T.C.
SiiRT UNIVERSITY
INSTITUTE OF SCIENCE

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

MASTER DEGREE THESIS

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ABBREVIATIONS AND SYMBOL LISTS

Abbreviation	Explanation
Km^2	**:** Square kilometers
ICZN	**:** International Code of the Zoological Nomenculature
M	**:** Meter

Symbol	Explanation
&	: and
%	: hundred percentages
o	: degree
'	: minute
"	: seconde
-	: not available

ÖZET

YÜKSEK LİSANS TEZİ

Erbil'in Papilionoidea ve Hesperioidea Faunası Üzerine Araştırmalar (Lepidoptera)

Hawraz Dhahir OTHMAN

Siirt Üniversitesi Fen Bilimleri Enstitüsü
Biyoloji Anabilim Dalı

Danışman: Yrd. Doç. Dr. Mustafa Cemal ÇİFTÇİ

2017, 76 Sayfa

Bu çalışmada, Erbil İlinde (Kuzey Irak) yayılış gösteren kelebek türleri faunistik ve ekolojik yönden incelenmiştir. Bu amaçla, Papilionoidea ve Hesperioidea üstfamilyaları içerindeki toplam 1240 örnek değerlendirilerek 55 tür tespit edilmiştir. Geçerli isimler, sinonimler, habitat tercihleri, dikey dağılımları, fenolojik ve topografik özelliklerinden bahseldilmiştir. Bilimsel isimlerin kullanımı Zoolojik Nomenklatür Kurallarına (ICZN) göre yapılmıştır.

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

ABSTRACT

MASTER THESIS

Studies on the Fauna of Papilionoidea and Hesperioidea of Erbil (Lepidoptera)

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The Degree of Master of Science
In Biology Department

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In this study, the faunistical and ecological features of the butterflies inhabiting in the Erbil Province investigated for the first time. For this purpose, totally 1240 samples belonging to 55 species in the superfamilies Papilionoidea and Hesperioidea were collected by the author. Faunal and ecological information of 55 species were evaluated. Valid scientific names, synonyms, 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).

Key Words: Lepidoptera, Papilionoidea, Hesperioidea, fauna, ecology, Erbil, Iraq.

1. INTRODUCTION

1.1. Importance of the Study

The important of this study is the first study on the types of butterflies of Erbil province, and there is no ckek-list previously available about it only there is some study about Iraqi Lepidoptera and some studies of middle east Lepidoptera and middle east butterflies, and Iraqi butterflies, actually this study will be the first edition and in future we will try to make a check-lists for another provinces of Iraq, so we don't have numbers of butterflies previously known from the field only we know that (151 species of butterflies Papilionoidea 129, Hesperioidea 22) listed in Iraq (Kemal and Koçak, 2011) and in this study only in Erbil province totally (- 55-) species belong to *Papilionoidea* and *Hesperioidea* were recorded in study area.

1.2. What are butterflies?

Butterflies are perhaps the best–known group of insects. Their brilliance and popularity have given them special significance and many people regard them with affection as the ´ birds' of the insect world (Braby, 2004).

Butterflies are a group of evolutionarily related animals. They are grouped as part of the class Insecta and together with the moths constitute the order Lepidoptera. This word derives from the Greek words for scale (=Iepid) and wing (=ptera). True butterflies (superfamily *Papilionoidea*) and skipper (superfamily *Hesperioidea*) are usually considered together as "butterflies," and separately from moths. It is generally easy to distinguish butterflies and moths (Murphy and Ehrlich, 1984).

Almost all our butterflies are active exclusively during the day, while the great majority of moths are active only at night. Some moths are active during the day, but these can usually be identified by their flight, which is characteristically stiff and very erratic. In part, this is because most moths have structures, called a frenulum and a retinaculum, that hook the forewing to the hind wing Butterflies lack these structures and thus , in general , fly much more gracefully than most moths. When seen well, our butterflies and moths almost always can be distinguished by the shape of their antennas. Butterflies and skippers have a club (a swelling) at the end of their antennas, while almost all moths have a thin or often feathery end (Glassberg, 2001).

1.2.1 Butterfly morphology

Like all insects, the butterfly consists of three body parts or groups of segments (also known as Tagma) the head, thorax and abdomen. Adults have large, often brightly colored wings, held vertically above the body when at rest. Compared to moths the butterflies have a slender body while the antennae are elongate and thin with an abrupt terminal club (Figure 1.1) (Braby, 2004).

The head: The head is heavily sclerotized and bear the following appendages: a pair of antennae, two compound eyes, and the mouthparts. The antennae are long and knobbed and serve as the main organ of smell. The large compound eyes are the most obvious feature of the head. With the eyes butterflies can recognize color patterns on flowers and on the wings of other butterflies, which are undetectable by the human eye. Butterflies and moths feed through a specialized sucking - tube called a proboscis. It is held coiled when it is not in use. However, when it is in use, the proboscis will be uncoiled and extended to probe into flowers and other sources of food. In different groups of Lepidoptera, the proboscis is modified to adapt to different feeding habits (Abang, 2006).

The thorax: The thorax lies behind the head. Being the locomotive tagma, it is known as the powerhouse of the insect's body. It contains the organs of locomotion and principle nerve centers.It is divided to three parts called the prothorax, mesothorax and metathorax. Each thoracic segment carries a pair of jointed walking legs with claws at their ends which enable them to grip the surface on which they clinging. The second (mesothorax) and third (metathorax) segments of the thorax , each carries a pair of wings. Each wing is made up of an upper side and under side membrane, which are supported by a framework of veins carrying air, nerve fibers and blood (Abang, 2006).

The abdomen: The posterior most part of the insect body of the insect body is called the abdomen. It houses the bulk of the circulatory, respiratory, digestive, excretory and reproductive system. It consists of ten segments, of which the last two are modified to form genitalia. Genitalial structures, particularly, the male's aedeagus serves as important internal characteristics used in butterfly species identification (Abang, 2006).

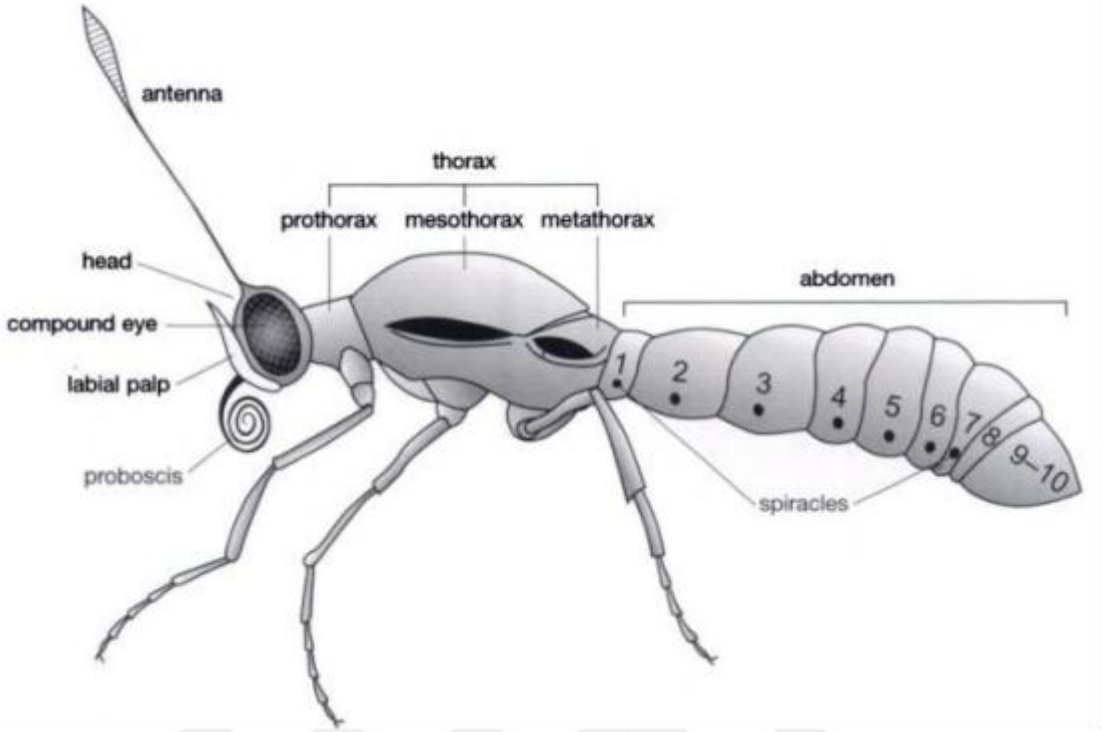


Figure 1.1. The main parts of the body of an adult butterfly (Braby, 2004).

1.2.2. The butterfly's life cycle

The amazing process of metamorphosis, the butterfly's transition from egg to caterpillar to pupa to winged adult, is well known and fairly well understood, but it is still rightly regarded as a miracle. The process begins with the egg laid by the adult female on or near the plants that will serve as food for the caterpillars. Most butterfly caterpillars cannot survive on the wrong plants, so the adult's choice of where to lay her eggs is critically important. But given the right plant, the caterpillar or larva (plural; larvae) is a little eating machine, and as it grows it passes through about five stage or instars, each one larger than the last. Because the larva's skin can stretch only so far, it sheds its skin each time it passes to the next instar. The last time it sheds its skin, it reveals not a larger larva but the next phase in its life, the pupa (plural; pupae). The pupa, also called the chrysalis, is the stage in which the larva is transformed into the adult butterfly. Unlike many moths, most butterflies do not spin a protective cocoon; their pupa is smooth but often colored for camouflage. When the development inside is complete, the pupa splits open and the adult crawls out; after an hour or two for the wings to expand and dry, the butterfly is ready for flight. In cooler climates, butterflies have the challenge of surviving through winter (Brock and Kaufman, 2006).

Some pass the winter as eggs, others as partly grown larvae or as pupae. A few overwinter as adults, emerging to fly about on unusually warm winter days. But aside from such hibernators, and a few large species such as Monarchs and long wings, most butterflies do not live very long in the adult stage, a couple of weeks is along life for a small butterfly.In some cases, a butterfly passes through all four stages in a matter of weeks, and the whole cycle is repeated several times during the year. In this guide we note how many generations, or broods, a species may have per year. Many species have only one brood per year, and these usually have short flight seasons. Some have fewer than one brood per year; in the far north, where summers are short, some species take two years to develop, hibernating through one winter as a small larva and the next winter as a nearly full grown larva; adults may appear only every other year (Brock and Kaufman, 2006)

Some butterflies found in northern climates cannot survive the winter there in any stage. Instead, in cooler climates, butterflies they invade northward every summer, with some of their offspring surviving to move south in fall. These migrations generally seem far more haphazard than those of birds, but so far they are not well known (Brock and Kaufman, 2006) (Figure 1.2).

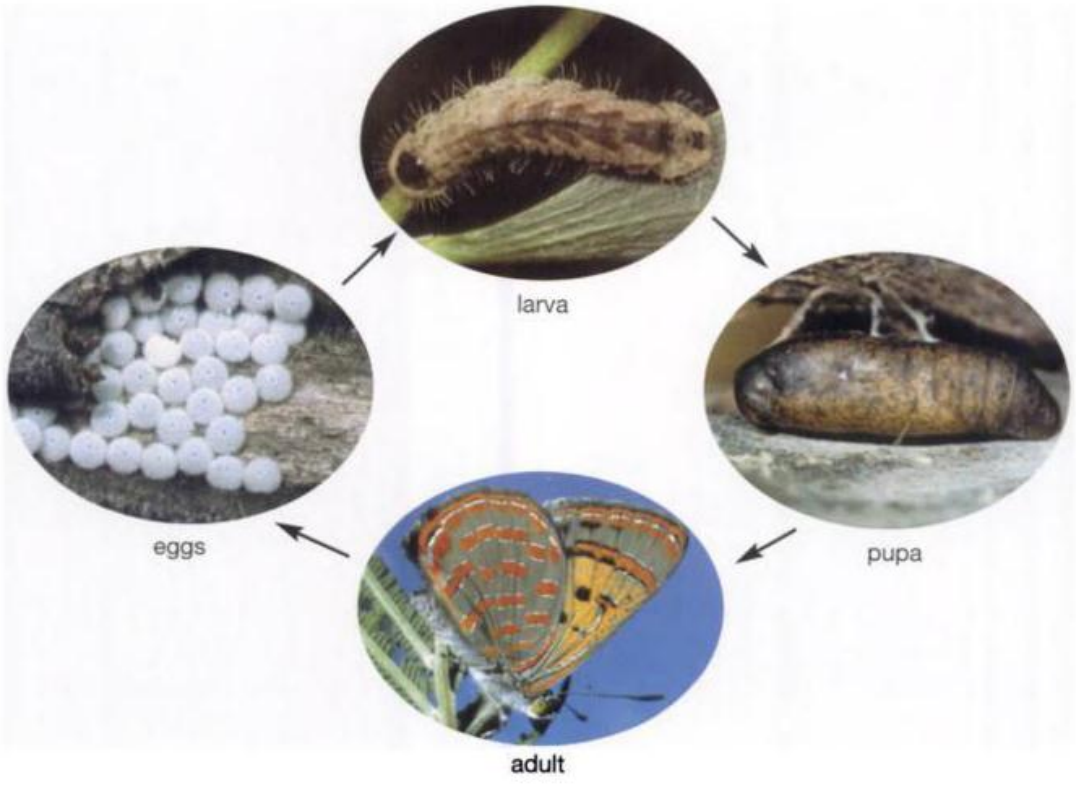


Figure 1.2. Life cycle of the Moonlight jewel *Hypochrysops delicia* (Braby, 2004).

1.2.3. The butterfly's behavior

Because so little is known about butterfly behavior, this is an area where patient observation can increase our knowledge. Here are a few types of behaviors to look for when you are watching butterflies (Brock and Kaufman, 2006).

Basking: Butterflies are cold-blooded- their body temperature largely depends on the ambient temperature. Thus when it is cold outside, butterflies want to warm up, and they employ two different basking strategies to do so. Some butterflies sit in the sun shine in an exposed spot (or, even better, on a warm rock) and open their wings. This allows the sun's rays to warm them. Other butterflies engage in lateral basking. These butterflies sit in the sunshine with their wings closed. They then tilt their bodies so that the plane of their wings is perpendicular to the sun's rays, thus most efficiently capturing the warming energy of the sun (Brock and Kaufman, 2006).

Hill topping: Many humans go to singles bars because prospective mates may be concentrated at these locations. Hilltops are the butterfly equivalent of singles bars. Males of many butterfly species may be most easily found by climbing to the top of the highest hill in the vicinity, especially if the top of the hill is open and if at least some of the slopes are quite steep. Here the males patrol the area looking for females, or they select a favored perch and wait. Unmated females also f1y up here (Otherwise the system wouldn't work), but already mated females spend more time elsewhere, looking for host plants and nectar (Brock and Kaufman, 2006).

Gully bottoming: Just as there are different types of singles bars that attract participants with different Predilections, some butterfly species shun hilltops and instead meet at the bottoms of gullies and canyons. Some species seem to prefer the centers of gullies and washes; others appear to hang out closer to the edges.
Exploring different zones of canyons and other interesting topological features may yield different butterfly species (Brock and Kaufman, 2006).

Mud paddling: Many butterflies, especially males, congregate at damp sand or soil. Here they imbibe salts along with the water. The salts are passed along to the female at mating and contribute to the nourishment of the eggs. Seeing a large mud puddle party with many species of swallowtails and other butterflies is a thrilling experience (Braby, 2004).

Courtship: We don't really have detailed knowledge about most butterflies ' courtship patterns. Males of many species stake out "territories." They then police these, either by flying back and forth, or by occasionally sallying forth from a favored perch, making sure that they're the only male around when a female saunters into the territory. Although the main objective would seem to be to drive away other males of the same species, some aggressive males try to drive off everything that moves, including birds and sometimes humans! Some butterflies have almost no court ship displays. The males simply fly up to a landed female, and if she is receptive, male immediately (Abang, 2006).

Other butterflies behave differently. Most male hairstreaks set up territories then fly up to greet a female flying through their territory. He flies with her until she lands, then lands next to her, usually facing her, and fans his wings. This disperses the "mating perfume" (pheromone) that most male hairstreaks have in special patches of scales on the upper side of their FWs. Many other butterflies are also territorial. While another group of males, taking the initiative uses patrolling behavior to locate females they just keep flying till they find them. Male Barred Yellows land a long side a female and flick opens their FW that is closer to the female. They place their FW right in front of the female, touching her antennas, to dazzle her with their great-looking and - smelling (because of a mating perfume) bar! Most males of a given species will generally engage in either patrolling or territorial behavior, but not both. But males can sometimes switch between perching and patrolling, and this may be related to population density (Abang, 2006).

Migration: Perhaps surprisingly, many butterfly species undertake migrations. We know very little about these movements. Here again is an area where careful observation by the increasing number or butterflies will provide important new information (Glassberg, 2001).

While all butterflies move around, most don't "migrate" in the traditional sense. What they do is to disperse in a random direction from the site where they emerge from the chrysalis. Some adults immediately fly away from their emergence site, others stay around for most of their lives, then wander off as they get older, while some never leave. If none of the population ever left the original site, butterflies would never be able to colonize new, suitable sites. Since many butterfly species live in habitats that

disappear over time (open meadows being replaced by forests, etc.), this dispersal is critical to the survival of butterfly species. So a stray butterfly could appear almost anywhere (Glassberg, 2001).

Many butterflies that spend the summer in the north cannot survive northern winters. Each year, as the weather becomes warmer, butterflies from Mexico fly north to repopulate these regions. Species that move northward each year include Cloudless Sulfur, Lillie Yellow, Gulf Fritillary, Variegated, Fritillary, Painted Lady, Red Admiral, Common Buckeye, Monarch, Fiery Skipper, and Sachem. For most species these northward dispersals are gradual, but in especially good years, one can see Painted Ladies streaming northward (Glassberg, 2001).

1.2.4. Variation of butterflies

As with humans and other living things, no two individual butterflies look exactly alike. Most of the variation within a species is so minor that you would not notice it in the field, but sometimes it is enough to cause confusion. Occasionally you'll see an individual that looks totally unlike the normal color pattern for its species; these aberrant butterflies may be identifiable only by shape or the other clues. Many species vary from place to place, and if these variations are well marked, a local or regional population may be designated as a subspecies; there are also seasonal variations (Brock and Kaufman, 2006).

For example, Zebra Swallowtails flying in spring are smaller and paler than those flying in summer, even though they all belong to the same species; Goat weed Leaf wing flying in fall have more sharply pointed forewings than those flying in early summer. Males and females often differ in pattern or even in shape- sometimes subtly, sometimes so strikingly that they appear to be unrelated and finally, every individual butterfly gradually changes in appearance as its condition becomes more worn and faded. The two Painted Ladies shown here, for example, were sitting on flowers in the same meadow. The ragged one on the right can still be identified, because Painted Ladies have lots of field marks, but some butterflies in this condition would be unrecognizable (Brock and Kaufman, 2006) (Figure 1.3).

And that was one of the real problems during my study, because I always confused about it, so I thought it is necessary to mention it in this part.

Figure1.3. Variation of butterflies (Brock and Kaufman, 2006).

1.3. Geological Features and Geographical Location of the Study Area

1.3.1. Geographical Location of the Study Area;

Erbil is the capital city of north region in Iraq. It is located approximately 350 kilometres (220 miles) north of Baghdad. Its governorate has a permanent population of approximately 1.9 million as of 2012. Erbil Province intermediate the north of Iraq and occupy the north-eastern part of Iraq, It bordered Turkey and Iran in the north and north-east respectively, and are adjacent to Dohuk and Nineveh province to the west, it also borders the provinces of Sulaymaniyah and Kirkuk on the east, south-east and south (Figure 1.4) . The latitude of Erbil, Iraq is between **(**35^{o}30'-37^{o}15') North, and the longitude is between (43^{o}23'- 45^{o}05') East (Omer, 2013).

1.3.2. Geological characteristics of the research area

The study area within the limits referred to includes an area of (14871) km^{2,} it consists of ten districts (Koya, shaqlawa, rwanduz, choman, makhmwr, soran, mergasor, khabat, Erbil district, Dashty Hewler) (Figure1.5). The southern and south-western locations of the province (dashty hewler , makhmur) are not rich in stream , valley and forest so I focused on the eastern and northern part of the province (Koya, shaqlawa , rawanduz , choman, makhmwr, soran) because it contains a lot of valley and stream specially in March , April , Jun , and also it contain a highland and mountains (Safeen, Haebat sultan, Korek, Bawajy, Qandil, Akoyan, Bradost, Malakan, Bnabawe) and there is forest in some place but it is not dense. The province is far from the water

bodies, there are the great Zab River and the small Zab River passing through the city's outskirts (Omer, 2013).

Figure1.4. Location of Erbil Governorate in Iraq (Erbil Governorate – Wikipedia)

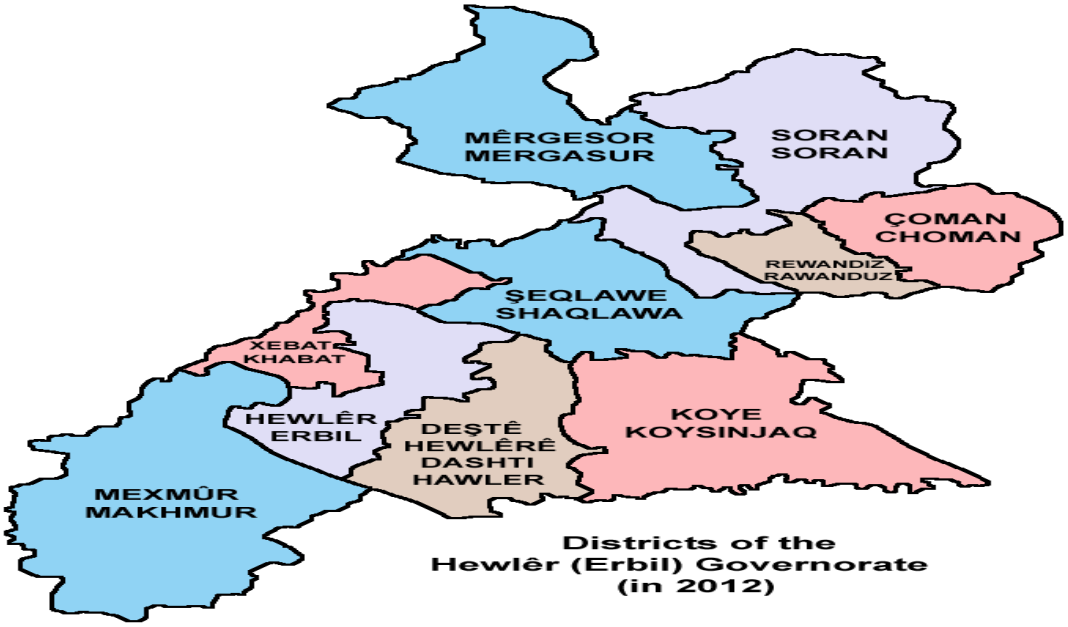


Figure1.5. Districts of the Erbil Governorate (Erbil Governorate – Wikipedia)

1.3.3. Climate

Erbil climate is hot-summer Mediterranean , according to Köppen climat classification, with extremely hot summers and cool wet winters. January is the wettest month. I will mention the climate that butterflies are available, during the summer period (May-September), the weather in Erbil may be considered as very hot and dry weather, especially on the Erbil Plain, often reaching temperatures as high as 45-50 degrees Celsius. It is slightly cooler in the evenings and in the mountainous regions around Erbil. The winter months can be cool with rain and some snowfall (Omer, 2013).

1.3.4. Security condition

One of the troubles of my experience during my work is there is some point in study area that I couldn't went there, because some people with power took over some of the land in strategic places and built a fence around it, and this is a common phenomenon in study area, for example (Shaqlawa, Koya) also there was some place that I couldn't went there because it was near to the border, there were sometimes battles between the two sides (Choman, Makhmur).

1.4. Flora of the Study Area

In the study area, 288 plant taxa belonging to 57 families and 200 genera were determined. The largest families are Fabaceae (38; 13.2%), Asteraceae (37; 12.8%) and Brassicaceae (27; 9.4%) respectively. 272 plant taxa were categorized according to Raunkiaer life forms. Of these; 143 plant taxa (52.57 %) were determined as Therophyte,59 species (21.69 %)as Hemicryptophyte, 30 species (11.03 %)as Phanerophyte, 24 species (8.82 %)as Cryptophyte (Cr-He: 1, Cr-Ge: 13) and 16 species (5.88 %)as Chamaephyte and in the (Table 1.1) I gave some examples of these plants (Townsend and Guest, 1980).

Table 1.1. Known plant species in the study area

Family	**species**
Apiaceae	*Bunium avromanum* (Boiss. & Hausskn.) Drude, *Bunium cornigerum* (Boiss. & Hausskn.) Drude, *Eryngium hainesii* C.C. Towns, *Ferula shehbaziana* S.A.Ahmad
Araceae	*Arum hainesii* Agnew et Hadac ex Riedl
Boraginaceae	*Arnebia linearifolia* A. DC. subsp. *desertorum* Riedl, *Heliotropium albo- villosum* Riedl, *Heliotropium confertiflorum* Boiss. & Noë, *Myosotis kurdica* Riedl, *Onosma hawramanensis* S.A.Ahmad, *Onosma sulaimaniaca* Riedl
Brassicaceae	*Alyssum aff inflatum* Nyar [Fl. Iraq 1980: 983], *Camelinopsis kurdica* (A.G.Mill.) Al-Shehbaz & A.G.Mill, *Erysimum strophades* Boiss, *Hesperis blakelockii* F.Dvořák,
Caryophyllaceae	*Paronychia mesopotamica* Chaudhri, *Petrorhagia sarbaghiae* S.A.Ahmad,
Compositae	*Achillea aleppica* DC. subsp. *densa* (Blakelock) Hub.-Mor, *Anthemis micrantha* Boiss. & Hausskn, *Anthemis microlepis* Eig, *Centaurea alveicola* Rech.f, *Centaurea foveolata* Blakelock, *Cousinia acanthophysa* Rech.f, *Echinops nitens* Bornm
Dipsacaceae	*Pterocephalus laxus* I.K. Ferguson
Gramineae	*Eragrostis boriana* Launert
Labiatae	*Marrubium eriocephalum* Seybold, *Scutellaria porphyrantha* Rech.f, *Stachys iraqensis* Bhattacharjee, *Thymus neurophyllus* (Rech.f.) R.Morales.
Liliaceae	*Allium calocephalum* Wedelbo, *Bellevalia parva* Wendelbo, *Ornithogalum iraqense* Feinbrun, *Tulipa kurdica* Wendelbo, *Scilla kurdistanica* Speta
Linaceae	*Linum velutinum* Steud. Ex Planch, *Linum mucronatum* Bertol. subsp. *pubifolium* (P.H.Davis) P.H.Davis
Orchidaceae	*Himantoglossum hircinum* (L.) Spreng. var. *pseudocaprinum* J.J. Wood
Papaveraceae	*Glaucium cuneatum* Cullen
Papilionaceae	*Astragalus baijensis* Townsend, *Astragalus chionobiiformis* C.C. Towns, *Astragalus dolius* Boiss. & Hausskn, *Astragalus helgurdensis* C.C. Towns, *Astragalus porphyrodon* C.C. Towns, *Astragalus sarae* Eig, *Vavilovia formosa* (Stev.) Al. Fed, *Vicia singarensis* Boiss. & Hausskn. in Boiss
Plumbaginaceae	*Acantholimon astragalinum* Mobayen

Table 1.2. Known plant species in the study area

Family	**species**
Polygonaceae	*Pteropyrum noeanum* Boiss. ex Meisn.
Ranunculaceae	*Delphinium micranthum* Boiss. & Hohen.
Rosaceae	*Alchemilla kurdica* Rothm.
Rubiaceae	*Asperula asterocephala* Bornm, *Asperula comosa* Schoenb.-Tem, *Asperula friabilis* Schoenb.-Tem, *Galium hainesii* Schonb.-Temb, *Galium qaradaghense* Schonb.-Temb.
Scrophulariaceae	*Rhynchocorys elephas* (L.) Griseb. subsp. *carduchorum* Burbidge & Richardson, *Scrophularia atroglandulosa* Grau, *Verbascum arbelense* Bornm, *Scrophularia sulaimanica* S.A.Ahmad
Urticaceae	*Parietaria rechingeri* Chrtek.
Valerianaceae	*Valerianella deserticola* Hadac
Vitaceae	*Vitis hissarica* subsp. *rechingeri* Vassilcz.

2. LITERATURE REVIEW

2.1. Iraqi Lepidoptera researches

Wiltshire (1937) was given this article deals 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 north of 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.

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), *Hesperiidae* (22). The full list of 145 species is 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.

Kemal and Koçak (2011), were given this is the first modern 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 is 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.

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.*

2.2. Identification researches

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

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

2.3. Studies adjacent to the research area

Koçak et al (2006), presented in this paper deals with 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), in this study he 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), preseneted in this paper deals with 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), presented in this study, 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 with in Turkey and world, faunal elements, habitat preferences, phenological and topographical features are mentioned in the thesis.

Koçak and Kemal (2009) Listed Turkish butterflies. Synonymous names are also mentioned. Provincial distributions are given as codes to each species if available. Vernacular names in Turkish are also mentioned if present. The synonym used in my research is derived from this research.

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).

Koçak et al. (2011), were presented This article deals with the *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*.

Back (2012), presented the species, and all their subspecies, out of the genus *Zegris* Boisduval, 1836 are phenotypically and genotypically analysed. Due to the genetically distance of 3, 5 % from *Z. eupheme* (Esper, [1804]), the isolated populations from the Iberian Peninsula and from Moroc are given specific status: *Zegris meridionalis meridionalis* Lederer, 1852 stat. nov. and their subspecies *Zegris meridionalis marocana* Bernardi, 1950 comb. nov. The other two species, *Z. fausti* Christoph, 1876 and *Z. pyrothoe* (Eversmann, 1832), have a genetic distance of more than 4 %.

Koçak and Kemal (2015) 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 were arranged according to this source.

Abusarhan et al. (2016) were collected 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).

Korb (2017), presented A brief review of three subspecies of *Zegris eupheme* (Esper, [1804]) known from the territory of the former USSR is proposed and its diagnostic features are listed. The neotype of *Zegris eupheme tschudica* Herrich-Schäffer, [1850] and lectotypes of *Z. eupheme sulphurea* O. Bang-Haas, 1927, *Pontia erothoe* Eversmann, 1832 and *Papilio eupheme* Esper, [1804] are designated. *Zegris eupheme tschudica* Herrich-Schäffer, [1850] is synonymized to *Zegris eupheme erothoe* (Eversmann, 1832); *Zegris eupheme dyala* Peile, 1921 and *Zegris eupheme tigris* Riley, 1921 are synonymized to *Zegris eupheme menestho* (Ménétriés, 1832).

2.4. Global researches

Glassberg (2001), this research given information about Netting, butterfly behavior, life cycle, how to take photography for non photographers, and also he given photos for species of Westeren North America.

Braby (2004), he had given information about body structure, life cycle, how to distinguish between butterfly families by their (adult, caterpillar, egg) shapes, also he given photos for butterflies of Australia.

Brock & Kaufman (2006), given photos of types of butterfly in North America, butterfly life cycle, variation of butterflies, how to found butterflies, also maps for distribution different types of butterflies of North America.

Abang (2006), given information about butterfly morphology, life cycle, habitate and hostplants, also she mention butterfly classification with example for each families.

3. MATERIAL AND METHOD

3.1. Information about the research area

The study area is the province of Erbil, located in the north of Iraq, The butterfly fauna was surveyed from April & Jun of 2016 and from March 2017 to October 2017, from different heights ranging from (387m to 1323m) (Figure3.1).

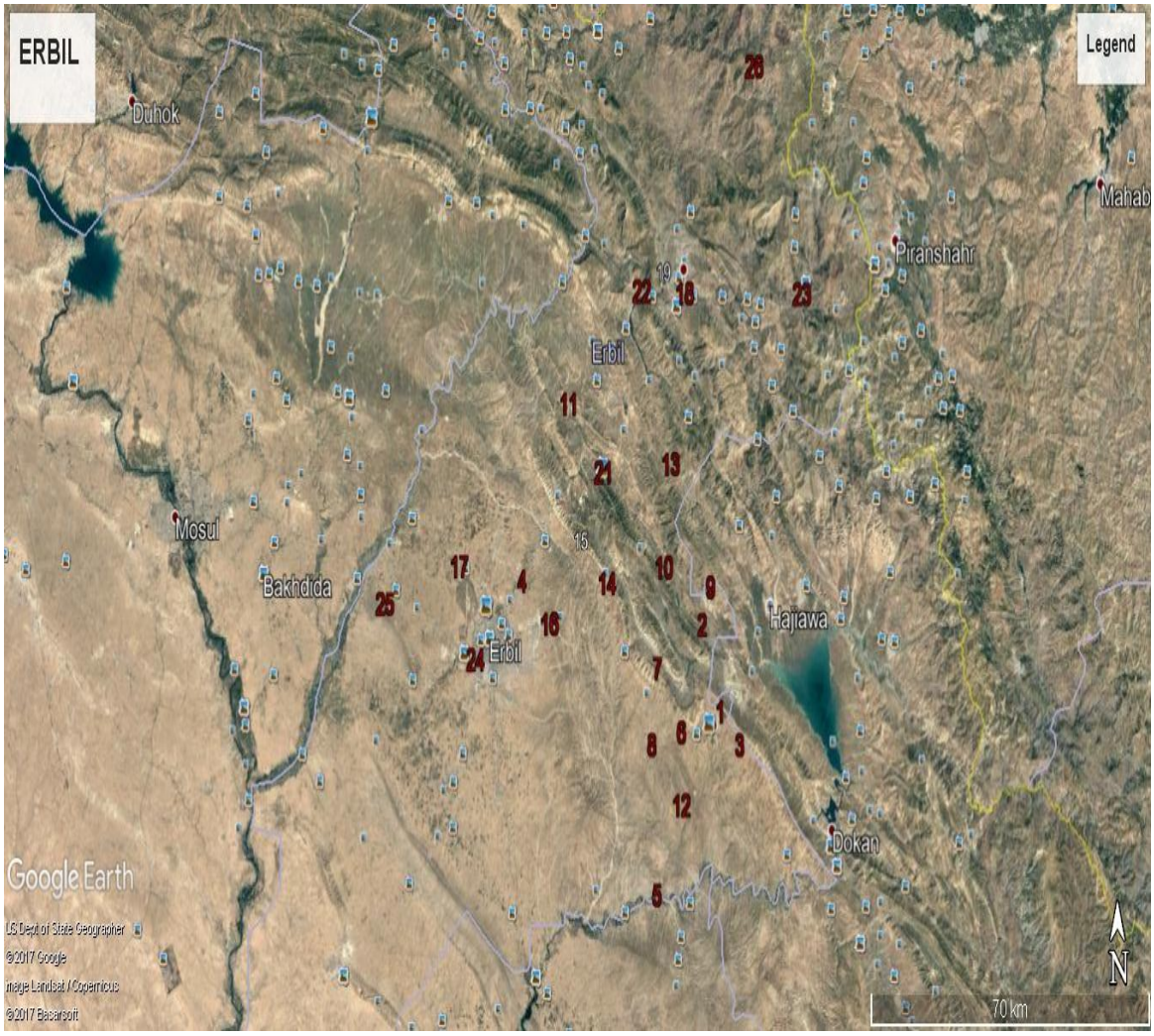


Figure 3.1. Studied localities in the area (modified from Google-Earth).

All studied localities in the area were given in order of Figure 3.1, 3.2, 3.3, 3.4, 3.5 and Table 3.1 photographed and illustrated in below.

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

Locality	Coordinates	Altitude	Studied dates	Plants
1.Koya	36°04'29"N 44°39'15"E	554 m	04/5/2016 14/3/2017 22/4/2017 08/7/2017	*Citrus sp.,* *Crussiferae sp.* *Fabaceae sp.* *Triticum sp.* *Umbelliferae sp.*
2. Jale	36°44'25"N 44°36'11"E	738 m	25/4/2016 27/3/2017 20/5/2017 18/6/2017 06/7/2017	*Quercus brantiti,* *Quercus Infectoria,* *Salex alba*
3. Hawawan	36°03'32"N 44°42'26"E	703 m	04/4/2017	*Anemone coronaria* *Apiaceae spp*
4.Mala omer	36°56'96"N 44°42'26"E	570 m	05/4/2017	*Triticun aestium*
5. Taq taq	35°54'45"N 44°36'39"E	401 m	06/4/2017	Herbaceous plants
6. Shekharwan	36°04'31"N 44°32'39"E	631 m	08/4/2017	*Quercus brantiti,* *Quercus infectoria*
7.Shewe samal	36°06'02N 44°31'34"E	770 m	18/4/2017	Herbaceous, *Asteraceae sp.* *Crussiferae sp.*
8. Ttopco	36°01'59"N 44°28'31"E	527 m	19/4/2017 21/4/2017 22/4/2017 15/6/2017	*Salix alba,* *Citrus sp.* *Ornithogalum-nabonense*
9. Sktan	36°13'57"N 44°36'46"E	694 m	26/4/2017	*Daphne sp.* *Asteraceae sp*
10. Heran	36°17'04"N 44°29'33"E	852 m	27/4/2017	*Punica granatum* *Citrus sinensis* *Citrus limon*
11. Mawaran	36°27'52"N 44°15'20"E	759 m	29/4/2017	*Daphne mucronata,* Herbaceous plants.
12. Elnjakh	35°58'12"N 44°30'50"E	469 m	01/5/2017	Herbaceous, *Triticum sp* *Salix alba*
13. Meersaid	36°24'44"N 44°30'51"E	841 m	04/5/2017 05/7/2017	*Quercus sp.* *Daphne sp.* *Ranunculaceae sp.*
14. Permam	36°22'25"N 44°10'26"E	834 m	05/5/2017	*Quercus sp.,* *Pinaceae sp,* *Geranium - tuberosum.*
15. Faqayan	36°15'52"N 44°20'15"E	863 m	07/5/2017	*Apiaceae sp.*
16. Dlope	36°11'26"N 44°07'03"E	749 m	08/5/2017	*Quercus sp.,* *Pinaceae sp.*
17. Gazna	36°14'20"N 43°56'01"E	387 m	09/5/2017	Herbaceous, *Triticum sp*

Locality	Coordinates	Altitude	Studied dates	Plants
18. Bekhal	36°36'17"N 44°31'41"E	756 m	10/5/2017	*Quercus brantiti, Quercus infectoria,* Herbaceous.
19. Jwndyan	36°39'28"N 44°30'54"E	547 m	12/5/2017	*Quercus sp.* Herbaceous
20. Kosar	36°06'30"N 44°40'09'E	900 m	13/5/2017	*Quercus sp. Pinaceae sp.*
21.Shaqlawa	36°24'17"N 44°19'38"E	806 m	10/7//2017	*Daphne sp. Quercus sp.*
22. Khalifan	36°36'19"N 44°24'22"E	664 m	11/7/2017	*Populus sp.*
23.Choman	36°34'49"N 44°51'37"E	1060 m	12/7/2017	Herbaceous plants
24. Sami Abdul-rahman park	36°11'32"N 43°59'37"E	418 m	13/7/2017	*Quercus sp. Citrus sp. Umbelliferae sp.*
25. Khabat	36°14'40"N 43°43'09"	404 m	02/8/2017	cane plants and herbs
26. Dole Sakran	36°54'58"N 44°44'53"E	1323 m	09/8/2017	*Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable

Table 3.2. Types of habitat

Types of habitat	**Localities**
1. The presence of wheat , broad bean , dominate plants , and vegetable located in smooth plain	Elnjakh, Mala omer, Gazna
2. Dominate *Quercus*, Salix plants, *Juniperus* on mountain slopes	Kosar, Haebat sultan, Mawaran, Jale, Dlope, Meer said
3. Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species	Kane qara, Sami abdulrahman park, shaqlawa, heran
4. Sparse communities of Herbaceous plants located in valleys	Shekharwan, Shewe samal, Hawawan, Ttopco, Faqayan
5. Sparse communities of *Quercus, Juniperus,* plants located in valleys	Soran, Choman
6. *Daphne, Quercus, Herbaceous* plants on the watter stream.	Taq taq, Sktan
7. *Populus* forest	Khalefan
8. A swamp filled with cane plants and herbs.	Khabat
9. Sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys	Dole Sakran

Koya

Jale

Hawawan

Mala omer

Taq taq

Shekharwan

Shewe samal

Ttopco

Figure 3.2. Photos of the study area (Hawraz D. Othman).

Sktan

Heran

Mawaran

Elnjakh

Meersaid

Permam

Faqayan

Dlope

Figure 3.3. Photos of the study area (Hawraz D. Othman).

Gazna

Bekhal

Jwndyan

Kosar

Shaqlawa

Khalifan

Choman

Sami-abdulrahman park

Figure 3.4. Photos of the study area **(**Hawraz D. Othman).

Khabat

Dole sakran

Figure 3.5. Photos of the study area **(**Hawraz D. Othman).

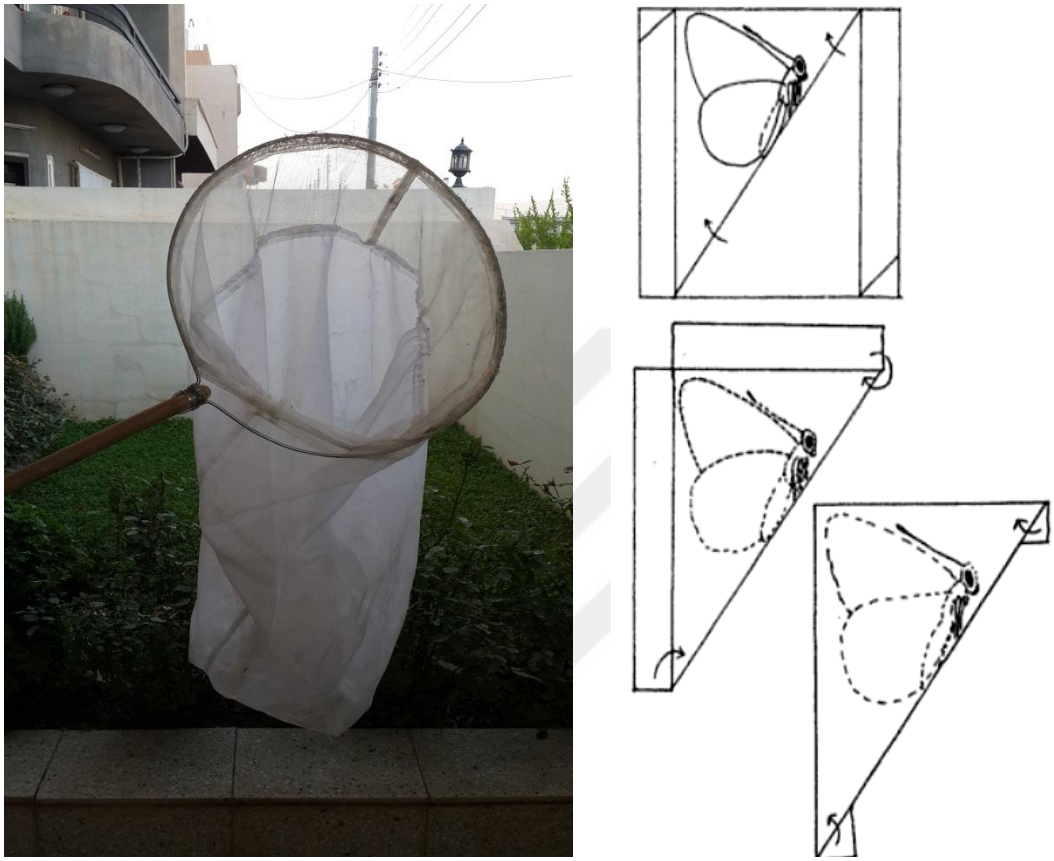
3.2. Collection, Stretching and Identification of Samples

3.2.1. Field studies

An essential tool to catch butterflies is a long-handled butterfly net (figure 3.7). The butterfly net were prepared using a light metal rod, a light metal ring and piece of soft, thin cotton mosquito net. Although the long handle of the net helps in catching butterflies resting a few feet away, some butterflies are very wary, and keep a safe distance from the observer. If they are resting on the ground, the best way to approach them is to kneel and move towards them slowly as soon as possible. Before getting down on one's knees, it is useful to hold the net in front and slightly raising. Once the butterfly is in sweeping range of the net, the net should be rapidly brought down on the butterfly. Butterflies usually tend to fly upwards when caught in the net; the rim should be rapidly turned around to close the net. Then the net can be lifted without letting the butterfly escape.

If the butterfly is resting on vegetation, the net can either be brought down upon it or swept in from the side. Whichever method is used to catch butterflies, the key factors leading to success are stealth when approaching the butterflies, and speed when sweeping the net. Once the butterflies are in the net and the net has collapsed on them, they should be either immediately transferred to a killing jars that containing cotton swabs with (Ethyl acetate), otherwise they flutter and try to escape, in the process damaging their wings. The specimens stored in butter-paper envelopes. The antennae of the specimen should be kept along the leading margin of the fore wing, so that they do not break after drying. The paper is folded in a triangle such that it secures the specimen inside from all three sides, the paper triangle should be enough to accommodate the

butterfly, (Figure 3.6). And we should take photos for both habitats and the butterfly food plants, or extract the plant from the soil and put it in paper envelope to dry, and then we can identify it when we need (Figure 3.8)



1 **2**

Figure 3.6. 1. Butterfly net, **(**Hawraz D. Othman). 2. Butter-paper envelope

3.2.2. Laboratory studies

When we need to stretched the butterfly, we note that the body of the dead butterfly becomes dry and rigid, so if the dry butterfly is kept in a container that contain a sponge to avoide weating the butterfly, with little water its muscles relax and then it can be spread. Now we need to pinned and spread it. For this purpose, a spreading board is needed. A spreading board has a groove in the middle with two flat surfaces on either side of it. We use different size groove for different size of butterflies. The body of the butterfly should fit into the groove, and the wings should be spread on the flat surfaces. Paper strips can be used to hold the wings in the right positions and then they can set

with pins. A long, rust-proof pin goes through the middle of the thorax of the butterfly, and then using a longer pin or a needle, the wings can be spread. The outspread wings should be immediately fixed with paper strips, the lower margin of the fore wings should be at a right angle to the body, and the antennae should be in front of the head.

The butterfly should be left to dry for at least two days, after which the pins and paper strips can be removed and the specimen pinned in a wooden box. The wooden boxes should be without slites and holes that is completely closed from all sides and covered from the top, preferably by glass. The boxes should be equipped with small cotton swabs moistened with insect repellent chemicals (naphthalene), so that other insect that may destroy preserved specimens are kept away from specimen boxes. And one of the most important thing, is we should labeled the specimen with information of the location, date, altitude and the author, for each specimen we keep separate Labelle (Figure 3.7).

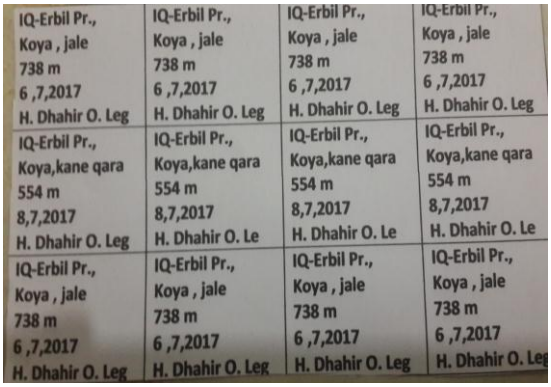
2.2.3. Identification procedures

For diagnosis the species we used (Hesselbarth's 1995) Turkish butterfly book, (Tolman 1997) study of English and European butterflies.

Families and genus groups classified accoding to their characteristics, morphological features, colors, discriminatory properties carried by male – female individuals, flight periods and spread in Iraq. A Sony-Cybershot 1080 (8 megapixel 4x optical zoom) phtographic machine was used to photograph the localities and butterflies in front of the selected stretched specimens and terrian.

After the diagnostic process is finished, samples are labeled with labels that are biased by scientific names, and the boxes containing the samples are preserved with naphthalen in a collection of cupboards in the Entomology Laboratory of the Biology Dipartment of the Siirt University.

1.



2.

3.

4.

5.

Figure 3.7. Laboratory equipment 1. Entomological pin, 2. Labelle, 3. Woody setting board, 4. Corky setting board, 5. Sample box. (Hawraz D. Othman).

Figure 3.8. Examples of Butterfly food plant: 1. Asteraceae sp., 2. Crussiferae sp., 3. Fabaceae sp., 4. Ranunculaceae sp., 5. Asteraceae sp., 6. Crussiferae sp., 7. *Ornithogalum nabonense*, 8. *Cardaria draba*, 9. *Anemone coronaria* **(**Hawraz D. Othman).

4. Results

In this part, 55 species were presented and listed according to superfamilies, and families. For each species synonyms (Koçak and Kemal, 2009), examined materials, ecological information and habitat information were given.

4.1. Superfamily Papilionoidea

4.1.1. Family Papilionidae

Iphiclides podalirius (Linnaeus, 1758) (*Papilionidae*) (Figure 4.1)

Synonym(s): *podalirius Linnaeus,1758; sinon Poda,1761; flammeus Fourcroy,1785; brassicae Fabricius,1807; inalpinus Verity,1911; valesiaca Verity,1911; zanclaeides Verity,1911; pseudopersica Rocci,1926.*

Examined materials: A total of 19 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Doly sakran (19♂♀), 1323 m, 09.08.2017.

Ecological information: I found these individual in the high place in mountain slope on a pear tree.Vertical distribution: more than 1000 m, Phenology: August.

Habitats: Located in Sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis Pyrus* plants and vegetable located in valleys.

Zerynthia (Allancastria) deyrollei (Oberthür, 1869) (*Papilionidae*); (Figure 4.1).

Synonym(s): *deyrollei Oberthür,1869; eisneri Bernardi,1970; lycaoniae Eisner & Wagener,1974; #flavomaculata Verity,1905; #ochracea Verity,1905; #obscurior Verity,1905; #subflava Schultz,1908; #deflexa Schultz,1908; #charis Schultz,1908; #separata Sheljuzhko,1927.*

Examined materials: A total of 104 individuals were examined and their distribution according to the collected localities are as follows:Erbil : Kane qara (3♂♀), 554 m, 22.04.2017 ; Jale (4♂♀) 738 m, 25.04.2016; Mala omer (6♂♀) 570 m, 05.04.2017; Taq taq (5♂♀), 401 m, 06.04.2017; Sktan (30♂♀), 694 m, 26.04.2017; Heran (2♂♀) 852 m, 27.04.2017; Mawaran (42♂♀), 759 m, 29.04.2017; Elnjakh (2♂♀), 469 m, 01.05.2017, Bekhal (10♂♀), 756 m, 10.05.2017.

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: 400-900 m, Phenology: April-May.

Habitats: Located in smooth plain where The presence of *Triticum*, *Vicia sativum* , dominate plants , and vegetable; Dominate *Quercus*, *Salix* plants, *Junipers* on mountain slopes; *Daphne, Quercus, Herbaceous* plants on the watter stream.

Archon apollinaris (Staudinger, [1892]) (*Papilionidae*); (Figure 4.1)

Synonym(s): *apollinaris Staudinger, [1892]; pallidior Spuler, 1892; #mardina Stichel, 1907.*

Examined materials: A total of 9 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Kane qara (3♂♀), 554 m, 14.03.2017; Jale (1♂), 738 m, 27.03.2017; Taq taq (3♂♀), 401 m, 06.04.2017; Mawaran (2♂♀), 759 m, 29.04.2017.

Ecological information: Samples were collected between the *Triticum* species in natural and anthropogenic areas at times when the vegetation cover was moderately advanced. Vertical distribution: 400-800 m, Phenology: April-May.

Habitats: Located in smooth plain where The presence of *Triticum*, *Vicia sativum*, dominate plants, and vegetable; Dominate *Quercus, Salix* plants, *Junipers* on mountain slopes; *Daphne, Quercus, Herbaceous* plants on the watter stream.

Papilio (s.str.) machaon Linnaeus, 1758 (*Papilionidae*); (Figure 4.1)

Synonym(s): *machaon Linnaeus, 1758; reginae Retzius, 1783; umbellatarum Fabricius, 1807; aurantiaca Speyer, 1858.*

Examined materials: A total of 2 individuals were examined and their distribution according to the collected locality is: Erbil: Ttopco (2♂♀), 527 m, 13.6.2017.

Ecological information: Samples were collected between *Salix alba* trees. Vertical distribution: 527 m, Phenology: Jun-Jul

Habitats: The presence of *Triticum, Vicia sativum*, dominates plants, and vegetabl and a few *Salix alba.*

Princeps (s.str. (s.str)) demoleus Linnaeus, 1758 (*Papilionidae*); (Figure 4.1)

Synonym(s): *demoleus Linnaeus, 1758; erithonius Cramer, [1782]; epius Fabricius, 1793; sthenelus Macleay, 1826; demoleinus Oberthur, 1879; pictus Fruhstorfer, 1898; #chryseis Boullet & Le Cerf,1912; flavosignatus Heydemann,1954.*

Examined materials: A total of 4 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Kane qara (4♂♀), 554 m, 08.07.2017

Ecological information: Samples were collected when it was fliying between *Citrus limon* trees and i saw her laying her eggs on the newly developed leaves, Vertical distribution: 500-600 m, Phenology: Jun-July.

Habitats: Located in the Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis*, *Citrus* plant species**.**

Iphiclides podalirius (U.F.)

Iphiclides podalirius (L.F.)

Zerynthia deyrollei (U.F.)

Zerynthia deyrollei (L.F.)

Papilio machaon (U.F.)

Papilio machaon (L.F.)

Archon apollinaris (U.F.)

Archon apollinaris (L.F.)

Princeps demoleus (U.F.)

Princeps demoleus (L.F.)

Figure 4.1. Photos of Papilionidae species (Hawraz D. Othman)

4.1.2. Family Pieridae

Pieris (Artogeia) rapae (Linnaeus, 1758) (*Pieridae*); (Figure 4.2)

Synonym(s): *rapae Linnaeus, 1758; nelo Bergsträßer, 1780; metra Stephens, 1827; alpica Rossi, 1929.*

Examined materials: A total of 112 individuals were examined and their distribution according to the collected localities are as follows:Erbil : Kane qara (8♂♀), 554 m, 14.03.2017; (9♂♀), 22.04.2017; (2 ♂♀), 04.05.2016; (12♂♀), 03.05.2017; (9♂♀), 08.07.2017; Jale (2♂♀), 738 m, 25.04.2016; Elnjakh (12♂♀) 469 m, 01.05.2017; Haebat sultan (12♂♀), 834 m, 05.05.2017; Dlope (4♂♀), 749 m, 08.05.2017; Gazna (6 ♂♀), 387 m, 09.05.2017; Bekhal (2 ♂♀), 756 m, 10.05.2017; Soran (6 ♂♀), 547 m, 12.05.2017; Shaqlawa (13♂♀), 806 m, 10.07.2017; Khalifan (8♂♀), 664 m, 11.07.2017; Choman (3♂♀), 12.07.2017; Sami abdulrahman park (1♀), 418 m, 13.07.2017, Dole sakran (3♂♀), 1323 m, 09.08.2017.

Ecological information: I found these individuals in every where, *Triticum, Vicia,* Vegitable&Herbaceous plants. Vertical distribution: 300 - 1400 m, Phenology: March-august.

Habitats: Located in smooth plain where The presence of *Triticum* , *Vicia sativum* , dominate plants , and vegetable; Dominate *Quercus*, *Salix* plants, *Junipers* on mountain slopes; *Daphne, Quercus, Herbaceous* plants on the watter stream, Fruit gardens dominate with *Malus, Ficus*, *Punica, Morus, Vitis* plant species; Sparse communities of *Quercus, Juniperus,* plants located in valleys.

Pieris (s.str.) brassicae (Linnaeus, 1758) (*Pieridae*) (Figure 4.2)

Synonym(s): *brassicae Linnaeus, 1758; chariclea Stephens, 1827; #venata Verity, 1908; cyniphia Turati, 1924.*

Examined materials: A total of 71 individuals were examined and their distribution according to the collected localities are as follows:Erbil : Kane qara (5♂♀), 554 m, 14.03.2017; (4 ♂♀), 04.05.2016; (12♂♀), 03.05.2017; (4 ♂♀), 08.07.2017; Jale (5♂♀), 738 m, 25.04.2016; Mala omer (11♂♀), 570 m, 5.4.2017, Elnjakh (12♂♀) 469 m, 01.05.2017; Meer said (4♂♀), 841 m 04.05.2017; Faqayan (8♂♀), 863 m, 07.05.2017; Bekhal (9♂♀), 756 m, 10.05.2017; Khalifan (2♂♀), 664 m, 11.07.2017.

Ecological information: Also same ***Pieris rapae*** I found these individuals in every where, *Triticum, Vicia,* Vegitable and Herbaceous plants. Vertical distribution: 500 - 900 m, Phenology: March-august.

Habitats: Located in smooth plain where The presence of *Triticum* , *Vicia sativum* , dominate plants , and vegetable; Dominate *Quercus*, *Salix* plants, *Junipers* on mountain slopes; *Daphne*, *Quercus, Herbaceous* plants on the watter stream, Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus, Vitis* plant species; Sparse communities of *Quercus, Juniperus,* plants located in valleys, & *Populus* forest.

Pieris (Artogeia) ergane (Geyer, [1828]) (*Pieridae*) (Figure 4.2)

Synonym(s): *ergane Geyer, [1828]; narcaea Freyer, [1828]*.

Examined materials: A total of 13 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Kane qara (10♂♀), 554 m, 14.03.2017; (3♂♀), 04.05.2016.

Ecological information: Samples were collected between the *Triticum* species in natural and anthropogenic areas at times when the vegetation cover was moderately advanced. Vertical distribution: 500 - 600 m, Phenology: March - August.

Habitats: Located in smooth plain where the presence of *Triticum, Vicia sativum,* dominates plants, and vegetable.

Pieris (Artogeia) pseudorapae Verity, 1908 (*Pieridae*) (Figure 4.2)

Synonym(s): *pseudorapae Verity, 1908*

Examined materials: A total of 10 individual were examined and their distribution according to the collected locality is as follow: Erbil: Kane qara (5♂♀), 554 m, 14.03.2017, (1♂), 02.04.2017; Dlope (4♂♀), 749 m 08.05.2017.

Ecological information: Samples were collected between the *Triticum* species in natural and anthropogenic areas at times when the vegetation cover was moderately advanced. Vertical distribution: 500 - 600 m, Phenology: March - August.

Habitats: Located in smooth plain where the presence of *Triticum, Vicia sativum,* dominates plants, and vegetable; Dominate *Quercus, Salix* plants, *Juniperus* on mountain slopes

Colias (Eriocolias) crocea (Fourcroy, 1785) (*Pieridae*) (Figure 4.3)

Synonym(s): *crocea Fourcroy, 1785; pyrenaica Groum-Grshimailo, 1893.*

Examined materials: A total of 29 individuals were examined and their distribution according to the collected localities are as follows:Erbil : Kane qara (1♀), 554 m, 04.05.2016; (1♂), 08.07.2017; Jale (10♂♀), 738 m, 25.04.2016; Taq taq (2♂♀), 401 m, 06.04.2017; Faqayan (2♂♀), 863 m, 07.05.2017; Bekhal (2♂♀), 756 m, 10.05.2017; Shaqlawa (1♀), 806 m, 10.07.2017; Sami abdulrahman park (1♂), 418 m, 13.07.2017, Dole sakran (8♂♀), 1323 m, 09/08/2017

Ecological information: It is feeds chiefly on lucerne, and also on wild trefoils and clovers. While it may take toll of lucerne it does not render it unfit for fodder, Vertical distribution: 400 - 1400 m, Phenology: March - September.

Habitats: Sparse communities of *Quercus, Juniperus,* and plants located in valleys; Dominate *Quercus, Salix* plants, *Juniperus* on mountain slopes.

Euchloe (s.str.) belemia (Esper, [1800]) (*Pieridae*) (Figure 4.3).

Synonym(s): *belemia Esper, [1800]; glauce Freyer, [1848]*.

Examined materials: A total of 52 individuals were examined and their distribution according to the collected localities are as follows:Erbil : Kane qara (5♂♀), 554 m, 14.03.2017; (4♂♀), 22.04.2017; (1♀), 04.05.2016; Hawawan (1♀), 703 m, 04.04.2017; Taqtaq (8♂♀), 401 m, 06.04.2017; Shekharwan (2♂♀), 631 m, 08.04.2017; Shewe samal (1♂), 770 m, 18.04.2017; Ttopco (2♂♀), 527 m, 19.04.2017; Sktan (2♂♀) 694 m, 26.04.2017; Elnjakh (10♂♀) 469 m, 01.05.2017; Meer said (2♂♀), 841 m, 04.05.2017; Haebat sultan (4♂♀), 834 m, 05.05.2017; Dlope (6♂♀), 749 m, 08.05.2017; Gazna (2♂♀), 387 m, 09.05.2017; Bekhal (2♂♀), 756 m, 10.05.2017.

Ecological information: Widespread in the plains and foot-hills. Doubtless it also penetrates Middle Heights. It feed on *Hirschfeldia adpressa, Sinapis alba* and probably other wild *Cruciferae*. Vertical distribution: 350-900 m, Phenology: March-May.

Habitats: Located in smooth plain were The presence of wheat , broad bean , dominate plants , and vegetable; Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species; Sparse communities of Herbaceous plants located in valleys.

Aporia (s.str.) crataegi (Linnaeus, 1758) (*Pieridae*) (Figure 4.2).

Synonym(s): *crataegi Linnaeus, 1758; nigronervosus Retzius, 1783; minor Verity, 1907; basanius Fruhstorfer, 1910; crataegiaugusta Verity, 1937.*

Examined materials: A total of 82 individuals were examined and their distribution according to the collected localities are as follows: Erbil: Meer said (6♂♀), 841 m, 04.05.2017; Faqayan (46♂♀), 863 m, 07.05.2017; Bekhal (24♂♀), 756 m, 10.05.2017; Soran (4♂♀), 547 m, 12.05.2017; Kosar (2♂♀), 900 m, 13.05.2017.

Ecological information: Quite common at middle heights in the mountain**.**Vertical distribution: 500-900 m, Phenology: May-Jun.

Habitats: Dominate *Quercus, Salix* plants, *Juniperus* on mountain slopes; Sparse communities of Herbaceous plants located in valleys.

Anthocharis cardamines (Linnaeus, 1758) (*Pieridae*) (Figure 4.3).

Synonym(s): *cardamines Linnaeus,1758; hesperides Newman,1894; britannica Verity,1908; meridionalis Verity,1908 nec Lederer,1852; montivaga Turati & Verity,1911*.

Examined materials: A total of 32 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (1♂), 738 m, 25.04.2016; (5♂♀), 27.03.2017; (1 ♀), 27.04.2017; Taq taq (1♀), 401 m, 06.04.2017; Mawaran (24 ♂♀), 759 m, 29.04.2017.

Ecological information: I found it around *Cardamine sp*. Vertical distribution: 400 - 800 m, Phenology: March - April.

Habitats: located in Dominate *Quercus, Salix* plants, *Juniperus* & *Cardamine* on mountain slopes.

Zegris eupheme (Esper, [1804]) (*Pieridae*) (Figure 4.2).

Synonym(s): *eupheme Esper, [1804]; erothoe Eversmann, 1832; tschudica Herrich-Schäffer, [1851]*.

Examined materials: A total of 6 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Ttopco (6♂♀), 527 m, 19.04.2016.

Ecological information: I found it It feeds on Sinapis, Raphanus, and probably other Cruciferae. Vertical distribution: 500 - 600 m, Phenology: March - April.

Habitats: located in sparse communities of herbaceous plants located in foot-hill.

Pontia edusa (Fabricius, 1777) (*Pieridae*) (Figure 4.3)

Synonym(s): *edusa Fabricius, 1777; bellidice Ochsenheimer, 1808; persica Bienert, 1869; #nitida Verity, [1908]*.

Examined materials: A total of 15 individuals were examined and their distribution according to the collected localities are as follows: Erbil : Mala omer, (1♀), 570 m,05.04.2017; Haebat sultan, (2♂♀), 834 m, 05.05.2017; Dlope (6♂♀), 749 m, 08.05.2017; Bekhal (2♂♀), 756 m, 10.05.2017, Dole sakran (4♂♀), 1323 m, 9/8/2017.

Ecological information: Rarly i found these typpe because it was like trees more than grasses like Quercus. Vertical distribution: 500 - 1400 m, Phenology: March - September.

Habitats: located in Dominate *Quercus, Salix* plants, *Juniperus* & *Cardamine* on mountain slopes; Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species.

Pontia daplidice (Linnaeus, 1758) (*Pieridae*) (Figure 4.3)

Synonym(s): *daplidice Linnaeus, 1758; belemida Geyer, [1832]; albidice Oberthür, 1881; iberidice Bryk, 1940.*

Examined materials: A total of 10 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (2♂♀), 738 m, 20.05.2017; Kane qara (4♂♀), 554 m, 08.07.2017; Shaqlawa (4♂♀), 806 m, 10.07.2017.

Ecological information: it is confined to the mountain. It feeds on various Cruciferae and in Cyprus I have seen it feeding on caper (*Capparis spinosa*). Vertical distribution: 500 - 800 m, Phenology: May - August. **Habitats:** located in Dominate *Quercus, Salix* plants, *Juniperus* on mountain slopes, Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species, *Cruciferae, Cyprus.*

Distribution in Iraq: it is recoded in Iraq in 1957 by Wilshire but it is not recorded in 2008, 2011 by Kemal & Koçak

Pieris rapae (U.F.)

Pieris rapae (L.F.)

Pieris pseudorapae (U.F.)

Pieris pseudorapae (L.F.)

Pieris ergane (U.F.)

Pieris ergane (L.F.)

Pieris brassicae (U.F.)

Pieris brassicae (L.F.)

Aporia crataegi (U.F.)

Aporia crataegi (L.F.)

Zegris eupheme (U.F.)

Zegris eupheme (L.F.)

Figure 4.2. Photos of Pieridae species (Hawraz D. Othman).

Anthocharis cardamines

Anthocharis cardamines

Euchloe belemia (U.F.)

Euchloe belemia (L.F.)

Pontia edusa (U.F.)

Pontia edusa (L.F.)

Pontia daplidice (U.F)

Pontia daplidice (L.F)

Colias crocea (U.F.)

Colias crocea (L.F.)

Figure 4.3. Photos of Pieridae species (Hawra D. Othman)

4.1.3. Family Argynnidae *(*=Nymphalidae auct.)

Argynnis (Pandoriana) pandora ([Denis & Schiffermüller], 1775) (*Argynnidae*), (Figure 4.5)

Synonym(s): *pandora [Denis & Schiffermüller],1775; maja Cramer,1775 nec Fabricius,1775; cynara Fabricius,1777; cyrnea Schwerda,1926; transcaucasica Moucha ,1967; deserticola Gross & Ebert,1975.*

Examined materials: A total of 6 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Dole sakran (6♂♀), 1323 m, 09/08/2017.

Ecological information: I found it in a hight place in a mountain in Sycamore forest in a hot weather.Vertical distribution: more than 1000 m, Phenology: August.

Habitats: Sparse communities of *Quercus, Juniperus, Salix alba*, *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis*, *Acer pseudoplantus* plants and vegetable located in valleys.

Vanessa (Cynthia) cardui (Linnaeus, 1758) (*Argynnidae*) (Figure 4.5)

Synonym(s): *cardui Linnaeus,1758; carduelis Cramer,1775; elymi Rambur,1829; kershawi McCoy,1868; pallida Schoyen,1881; universa Verity,1919; takesakiana Kato,1925.*

Examined materials: A total of 35 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (17♂♀), 738 m, 25.04.2016; Kane qara (11♂♀), 554 m, 04.05.2016; (1♂), 22.04.2017; Faqayan (2♂♀), 863 m, 07.05.2017; Bekhal (4♂♀), 756 m, 10.05.2017.

Ecological information: It feed principally on Malva parvijlora; thistles are also eaten, and occasionally nettle.Vertical distribution: 500 - 900 m, Phenology: March - May.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes; Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species; Sparse communities of Herbaceous plants located in valleys.

Limenitis (Azuritis) reducta Staudinger, 1901 (*Argynnidae*) (Figure 4.5)

Synonym(s): *reducta Staudinger, 1901.*

Examined materials: A total of 8 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Dole sakran (8♂♀), 1323 m, 09.08.2017.

Ecological information: A woodland species, widely distributed in the mountains. I found it feeds on *Lonicera*. Vertical distribution: more than 1000 m, Phenology: Jun-August.

Habitats: Sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* , *Lonicera* plants and vegetable located in valleys.

Polygonia (Comma) egea (Cramer, [1775]) (*Argynnidae*) (Figure 4.5)

Synonym(s): *egea Cramer,[1775] (junior homonym); vaualbum Esper,1780; l-album Esper,1789; triangulum Fabricius,1793; autumnalis Stefanelli,1873; #balucha Evans,1932; #pallida Evans,1932.*

Examined materials: A total of 10 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Meer said (2♂♀), 841 m, 04.05.2017; Soran (8 ♂ & ♀), 547 m, 12.05.2017.

Ecological information: Widespread in the mountains. It feeds on pellitory (Parietaria) which grows on walls and cliffs, and in caves. Vertical distribution: 500 - 900 m, Phenology: May-Jun.

Habitats: located in Dominate *Quercus*, Salix plants, *Juniperus* & *Cardamine* on mountain slopes; sparse communities of *Quercus*, *Juniperus*, and plants located in valleys.

Melitaea (Cinclidia) (phoebe) phoebe (Goeze, 1779) (*Argynnidae*) (Figure 4.5)

Synonym(s): *#phoebe [Denis & Schiffermüller], 1775; phoebe Goeze, 1779; paedotropos Bergsträßer, [1780]; tremulae Piller & Mitterpacher, 1783.*

Examined materials: A total of 5 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (1♀), 738 m, 18.06.2017; Mawaran (2♂♀), 759 m, 29.04.2017; Bekhal (2♂♀), 756 m, 10.05.2017.

Ecological information: Inhabits upper Middle Heights in the mountain. There is one generation which flies in early summer. Vertical distribution: 700 - 800 m, Phenology: May-Jun. **Habitats:** located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes.

Melitaea (s.str.) arduinna (Fabricius, 1787) *(Argynnidae*) (Figure 4.5)

Synonym(s): *arduinna Fabricius, 1787; rhodopensis Freyer, [1836]; uralensis Eversmann, 1844.*

Examined materials: A total of 2 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Mawaran (2♂♀), 759 m, 29.04.2017.

Ecological information: I found it at middle heights on the mountain. Vertical distribution: 700 - 800 m, Phenology: May-Jun.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes.

Melitaea (Didymaeformis) fascelis (Fabricius, 1787) (*Argynnidae*) (Figure 4.4)

Synonym(s): *#trivia Denis & Schiffermüller, 1775; iphigenia Esper, 1782 (praeoc.); #fascelis Esper, 1783; fascelis Fabricius, 1787; cleo Latreille, 1803.*

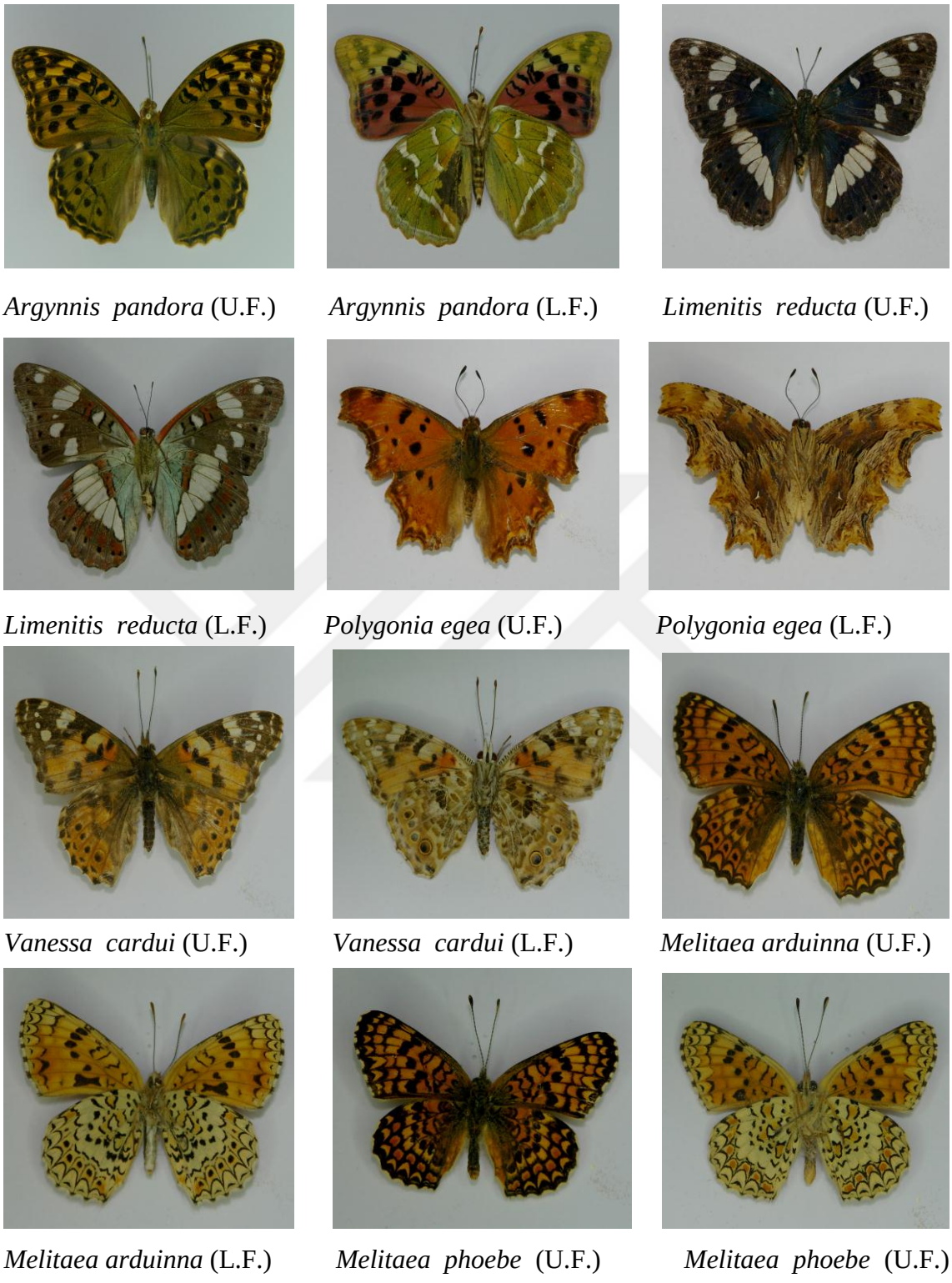
Examined materials: A total of 6 individuals were examined and their distribution according to the collected localities are as follows: Erbil : Taq taq (2♂♀), 401 m,

06.04.2017; Shekharwan (2♂♀), 631 m, 08.04.2017; Mawaran (2♂♀), 759 m, 29.04.2017.

Ecological information: i found this typpe occasionaly in the top of the hill during basking. Vertical distribution: 400 - 800 m, Phenology: March - May.

Habitats: Located in *Daphne, Quercus, Herbaceous* plants on the watter stream; Dominate *Quercus, Salix* plants, *Juniperus* on mountain slopes.

Figure 4.4. *Melitaea fascelis* (Hawraz D. Othman)



Argynnis pandora (U.F.) *Argynnis pandora* (L.F.) *Limenitis reducta* (U.F.)

Limenitis reducta (L.F.) *Polygonia egea* (U.F.) *Polygonia egea* (L.F.)

Vanessa cardui (U.F.) *Vanessa cardui* (L.F.) *Melitaea arduinna* (U.F.)

Melitaea arduinna (L.F.) *Melitaea phoebe* (U.F.) *Melitaea phoebe* (U.F.)

Figure 4.5. Photos of Argynnidae species (Hawraz D. Othman).

4.1.4. Family Satyridae

Kirinia (Melike) roxelana (Cramer, [1777]) (*Satyridae*) (Figure 4.7)

Synonym(s): *roxelana Cramer, [1777]; #anatolica Koçak, 1989.*

Examined materials: A total of 2 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (1♂), 738 m, 20.05.2017; (1♀), 18.06.2017.

Ecological information: I found it flying and landing on *Quercus sp.* Vertical distribution: 700 - 800 m, Phenology: May-Jun.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes.

Lasiommata megera (Linnaeus, 1767) (*Satyridae*) (Figure 4.7)

Synonym(s): *megera Linnaeus,1767; caledonia Verity,1911; alticola Verity,1911; pseudoadrasta Stauder,1922; infrapallens Verity,1922; ocellatior Verity,1923; pallidedepulverata Verity,1923.*

Examined materials: A total of 29 individuals were examined and their distribution according to the collected localities are as follows: Erbil : Jale (1♂), 738 m, 20.05.2017; (1♂), 18.06.2017; Taq taq (3♂♀), 06.04.2017; Shekharwan (10♂♀), 631 m, 08.04.2017; shewe samal (2♂♀), 770 m, 18.04.2017; Ttopco (2♂♀), 527 m, 19.04.2017; Sktan (2♂♀), 694 m, 26.04.2017; Meer said (2♂♀), 841 m, 04.05.2017; Bekhal (2♂♀), 756 m, 10.05.2017, Dole sakran (4♂♀), 1323 m, 09/08/2017.

Ecological information: I found it flying during landing on top of the hill for mating, it feed on grasses. Vertical distribution: 500 - 1400 m, Phenology: April - September.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes; *Daphne, Quercus, Herbaceous* plants on the watter stream; sparse communities of herbaceous plants located in valleys.

Pararge aegeria (Linnaeus, 1758) (*Satyridae*) (Figure 4.7)

Synonym(s): *aegeria Linnaeus, 1758; meone Cramer, 1782; egeria Ochsenheimer, 1807; sardoa Verity, 1908.*

Examined materials: A total of 1 individual was examined and the distribution according to the collected locality is as follow: Erbil: Khalifan (1♀), 664 m, 11.07.2017.

Ecological information: I found it flying in among *Populus* sp. Feed on grasses. Vertical distribution: 600 - 700 m, Phenology: July.

Habitats: located in *Populus* forest in watter stream.

Pseudochazara (Achazara) anthelea (Hübner, [1824]) (*Satyridae*) (Figure 4.7)

Synonym(s): *anthelea Hübner, [1824]; atavirensis Coutsis, 1973.*

Examined materials: A total of 1 individual was examined and the distribution according to the collected locality is as follow: Erbil: Gazna (1♀), 387 m, 09.05.2017.

Ecological information: I found it flying among *Titicum* sp. Vertical distribution: 300 - 400 m, Phenology: Jun.

Habitats: located in The presence of wheat, broad bean, dominate plants, and vegetable located in smooth plain.

Coenonympha (s.str.) pamphilus (Linnaeus, 1758) (*Satyridae*) (Figure 4.7)
Synonym(s): *pamphilus Linnaeus,1758; menalcas Poda,1761; nephele Hufnagel,1766; marginata Heyne,1894; orantia Fruhstorfer,1908; scota Verity,1911; infrarasa Verity,1926; juldusica Verity,1926; asiaemontium Verity,1926; euxina Verity,1926; posteuxina Verity,1926; londonii Verity,1926; neolyllus De Lattin,1950.*

Examined materials: A total of 33 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (3♂♀), 738 m, 25.04.2016; (6 ♂ & ♀), 27.04.2017; Shewe samal (2♂♀), 770 m, 18.04.2017; Sktan (4 ♂♀), 694 m, 26.04.2017; heran (18♂♀), 852 m, 27.04.2017.

Ecological information: I caught it on the grasses, it feed on grasses. Vertical distribution: 600 - 900 m, Phenology: March - Jun.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes; Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species; *Daphne*, *Quercus*, *Herbaceous* plants on the watter stream.

Coenonympha (s.str.) saadi (Kollar, [1849]) (*Satyridae*) (Figure 4.7)

Synonym(s): *saadi Kollar, [1849]; iphias Eversmann, 1851.*

Examined materials: A total of 22 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (5♂♀), 738 m, 20.05.2017; (11♂♀), 18.06.2017; Meer said (6♂♀), 841 m, 05.07.2017.

Ecological information: I found it & caught it on grasses and *Daphne sp.*, it feed on grasses. Vertical distribution: 700 - 900 m, Phenology: May - July.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes; *Daphne*, *Quercus*, *Herbaceous* plants on the watter stream.

Hyponephele (s.str. (Turaninephele)) wagneri (Herrich-Schäffer,[1846]) (*Satyridae*) (Figure 4.8)

Synonym(s): *wagneri Herrich-Schäffer, [1846]; schmidti Bang-Haas, 1927*

Examined materials: A total of 1 individual was examined and the distribution according to the collected locality is as follow: Erbil: Jale (1♂), 738 m, 20.05.2017.

Ecological information: I found and caught it between *Quercus sp.* Vertical distribution: 700 - 800 m, Phenology: May -Jun.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes.

Hyponephele (s.str.) lupina (Costa, [1836]) (*Satyridae*) (Figure 4.8)

Synonym(s): *lupina Costa, [1836]*

Examined materials: A total of 6 individual were examined and the distribution according to the collected locality is as follow: Erbil: Dole sakran (6♂♀), 1323 m, 09.08.2017.

Ecological information: I found & caught it on herbaceous plants in a high place. Vertical distribution: more than 1000 m, Phenology: July-September.

Habitats: Sparse communities of *Quercus, Juniperus, Salix alba*, *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plants and vegetable located in valleys.

Maniola (Telmessiola) telmessia (Zeller, 1847) (*Satyridae*) (Figure 4.8)

Synonym(s): *telmessia Zeller,1847; pallescens Butler,1868; kurdistana Heyne,1894; oreas Le Cerf,1912; maniolides Le Cerf,1912; ornata Turati & Fiori,1930; marenigrans Verity,1938; pelekasii Kattulas & Koutsaftikis,1978.*

Examined materials: A total of 55 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (2♂♀), 738 m, 20.05.2017; (2♂♀), 18.06.2017; Soran (7♂♀), 547 m, 12.05.2017; Bekhal (44♂♀), 756 m, 10.05.2017.

Ecological information: I caught it on the mountain slopes. Vertical distribution: 500 - 800 m, Phenology: May - Jun.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* & *Cardamine* on mountain slopes; sparse communities of *Quercus*, *Juniperus*, and plants located in valleys.

Maniola (s.str.) jurtina (Linnaeus, 1758) (*Satyridae*) (Figure 4.8)

Synonym(s): *jurtina Linnaeus, 1758; janira Linnaeus, 1758; lemur Schrank, 1801.*

Examined materials: A total of 6 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Dole sakran (6♂♀), 1323 m, 09.08.2017.

Ecological information: I caught it on the mountain slopes. Vertical distribution: more than 1000 m, Phenology: August.

Habitats: Sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys.

Hipparchia (Neohipparchia) fatua (Freyer, 1844) (*Satyridae*) (4.8)

Synonym(s): *fatua Freyer,1844; sichaea Lederer,1857; insularis Turati,1929; elineata Verity,1937; infracastanea Verity,1938; kosswigi De Lattin,1950.*

Examined materials: A total of 6 individual were examined and the distribution according to the collected localities is as follow: Erbil: Jale (6♂♀), 738 m, 06.07.2017.

Ecological information: I caught it on the mountain slopes between *Quercus sp.,* it feeds on *herbaceous* plant. Vertical distribution: 500 - 800 m, Phenology: May - Jun.

Habitats: located in Dominate *Quercus, Salix* plants, *Juniperus on* mountain slopes.

Brintesia circe (Fabricius, 1775) (*Satyridae*) (Figure 4.8)

Synonym(s): *circe Fabricius,1775; proserpina Denis & Schiffermüller,1775; maga Fruhstorfer,1909; venefica Fruhstorfer,1909; gabalae Gaillard,1959; maladettae Varin,1962.*

Examined materials: A total of 5 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Ttopco (2♂♀), 527 m, 10.05.2017; Jale (3♂♀), 738 m, 20.05.2017.

Ecological information: I caught it on the mountain slopes between *Quercus sp.* Vertical distribution: 500 - 800 m, Phenology: May.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus on* mountain slopes; Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species.

Melanargia (Turcargia) hylata (Klug, 1832) (*Satyridae*) (4.6)

Synonym(s): *titea Klug, 1832.*

Examined materials: A total of 38 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (2♂♀), 738 m, 18.06.2017; Faqayan (2♂♀), 863 m, 07.05.2017; Kosar (34♂♀), 900 m, 13.05.2017.

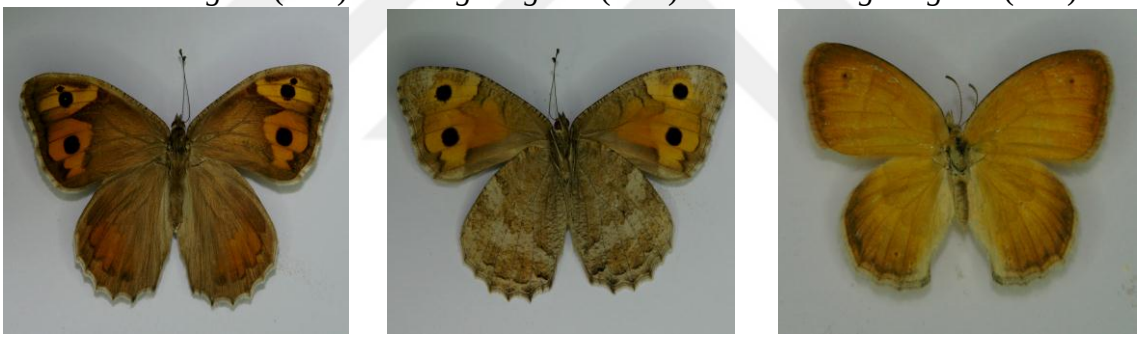
Ecological information: I caught it in the high area on the mountain slopes on the grasses. Vertical distribution: 700 - 1000 m, Phenology: May-Jun.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* on mountain slopes; sparse communities of herbaceous plants located in valleys.

Figure 4.6. *Melanargia hylata* (Hawraz D. Othman).

Kirinia roxelana (U.F.) *Kirinia roxelana* (L.F.) *Lasiommata megera* (U.F.)

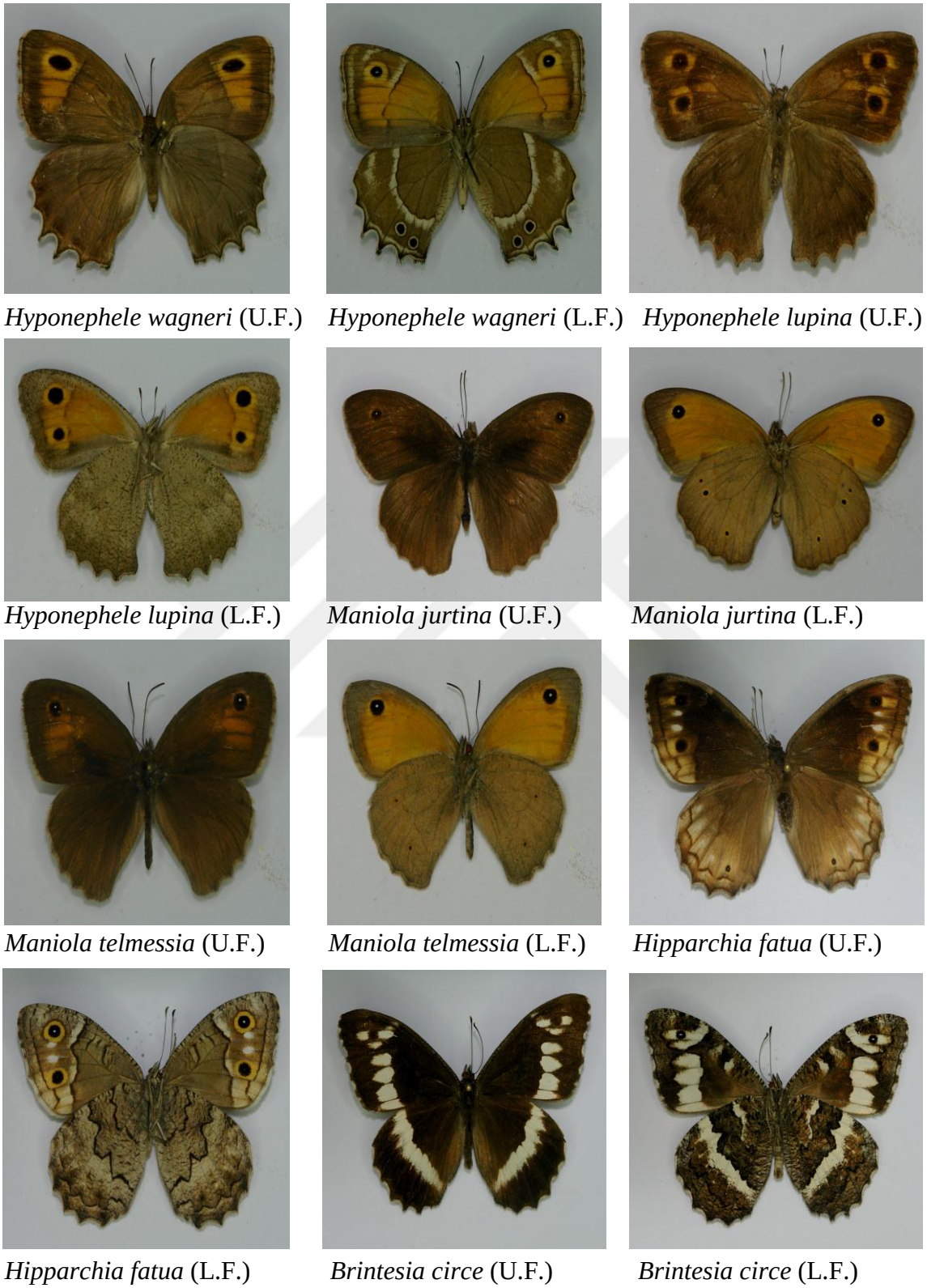
Lasiommata megera (L.F.) *Pararge aegeria* (U.F.) *Pararge aegeria* (L.F.)



Pseudochazara anthelea *Pseudochazara anthelea* *Coenonympha pamphilus*

Coenonympha pamphilus *Coenonympha saadi* (U.F.) *Coenonympha saadi* (L.F.)

Figure 4.7. Photos of Satyridae species (Hawraz D. Othman).



Hyponephele wagneri (U.F.) *Hyponephele wagneri* (L.F.) *Hyponephele lupina* (U.F.)

Hyponephele lupina (L.F.) *Maniola jurtina* (U.F.) *Maniola jurtina* (L.F.)

Maniola telmessia (U.F.) *Maniola telmessia* (L.F.) *Hipparchia fatua* (U.F.)

Hipparchia fatua (L.F.) *Brintesia circe* (U.F.) *Brintesia circe* (L.F.)

Figure 4.8. Photos of Satyridae species (Hawraz D. Othman).

4.1.5. Family Lycaenidae

Satyrium (Nordmannia) marcidum (Riley, 1921) (*Lycaenidae*) (Figure 4.9)

Synonym(s): *marcidum Riley, 1921.*

Examined materials: A total of 50 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Bekhal (48♂♀), 756 m, 10.05.2017; Soran (2 ♂♀), 547 m, 12.05.2017.

Ecological information: I caught it in the area contain *Quercus, Juniperus sp.* Vertical distribution: 500 - 800 m, Phenology: May.

Habitats: located in Dominate *Quercus*, *Salix* plants, *Juniperus* on mountain slopes; sparse communities of herbaceous plants located in valleys.

Tomares callimachus (Eversmann, 1848) (*Lycaenidae*) (Figure 4.9)

Synonym(s): *callimachus Eversmann, 1848*

Examined materials: A total of 2 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Hawawan (2 ♂ & ♀), 703 m, 04.04.2017.

Ecological information: I caught it near a brooklet during mud pudding. Vertical distribution: 700 - 800 m, Phenology: April.

Habitat: Sparse communities of herbaceous plants located in valleys.

Glaucopsyche (s.str.) alexis (Poda, 1761) (*Lycaenidae*) (Figure 4.10)

Synonym(s): *alexis Poda, 1761; damaetas [Denis & Schiffermüller, 1775; #sublugens Strand, 1909; #insulicola Turati & Fiori, 1930; mironi Coutsis, 1976.*

Examined materials: A total of 116 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (16♂♀), 738 m, 25.04.2016; (8♂♀), 28.04.2017; Taqtaq (8 ♂♀), 401 m, 06.04.2017; Shewe samal

(4♂♀), 770 m, 18.04.2017; Ttopco (2♂♀), 527 m, 19.04.2017; Sktan (4♂♀), 694 m, 26.04.2017; Heran (54♂♀), 852 m, 27.04.2017; Mawaran (16♂♀), 759 m, 29.04.2017; Faqayan (2♂♀), 863 m, 07.05.2017; Bekhal (2♂♀), 756 m, 10.05.2017.

Ecological information: It is wide spread in middle heights of the mountains. Vertical distribution: 400 - 900 m, Phenology: April-May.

Habitat: Sparse communities of herbaceous plants located in valleys; Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species; Dominate *Quercus*, *Salix* plants, *Juniperus* on mountain slopes.

Lycaena (s.str.) phlaeas (Linnaeus, 1761) (*Lycaenidae*) (Figure 4.10)

Synonym(s): *phlaeas Linnaeus,1761; virgaureae Fourcroy,1785 nec Linn.,1758; eleus Fabricius,1798; aestivus Zeller,1850; schmidtii Gerhard,1853*

Examined materials: A total of 2 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Jale (1♂), 738 m, 25.04.2016; (1 ♀), 27.03.2017.

Ecological information: In the mountains, inhabits woods, gardens, plains and bare slopes, it feeds on *Rumex*. Vertical distribution: 700 - 800 m, Phenology: March-April.

Habitat: Dominate *Quercus*, *Salix* plants, *Juniperus* on mountain slopes.

Lycaena (Loweia) tityrus (Poda, 1761) (*Lycaenidae*) (Figure 4.10)

Synonym(s): *tityrus Poda, 1761; acrion [Brünnich], 1763; orientalis Staudinger, 1881; argentifex Balint, 1990.*

Examined materials: A total of 13 individuals were examined and their distributions according to the collected localities are as follows: Erbil : Kane qara (6♂♀), 554 m, 08.07.2017; Shaqlawa (2♂♀), 806 m, 10.07.2017; Choman (2♂♀), 12.07.2017; Khabat (3♂♀), 404 m 02.08.2017.

Ecological information: I found it on vegetables like *Cucurbita* & Herbaceous. Vertical distribution: 400 - 900 m, Phenology: July-August.

Habitat: Dominate *Quercus*, *Salix* plants, *Juniperus* on mountain slopes; sparse communities of herbaceous plants located in valleys; a swamp filled with cane plants and herbs.

Lampides boeticus (Linnaeus, 1767) (*Lycaenidae*) (Figure 4.10)

Synonym(s): *boeticus Linnaeus,1767; damoetes Fabricius,1775; coluteae Fuessly,1775; pisorum Fourcroy,1785; boedicus Borkhausen,1788; #baeticus Latreille,1809; armeniensis Gerhard,1886; bagus Distant,1886*

Examined materials: A total of 3 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (1♀), 738 m, 06.07.2017; Kane qara (1♀), 554 m, 08.07.2017; Meer said (1 ♂), 841 m, 05.07.2017.

Ecological information: I found it on vegetables like *Cucurbita* in a hot weather. Vertical distribution: 500 - 900 m, Phenology: July.

Habitat: The presence of wheat, broad bean, dominates plants, and vegetable located in smooth plain; sparse communities of herbaceous plants located in valleys.

Chilades (Lachides) galba (Lederer, 1855) (*Lycaenidae*) (Figure 4.10)

Synonym(s): *galba Lederer, 1855*

Examined materials: A total of 38 individuals were examined and their distribution according to the collected localities are as follows: Erbil : Jale (1♂), 738 m, 18.06.2017; (20♂♀), 06.07.2017; Kane qara (10♂♀), 554 m, 08.07.2017; Choman (2♂♀), 1061 m, 12.07.2018; Sami abdulrahman park (2♂♀), 418 m, 13.07.2017; Khabat (3♂♀), 404 m, 02.08.2017.

Ecological information: I found it on vegetables like *Cucurbita* & *Anethum sp.,* and weed plants in a hot weather. Vertical distribution: 400 - 1100 m, Phenology: Jun-August.

Habitat: The presence of dominate plants, and vegetable located in smooth plain; sparse communities of herbaceous plants located in valleys; a swamp filled with cane plants and herbs.

Chilades (Freyeria) trochylus (Freyer, [1843]) (*Lycaenidae*) (Figure 4.10)

Synonym(s): *trochylus Freyer,[1843]; #trochilus Herrich-Schäffer,[1845]; parva Murray,1874; persa Bytinski-Salz & Brandt,1937; #supraradiata Wagner,1931*

Examined materials: A total of 4 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Dole sakran (4♂♀), 1323 m, 09.08.2017.

Ecological information: I found it in a high place in mountain slope during mud pudling. Vertical distribution: more than 1000 m, Phenology: July-August.

Habitat: sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys .

Polyommatus (Aricia (s.str.)) agestis ([Denis & Schiffermüller], 1775) (*Lycaenidae*) (Figure 4.11)

Synonym(s): *medon Hufnagel,1766 nec Linn.,1763; alexis Rottemburg,1775 nec Poda,1761; agestis [Denis & Schiffermüller],1775; astrarche Bergsträßer,[1779]*.

Examined materials: A total of 9 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Jale (2♂♀), 738 m, 28.04.2017; Taqtaq (2♂♀) 401 m, 06.04.2017; Dlope (3♂♀) 749 m, 08.05.2017; Choman (2♂♀) 1061 m, 12.07.2017.

Ecological information: I found it in hot & a mild atmosphere in mountain and also foot-hill. Vertical distribution: 400 - 1100 m, Phenology: April-July.

Habitat: Dominate *Quercus*, *Salix* plants, *Juniperus* on mountain slopes; *Daphne, Quercus, Herbaceous* plants on the watter stream; the presence of wheat, broad bean, dominate plants, and vegetable located in smooth plain.

Polyommatus (s.str.) icarus (Rottemburg, 1775) (*Lycaenidae*) (Figure 4.11)

Synonym(s): *argus Poda,1761 nec Linn.,1758; alexis Scopoli,1763 nec Pda,1761; thetis Esper,1777 nec Dru.,1773; icarus Rottemburg,1775; pampholyge Bergsträßer,1779; candybus Bergsträßer,1779; candiope Bergsträßer,1779; candaon Bergsträßer,1779; oceanus Bergsträßer,1779; fusciolus Fourcroy,1785; icarinus Scriba,1795; pusillus Gerhard,1851; neglectus Stradomsky & Arzanov,1999*

Examined materials: A total of 10 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Dole sakran (10♂♀), 1323 m, 09.08.2017.

Ecological information: I found it in hot & a mild atmosphere in mountain on a *Mentha sp*. Vertical distribution: more than 1000 m, Phenology: July-September.

Habitat: sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys.

Polyommatus (s.str. (Agrodiaetus (Admetusia))) alcestis (Zerny,1932) (*Lycaenidae*) (Figure 4.11).

Synonym(s): *alcestis Zerny, 1932; ahmadi Carbonell, 2001; karacetinae Lukhtanov & Dantchenko, 2002.*

Examined materials: A total of 15 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Dole sakran (15♂♀), 1323 m, 09.08.2017.

Ecological information: I found it in hot & a mild atmosphere in mountain on a vetches & Vegetable. Vertical distribution: more than 1000 m, Phenology: July-September.

Habitat: sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys.

Pseudophilotes vicrama (Moore, 1865) (*Lycaenidae*) (Figure 4.11).

Synonym(s): *vicrama Moore, 1865*

Examined materials: A total of 4 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Dole sakran (4♂♀), 1323 m, 09.08.2017.

Ecological information: I found it in a mountain during mud pudling. Vertical distribution: more than 1000 m, Phenology: Jun-September.

Habitat: sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys.

Tarucus (s.str.) balkanicus (Freyer, [1843]) (*Lycaenidae*) (Figure 4.11)

Synonym(s): *balkanicus Freyer, [1843]*

Examined materials: A total of 7 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Omarawa (3♂♀), 1061 m, 12/07/2017; Dole sakran (4♂♀), 1323 m, 09.08.2017.

Ecological information: I found it in a mountain during mud pudling also near watter stream on herbaceous plants. Vertical distribution: more than 1000-1400 m, Phenology: July-September.

Habitat: sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys.

Zizeeria (s.str.) karsandra (Moore, 1865) (*Lycaenidae*) (Figure 4.11)

Synonym(s): *karsandra Moore, 1865*

Examined materials: A total of 9 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Kane qara (5♂♀), 554 m, 08/07/2017; Khabat (4♂♀), 404 m, 02/08/2017.

Ecological information: Widespread in the plains and in the mountains up to Middle Heights at least. It is not a desert insect, and favours roadsides, paths, lawns and gardens, though not exclusive to such. Vertical distribution: more than 400-1000 m, Phenology: May-September.

Habitat: A swamp filled with cane plants and herbs.

Satyrium marcidum (U.F.)

Satyrium marcidum (L.F.)

Tomares Callimachus (U.F.)

Tomares Callimachus (L.F.)

Figure 4.9. Photos of Lycaenidae species (Hawraz D. Othman)

Glaucopsyche alexis (U.F.)

Glaucopsyche alexis (L.F.)

Lycaena phlaeas (U.F.)

Lycaena phlaeas (L.F.)

Lycaena tityrus (U.F.)

Lycaena tityrus (L.F.)

Lampides boeticus (U.F.)

Lampides boeticus (L.F.)

Chilades galba (U.F.)

Chilades galba (L.F.)

Chilades trochylus (U.F.)

Chilades trochylus (L.F.)

Figure 4.10. Photos of Lycaenidae species (Hawraz D. Othman)

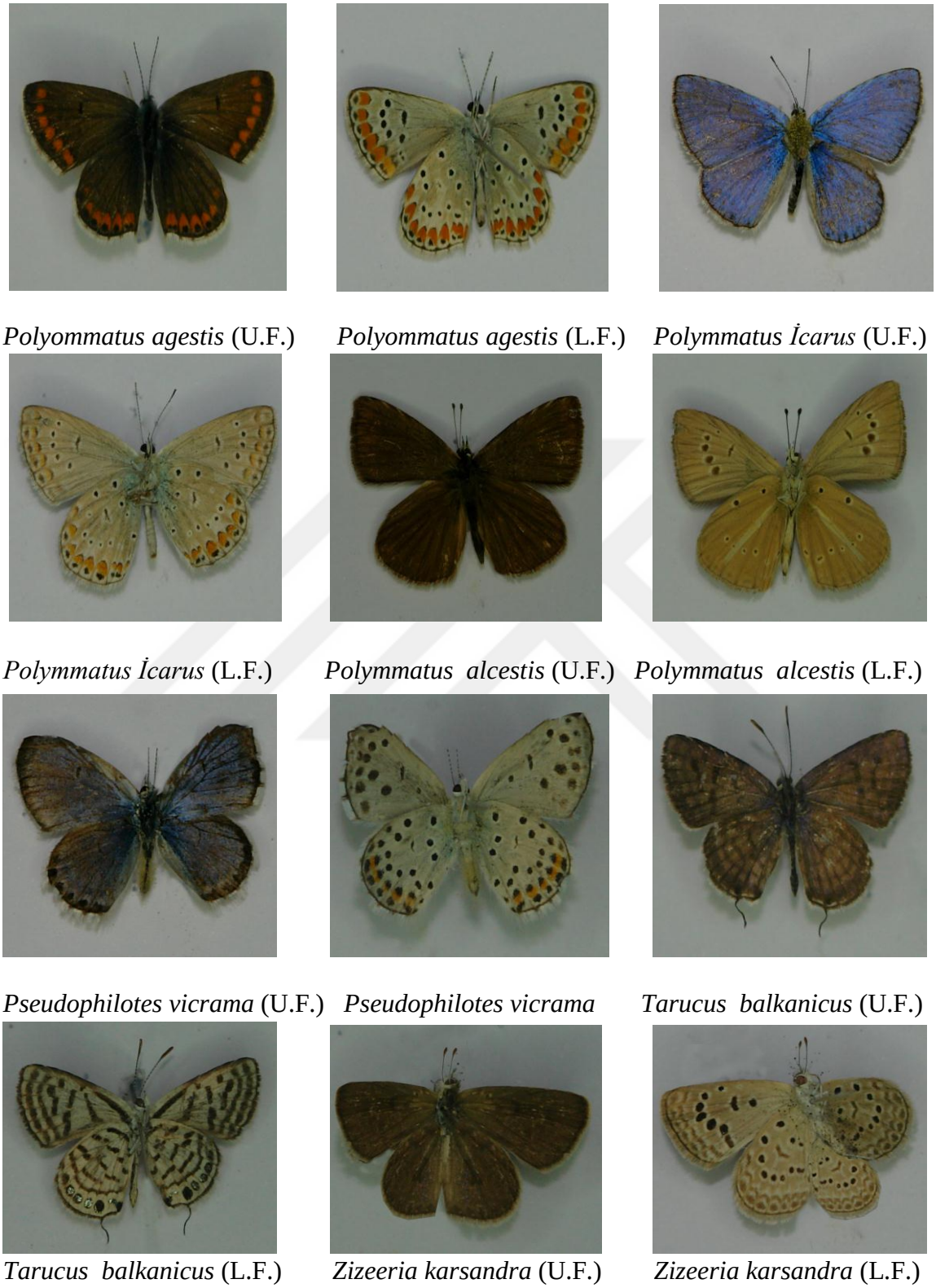


Figure 4.11. Photos of Lycaenidae species (Hawraz D. Othman)

4.2. Superfamily Hesperioidea

4.2.1. Family Hesperiidae

Spialia (Neospialia) orbifer (Hübner, [1823]) (*Hesperiidae*) (Figure 4.12)

Synonym(s): *orbifer Hübner, [1823]; tesselloides Herrich-Schäffer, [1845]*.

Examined materials: A total of 10 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Sktan (6♂♀), 694 m, 26.04.2017; Heran (2♂♀) 852 m, 27.04.2017; Faqayan (2♂♀) 863 m, 07.05.2017.

Ecological information: I found these types on the grasses. Vertical distribution: 600 - 900 m, Phenology: April-May.

Habitat: Located in Fruit gardens dominate with Malus, *Ficus*, *Punica*, *Morus*, Vitis plant species; *Daphne, Quercus, Herbaceous* plants on the watter stream; sparse communities of herbaceous plants located in valleys.

Thymelicus sylvestris (Poda, 1761) (*Hesperiidae*) (Figure 4.12)

Synonym(s): *sylvestris Poda,1761; flava Brünnich,1763; linea Müller,1764; thaumas Hufnagel,1766; divaricatus Fourcroy,1785; venula Hübner,[1813]; obscura Verity,1905.*

Examined materials: A total of 80 individuals were examined and their distribution according to the collected localities are as follows: Erbil : Haebat sultan (32♂♀), 834 m, 05.05.2017; Dlope (12♂♀), 749 m, 08.05.2017; Bekhal (26♂♀), 756 m, 10.05.2017; Soran (6♂♀), 547 m, 12.05.2017; Kosar (2♂♀), 900 m, 13.05.2017; Jale (2 ♂♀), 738 m, 20.05.2017.

Ecological information: I found These types in the mountain slopes between *Juniperus sp.* Vertical distribution: 500 - 900 m, Phenology: May.

Habitat: Dominate *Quercus*, *Salix* plants, *Juniperus* on mountain slopes; Sparse communities of *Quercus, Juniperus* plants located in valleys.

Gegenes pumilio (Hoffmannsegg, 1804) (*Hesperiidae*) (Figure 4.12)

Synonym(s): *pumilio Hoffmannsegg,1804; pygmaeus Cyrilli,1787 nec Fabr.,1775; aetna Boisduval,1840; lefebvrii Rambur,1842; monochroa Rebel,1907.*

Examined materials: A total of 6 individuals were examined and their distributions according to the collected localities are as follows: Erbil: Khabat (3♂♀), 404 m, 02.08.2017; Kane qara (3♂♀), 554 m, 20.08.2017.

Ecological information: I found these types on grasses in a damp place. Vertical distribution: 400 - 600 m, Phenology: August.

Habitat: A swamp filled with cane plants and herbs.

Carcharodus (s.str.) alceae (Esper, [1780]) (*Hesperiidae*) (Figure 4.12)

Synonym(s): *alceae Esper,[1780]; malvae Hufnagel,1766 nec Linn.,1758; malvarum Hoffmannsegg,1804; magnaustralis Verity,1924; corsicus Picard,1948.*

Examined materials: A total of 14 individuals were examined and their distribution according to the collected localities are as follows: Erbil : Kane qara (7♂♀), 554 m, 08.07.2017; Shaqlawa (2♂♀), 806 m, 10.07.2017; Sami abdulrahman patk (2♂♀), 418 m, 13.07.2017; Khabat (3♂♀), 404 m, 02.08.2017.

Ecological information: Inhabits oases of the central plain, and is more widespread in the mountains, the food plant is *Althaea*, hollyhock. Vertical distribution: 400 - 900 m, Phenology: July-August.

Habitat: Located in Fruit gardens dominate with *Malus*, *Ficus*, *Punica*, *Morus*, *Vitis* plant species; a swamp filled with cane plants and herbs.

Erynnis (s.str.) tages (Linnaeus, 1758) (*Hesperiidae*) (Figure 4.12)

Synonym(s): *tages Linnaeus, 1758; morio Scopoli, 1763; Geryon Rottemburg, 1775; subclarus Verity, 1921.*

Examined materials: A total of 4 individuals were examined and their distribution according to the collected locality is as follow: Erbil: Dole sakran (4♂♀), 1323 m, 09.08.2017.

Ecological information: Inhabits the upper woodland zone of the mountains. Vertical distribution: more than 1000 m, Phenology: May-August.

Habitat: Sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys.

Spialia orbifer (U.F.)

Spialia orbifer (L.F.)

Gegenes pumilio (U.F.)

Gegenes pumilio (L.F.)

Erynnis tages (U.F.)

Erynnis tages (L.F.)

Thymelicus sylvestris (U.F.)

Thymelicus sylvestris (L.F.)

Carcharodus alceae (U.F.)

Carcharodus alceae (L.F.)

Figure 4.12. Photos of Hesperiidae species (Hawraz D. Othman)

5. DISCUSSION AND CONCLUSION

5.1. Fauna

Unfortunaly untill now there is no one searched on Erbil butterflies. That is why I can't campare with the privous research, these searches are available only on Iraqi butterflies, I mean there is no search on each province, but on Iraq generally, I am going to mention them; Lepidoptera of Iraq (Wilshire 1957), in this study there is a record of 136 Butterflies (117 *Paoilionoidea,* 19 *Hesperioidea*), Lepidoptera Coğrapiyesi Üstide tetqiqatlar 3. İraq Képinekliri Üstide Zoocoğrapiyelik Hatiriler (*Lepidoptera*) (Koçak & Kemal 2001) in this study the number has risen to 145 species of butterflies (123 *Paoilionoidea,* 22 *Hesperioidea*), & A synonymical, and distributional checklist of the *Paoilionoidea* and *Hesperioidea* of East Mediterranean countries, including Turkey (*Lepidoptera*) (Kemal & Koçak 2011) again the number has risen to 151 Butterflies (129*Paoilionoidea,* 22 *Hesperioidea*).

In my thesis only in Erbil province there is a record of 55 species of Butterflies (49 *Paoilionoidea,* 5 *Hesperioidea*), that explained in (Table 5.1).

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

Family	**Number of species**	**Representation rate of families (%)**
Papilionidae	5	9.1%
Pieridae	11	20%
Argynnidae	7	12.7%
Satyridae	13	23.6%
Lycaenidae	14	25.5%
Hesperiidae	5	9.1%
Total	**55**	**100%**

You note that Lycaenidae has the largest number of species because of the variety of foodplant and the small sizes, in another hand Papilionidae has the smallest number of

species because of the large size and specific food plants. In the present study (1240) specimen were collected in the study area and are shown in the (Table 5.2).

Table 5.2. Number of collected samples according to families (Rates are calculated according to the collected 1240 specimens).

Family	**Number of collected spescimens**	**%Rate**
Papilionidae	138	%11.13
Pieridae	432	%34.84
Argynnidae	72	%5.8
Satyridae	202	%16.3
Lycaenidae	282	%22.74
Hesperiidae	114	%9.19
Total	**1240**	**% 100**

The reader notes that the Pieridae family contains the largest number of samples which is (432) samples, The reason is that individuals of this family are present in all regions and all heights, and it is not easy to identify because they are similar to each other and that is why I had to capture this number, on the other hand, I rarely found Argynnidae family, they were flying fast and hiding among the trees, making it difficult to catch them.

Specific species for northern Iraq; is *Zegris eupheme dyala* also I found this species in my research area in south of the province in foot hill with the altitude of 500-600 m in afield reach with *Sinapis sp*.

Rare species in the area: actually there some species in Satyridae that they were very rare like (Pararge aegeria, Pseudochazara anthelea, Hyponephele wagneri, Hipparchia fatua) because these species I culdn't catch and see them mostly in all fields that I visited.

Local species in the area: The obvious example is *Iphiclides podalirius* because it was present in a specific area close to the Iranian border called Dole sakran which is rech in Pear and almond treas and the altitude is more than 1000 m, this makes this area a special area for the spread of this species from the food hand and the heights.

Common species in the area: It is *Pieris rapae* that I caught and saw it in every were and different altitude started from 350-1350 m, it's foodplants are various *Cruciferae*, *Nasturtium* and *Reseda*, and it can damage cabbage crops.

5. 2. Ecology

5.2.1. Habitat preference of species

The following table illustrates the collected samples and its relationship to the type of habitate, It consists of nine different types of habitates.

Table 5.3. Distribution of the number of samples collected according to habitats (Rates are calculated according to the collected 1240 specimens).

Types of habitate	Nunber of specimens	% Rate
The presence of wheat , broad bean , dominate plants , and vegetable located in smooth plain	63	%5.1
Dominate *Quercus*, Salix plants, *Juniperus* on mountain slopes	562	%45.32
Fruit gardens dominate with *Malus, Ficus,Punica, Morus, Vitis* plant species	254	%20.48
Sparse communities of Herbaceous plants located in valleys	103	%8.3
Sparse communities of *Quercus, Juniperus,* plants located in valleys	45	%3.62
Daphne, Quercus, Herbaceous plants on the watter stream.	81	%6.53
Populus forest	16	%1.3
A swamp filled with cane plants and herbs.	18	%1.45
sparse communities of *Quercus, Juniperus, Salix alba, Malus, Ficus, Punica, Morus, Vitis* plants and vegetable located in valleys.	98	%7.9
Total	**1240**	**%100**

We find that the largest number of collected samples are in Dominate *Quercus*, Salix plants, *Juniperus* on mountain slopes which is about seven localities (Kosar, Haebat sultan, Mawaran, Jale, Dlope, Meer said, bekhal) some of them I visited it more than once (Jaly, Meers aid), This is one of the reasons and the second reason exists of *Quercus* sp. Which is a source of food and a place to live for many kinds of butterflies, the smallest number of collected samples are in *Populus* forest which is was only one locality (Khalifan), which I visited it only once because it was not a safe place this is the first reason that make the number few the second reason is This forest was dense with trees, making the access of the sun rays difficult, and i don't think so that butterflies like that.

5.2.2. Phenology

In this table below, the number of families in certain months has been clarified the months are started from March up to October.

Table 5.4. Numerical distribution and representation ratios of the species in the region according to their families (total number of species: 55).

Months	*Papilionidae*	*Pieridae*	*Argynnidae*	*Satyridae*	*Lycaenidae*	*Hesperiidae*	Total
March	1	5	-	-	1	-	7
	(%1.81)	(%9.1)	-	-	(% 1.81)	-	(%12.72)
April	2	9	4	2	4	1	22
	(%3.6)	(%16.36)	(%7.27)	(%3.6)	(%7.27)	(%1.81)	(%40)
May	1	9	4	8	3	2	27
	(%1.81)	(%16.36)	(%7.27)	(%14.54)	(%5.45)	(%3.6)	(%49.1)
Jun	1	4	2	5	2	1	15
	(%1.81)	(%7.27)	(%3.6)	(%9.1)	(%3.6)	(%1.81)	(%27.27)
July	1	4	1	4	8	2	20
	(%1.81)	(%7.27)	(%1.81)	(%7.27)	(%14.54)	(%3.6)	(%36.36)
August	1	3	1	3	8	3	19
	(%1.81)	(%5.45)	(%1.81)	(%5.45)	(%14.54)	(%5.45)	(%34.54)

You note that the month of April recorded the largest number of recorded species and this is due to the moderate atmosphere and the flora of plants and flowers,

on the other hand, the month of March recorded the lowest rate of registered species and this is due to the cold air and heavy rain throughout the month in 2017.

5.2.3. Altitude distribution of the species

During the research period, I visited different areas with different heights, the lowest of which is Gazna (387 m) and the highest one is Dole sakran (1323 m), according to the laws of mathematics I divided it into three groups each group containing 300 units (351-750), (751-1050) and (1051-1350) , (Table 5.5).

Table 5.5. Numerical distribution and representation ratios according to family, depending on the altitudes of species in the region (total species number: 55).

Altitude(m)	*Papilionidae*	*pieridae*	*Argynnidae*	*Satyridae*	*Lycaenidae*	*Hesperiidae*	Total
351-750	4	11	4	11	9	4	43
	(%7.27)	(%20)	(%7.27)	(%20)	(%16.36)	(%7.27)	(%78.18)
751-1050	2	8	5	6	4	3	28
	(%3.6)	(%14.54)	(%9.1)	(%10.9)	(%7.27)	(%5.45)	(%50.9)
1051-1350	1	3	2	3	7	1	17
	(%1.81)	(%5.45)	(%3.6)	(%5.45)	(%12.72)	(%1.81)	(%30.9)

As shown that the most types of butterflies are located in the vicinity of height 351-750 m This is due to the geographical nature of the search area.

5.2.4. Topography

The characteristics of the terrestrial have a significant impact on the presence of the types of butterflies and the study area are characterized by different terrestrial features such as (smooth plain, mountain slope, fruit gardin, valley and watter stream), (Table 5.6).

In the table bellow we see that the Valley are the characteristic that recorded the largest number of species and on the other hand Smooth plain is the characteristic that recorded the lowest number of species.

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: 55).

Family	smooth plain	mountain slope	fruit garden	valley	watter stream
Papilionidae	1	3	3	3	2
	(%1.81)	(%5.45)	(%5.45)	(%5.45)	(%3.6)
Pieridae	4	9	7	7	5
	(%7.27)	(%16.36)	(%12.72)	(%12.72)	(%9.1)
Argynnidae	-	5	1	5	1
	-	(%9.1)	(%1.81)	(%9.1)	(%1.81)
Satyridae	1	9	1	7	3
	(%1.81)	(%16.36)	(%1.81)	(%12.72)	(%5.45)
Lycaenidae	3	6	5	10	2
	(%5.45)	(%10.9)	(%9.1)	(%18.18)	(%3.6)
Hesperiidae	2	1	2	3	1
	(%3.6)	(%1.81)	(%3.6)	(%5.45)	(%1.81)
Total	11	33	19	35	14
	(%20)	(%60)	(%34.54)	(%63.63)	(%25.45)

Finally I hope the students after me can do this research again, so if there is another species available they can find more species than that I found in my study and I am ready help or support them, also I hope if they can do research for all Iraqi province.

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