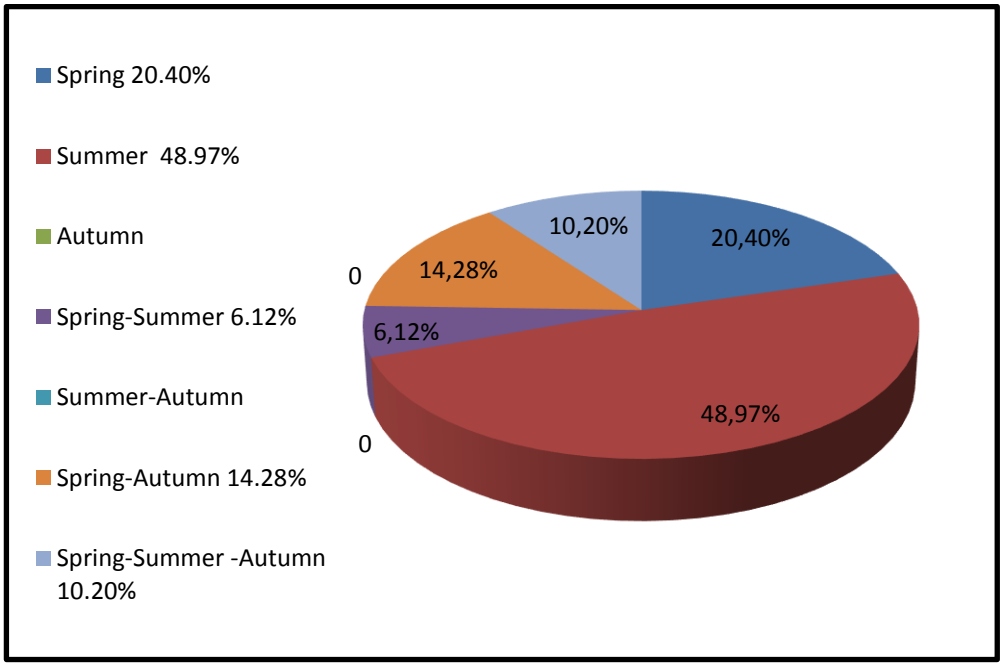


Figure5.1. The flight periods spectrum of the detected species (Spring, : Summer, : Autum, : Spring and Summer, Summer and Autumn, : Spring and Autumn, : Spring , Summer and Autumn,).

5.2.3. Altitude distribution of the species

The average elevation is approximately 890m according to the 46 localities in our study area. The lowest altitude habitat in our study area is Dumiz (440m) and the highest habitat is Gara mountain (1720m).

Table 5.5. Numerical distribution and representation ratios according to family, depending on the altitudes of species in the region (total species number:49).

Altitude (m)	Papilionidae	Pieridae	Argynnidae	Satyridae	Lycaenidae	Hesperiidae	Libytheidae	**Total**
400-900	4 (% 8.16)	9 (%18.36)	6 (%12.24)	9 (%18.36)	6 (%12.24)	4 (%8.16)	1 (%2.04)	39 (%79.59)
900-1400	1 (% 2.04)	6 (%12.24)	6 (%12.24)	6 (%12.24)	7 (% 14.28)	6 (%12.24)	-	32 (%65.30)
1400-1900	1 (%2.04)	4 (%8.16)	4 (%8.16)	5 (%10.20)	1 (%2.04.)	3 (% 6.12)	-	18 (%36.73)

As we can seen in Table 5.5, butterflies are visible at altitudes up to1400-1900m. This can be explained by the high plant diversity between 1400-1900m.These heights are usually creek beds and valley insides. Most of the species (79.59%) were found at altitudes of 400-900m.

An increase of 1300m, and a decrease of 130m above sea level. Pieridae, Lycaenidae and Hesperiidae species have a maximum of 900-1400m and *Papilionidae*, Satyridae have the same result between of 900-1400m and 1400-1900m and also Argynnidae have a same result between of 400-900m and 900-1400m, and was found in the same rate in all altitudes. Libytheidae species was found only in between 400-900m.

5.2.4. Topography

The study area is a rugged landscape ranging from 440 to1720m and, in general, butterfly species are most common in fruit garden. 39 were collected from fruit garden of the species identified in our study.

Pieridae, Satyridae, Argynnidae, species are found mostly in slop of mountain and fruit gardens whereas, species are the most preferred valleys and edge of forest, slop of mountain and Papilionidae species are the most preferred slop of mountain and stream bed. Hesperiidae, Lycaenidae species are the most preferred edge of forest, fruit garden and valleys. Finally Libytheidae were found only in the valley region (Table 5.6).

Table 5.6. Numerical distribution and representation ratios of the species collected from the study area according to topography by family (Total number of species: 49).

Family	Valley	Step	Slope of mountain	Stream bed	Fruit garden	Edge of forest
Papilionidae	2 (% 4.08)	1 (%2.04)	3 (%6.12)	3 (%6.12)	2 (%4.08)	2 (%4.08)
Pieridae	7 (%14.28)	2 (%4.08)	8 (%16.32)	4 (%8.16)	9 (%18.36)	3 (%6.12)
Argynnidae	5 (%10.20)	-	6 (%12.24)	3 (%6.12)	6 (%12.24)	4 (%8.16)
Satyridae	6 (%12.24)	5 (%10.20)	8 (%16.32)	6 (%12.24)	8 (%16.32)	4 (%8.16)
Lycaenidae	8 (%16.32)	3 (%6.12)	7 (%14.28)	3 (%6.12)	9 (%18.36)	9 (%18.36)
Hesperiidae	5 (%10.20)	2 (%4.08)	4 (%8.16)	3 (%6.12)	5 (%10.20)	6 (%12.24)
Libytheidae	1 (%2.04)	-	-	-	-	-
Total	34 (% 69.38)	13 (%26.53)	36 (%73.46)	22 (%44.89)	39 (%79.59)	28 (% 57.14)

The physical conditions of the environment in which they are found are important for butterflies, as well as the food plants in the living area. Species with strong wing structure can actively act (Satyridae, members of the Argynnidae family) despite severe air currents, while those with delicate wing and body structures prefer more sheltered places (such as Pieridae, Lycaenidae species) to be influenced by external factors.

Specific species for northern Iraq:

Iphiclides podalirius, Pieris napi, Hipparchia statilinus, Lycaena kefersteinii, Muschampia tessellum.

Rare species in the area:

Libytheidae, have the lowest number of species in our study due to may have missed sight during field studies.

Papilionidae, have the lowest number of species during the course of our studies, such as low population density, short flight times, etc, may be overlooked.

Local species in the area:

Libythea celtis where found only in the chamanki village at 895m.

Common types in the area:

Pieridae, Satyridae, Lycaenidae and Hesperiidae. These four family have the highest number of species in our study and that may be due to the high rat of food plant and this may lade to the high population density that help us for cathing a large number of their species and also the warm air condition fasiliate to spraed of these species .

The north of Iraq is one of the richest countries in Asia in terms of vegetation and fauna of the butterfly. However, the habitat of butterflies is destroyed by the increasing destruction of the natural environment. In this case, it is important that the relevant institutions of the government evaluate the results of scientists engaged in faunistic, ecological studies, taking the necessary measures in consideration of the proposed and being in the business association.

6. REFERENCES

Abusarhan M.A., Handal E.N., Ghattas M.M., Amr Z.S., and Qumsiyeh M.B., 2016.Some Records of Butterflies (Lepidoptera) from the Palestinian Territories. Jordan Journal of Biological Sciences, Volume 9, Number 1, Pages 11 – 23.

Ahmad, Zuhair K., S.A. Suhail I. (1999). The butterflies of Jordan Journal of Research on the Lepidoptera 37: 11-26.

Akın K., (2008). Studies On The Fauna And Ecology Of Papilionoidea and Hesperıoidea (Lepidoptera) in Ceylanpınar District (Şanlıurfa). Master thesis, Yuzuncu Yıl University, (unpublished, in Turkish). p. 1-93.

Angélique, D., (2010). Biodiversity of butterflies (Rhopalocera, Hesperiidae and Zygaenidae) into the future biosphere reserve in Val Müstair (Graubünden).5:221-230.

Atwal, A.S. (1964). Insect pests of citrus in the Punjab- Biology and control of citrus caterpillar Papilio demoleus L (Lepidoptera*: Papilionidae*). Punjab Hort J.; 4(1): 40-44.

Benyamini, D., Bruschini, C., Serra, G.and John, E. (2007). First confirmed records of *Papilio demoleus* (Linnaeus 1758) in Syria, with comments on the species' appearance in Turkey and the Dominican Republic. News of the Israeli *Lepidopterists* Society; 24: 4-11.

Benyamini D., Bruschini, C., Serra, G., & John. E., 2007. First confirmed records of *Papilio demoleus* (Linnaeus 1758) in Syria, with comments on the species' appearance in Turkey and the Dominican Republic. News of the Israeli *Lepidopterists* Society, Vol 24 (2).

Binoy C.F, Wilson, M.S., Ollukkaran, K.V,. Bini, C.B., (2014).Foraging pattern of insect pollinators in Pentas lanceolata (Forssk.) deflers and Catharanthus roseus (L.) G. DON in in Thrissur district, Kerala, India. International Journal of Science, Environment, and Technology; 3(5):1731–1737. ~ 401 ~ Journal of Entomology and Zoology Studies.

Brown Jr., K.S., (1992). Borboletas da serra do Japi: diversidade, habitat, recursos alimentares e variação temporal; p.142-187 In L.P.C. Morellato (org.)., História

Natural da Serra do Japi: ecologia e preservação de uma área florestal no sudeste do Brasil. Campinas: Unicamp/Fapesp.

Brown J., K.S., & Freitas A.V.L., (1999). Biodiversidade do Estado de São Paulo, Brasil: Síntese do Conhecimento ao Final do Século XX. 5. Invertebrados terrestres. Journal of Insect Conservation 6: 217–231.

Butani D.K., (1973). Insect pests of fruit crops- citrus. Pesticides; 7(12): 23-26.

Carbonell F., (1991). Une espèce jumelle méconue du genre *Polyommatus* (*Neolysandra*) Koçak, 1977. *Linneana Belgica,* 13 (1): 35-45.

Edward A. K., & Robert H.B., (2006)., "Natural Hazards" Pearson-Prentice Hall.

Guest E., & A. Al-Rawi., (1966)., Flora of Iraq. Pob. by ministry of agriculture of Republic of Iraq. Iraq. Baghdad. Vol.1.

Gullan P.J., Cranston, P.S., (2014). The Insects: An Outline of Entomology (5 ed.). Wiley. pp. 523–524.

Hesselbarth, G., van Oorschot, S.and Wagener, S. 1995, Die Tagfalter der Turkei. Vrlg. Wagener, Bocholt Vols 1 & 2: 1354p, Vol. 3: 847p.

Kato S., (1989) Notes on *Papilio demoleus* Linnaeus collected in Java, Indonesia

Kemal M., Koçak, A.Ö., (2007). Synonymical and distributional List of the species of Bit lis Province (East Turkey) (Lepidoptera). *Cent. ent. Stud., Misc. Pap.*111/112: 1-12.(Lepidoptera, Papilionidae). Tyô to Ga;40:189-191

Kemal M., Koçak A.Ö., (2011). A synonymical, and distributional checklist of the Papilionoidea and Hesperioidea of East Mediterranean countries, including Turkey (Lepidoptera). *Priamus* (Suppl.) 25: 1-162, 42 Pls.

Koçak A.Ö. & M.Kemal., (2001), Qazaqistan Képineklirining Zoocograpiyesi ve Taksonomiyesi Üstide Tetqiqatlar (Lepidoptera, Papilionoidea, Hesperioidea). *Priamus* 10 (3/4): 111-163.

Koçak A.Ö. &M.Kemal., (2001) Lepidoptera coğrapiyesi üstide tetqiqatlar 3.İraq képinekliri üstide zoocoğrapiyelik hatiriler (Lepidoptera, Papilionoidea, Hesperioidea). Cent. ent. Stud., Priamus 10 (3/4): 164-173 [in Uighur language].

Koçak A.Ö., Kemal M., Akdeniz İ., (2006). A new genus and species to the Lepidoptera fauna of Turkey and Syria (Papilionidae). *Cent. ent. Stud. Misc. Pap.* 97: 1-6, 2

Koçak A.Ö. & M. Kemal., (2007). Synonymical and distributional List of the species of Şırnak Province (South East Turkey) (Lepidoptera). *Cent. ent. Stud., Misc. Pap.* 127: 1-8.

Koçak A.Ö., Kemal, M., (2010). Synonymical and distributional List of the ptrygot insect in the middle east (result in the entomofuna of the world based upon info-system of the cesa) 88-priamus (supple) 18.2888-3186.

Koçak A.Ö., Kemal, M., Kayci, L., (2011). List of the Species of the Lepidoptera of Van Province (East Turkey). Cent. Ent. Stud., *Priamus* Suppl. 23: 1-43.

Koçak A., Kemal, M., (2015a).Annoted list of the Lepidoptera of Hakkari Province (SE Turkey).Cesa News 116: 1-146.

Koçak A., Kemal, M., (2015b). Intial result of the entomofauna of SW Asia, based upon the info-systemof the cesa (excl. Lepidoptera) .Priamus 35:1-1186.

Larsen, T.B., (1978).Extension récente en Iraq de l'aire de *Papilio demoleus* Linné. Entomops; 91(42):37-38.

Larsen, T.B., Larsen, K., (1980). Butterflies of Oman. Bartholomew, Edinburgh, , 80: 189-191.

Lewis D.S., Cuda, J.P & Stevens, B.R., (2011).Novel Biorational Pesticide: Efficacy of Methionine Against Heraclides (Papilio) cresphontes, a Surrogate of the Invasive *Princeps (Papilio) demoleus* (Lepidoptera: Papilionidae). Journal of Economic Entomology; 104(6):1986- 1990.

Linnaeus C., (1758).Systema naturæ per regna tria naturæ, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. *Tomus I. Editio Decima, Reformata*1 (4), 1–824.

Mohamed Sh.I.A., (2001).“The Local Weather and Climate Brief for Northern Iraq” FAO Publishing, July 5 (1): 15–18.

Mohammed, A.A‥ Elias, N. H., Manal, M. G‥ Zuhair, S.A and Mazin, B., Q(2015) Some Records of Butterflies (Lepidoptera) from the Palestinian Territories. Journal of Biological Sciences Vol 9, (1) pp11 – 23.

Murat.T., (1996).“Meteorological Drought in Turkey: A Historical Perspective, 1930-93”, Drought Network News, Oct 2 :30 – 36.

Murat.T., (1999).“Vulnerability of Turkey to Desertification With Respect to Precipitation and Aridity Conditions” Tr. J. of Engineering and Environmental Science, 23:363 – 380.

Prum R., Quinn, T., Torres, R., (2006). "Anatomically Diverse Butterfly Scales all Produce Structural Colours by Coherent Scattering". The Journal of Experimental Biology. 209 (Pt 4): 748–65.

Ronaldo B.F., Marcelo. D., Olaf. H.H., Astrid .C & André V.L.F., (2011) Butterflies (Lepidoptera, Papilionoidea and Hesperioidea) of the“Baixada Santista” region, coastal São Paulo, southeastern Brazil. Revista Brasileira de Entomologia 55(1): 55–68.

Russell P.*et al*., (2007).Further investigations into *Melitaea telona* Fruhstorfer, 1908 (ogygia Fruhstorfer, 1908; = *emipunica* Verity, 1919) (Lepidoptera: Nymphalidae), with observation on biology and distribution. Entomologist's Gazette, 58(3): 137-166.

Saman R. Afrasiab Lahony, Mohammad K. Mohammad, Hasan H. Ali, Azhar A. Al-Moussawi and Mohammad S. Abd Al-Rasul (2013), Fauna and Flora Of Hawraman Mountain (Part One) Hawraman Lowest Zone, Provınce North East Of Iraq *Bull. Iraq nat. Hist. Mus.* (4): 7-34.

Scoble, M.J. (1995). Lepidoptera .Form, function and diversity. United Kingdom: The Natural History Museum, Suffolk.404 p.

Seven E., (2010).Studies on the fauna and ecology of Papilionoidea and Hesperioidea (Lepidoptera) in Şirvan District (Siirt Prov., SE Turkey). *Priamus* (suppl.) 20: 1-118.

Shahbaz S.E, Pasha, A.A. and Balo A.H., (2002).The altitudinal variation of Pinus *brutia* ten (*Pinaceca*) in atroosh Natural Forest . Journal of Duhok Unvirsity . Vol 5(2). 23-32.

Smithers C.N., (1978). Migration records in Australia. 2. Hesperiidae and *Papilionidae* (Lepidoptera). Australian Entomological Magazine; 5(1):11-14.

Tolman T., (1997).*Butterflies of Britain and Europe.* Harper Collins Publishers, London. 320. Thrissur district, Kerala, India. International Journal of Science, Environment, and Technology; 3(5):1731–1737. ~ 401 ~ Journal of Entomology and Zoology Studies.

Vukusic P., Sambles J.R. & Ghiradella. H., (2000)."Optical Classification of Microstructure in Butterfly Wing-scales". Photonics Science News. 6: 61–66.

Wiltshire, E.P., (1937), Autumnal Lepidoptera in north of Iraq.Preliminary notes on some excursions in the Rowanduz Chai Valley, Iraq. Entomologist's Rec. J. Var. 49: 91-94, 107-109, pl.vii.

Withshire E.P., (1957).The Lepidoptera of Iraq.Nicholas kaye Ltd., London.162 pp.

Yusuf H., (2013) Faunistic Study on Papilionoidea and Hesperioidea (Lepidoptera) of Göksu Valley in Mut, Southern Turkey. Pakistan J. Zool., vol. 45(5), pp. 1291-1297.

CIRRICULUM VITAE

Naji Taha Said was born in 1963 in Duhok, Iraq. He completed his primary and secondary education in Duhok, Iraq. He studied department of Biology at Education College of Mosul Unşversity/Iraq. He graduated Bachelor in 1987. He started in Turkey M.Sc. at Siirt University Institute of Science at Biology Department. He can speak English, Kurdish, Arabic and Turkish.