



Studies on the Fauna of Papilionoidea and Hesperioidea (Lepidoptera) in Erbil Province (Northern Iraq)*

Hawraz Dhahir OTHMAN¹, Mustafa Cemal ÇİFTÇİ^{2**}, Erdem SEVEN³

¹Ministry of Education, Directorate of Koya Education, Hewa High School for Boys, Erbil, IRAQ

²Siirt University, Faculty of Agriculture, Department of Plant Protection, Siirt, TURKEY

³Batman University, School of Tourism and Hotel Management, Department of Gastronomy and Culinary Arts, Batman, TURKEY

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ORCID ID (By author order)

orcid.org/0000-0002-8248-068X orcid.org/0000-0003-2386-6969 orcid.org/0000-0002-7587-5341

**Corresponding Author: empididae@gmail.com

Abstract: In this study, the butterfly fauna of Erbil Province (northern region of Iraq) is investigated for the first time. For this purpose, 1240 collected specimens are evaluated and 55 species are recorded belonging to superfamilies Papilionoidea and Hesperioidea. Valid scientific names, materials, collecting localities and distributions of each species in the region, are given.

Keywords: Butterflies, Papilionoidea, Hesperioidea, fauna, Erbil, Iraq

1. Introduction

The oldest literature dealing with the butterflies of Iraq goes back to the beginning of the 20th century. First comprehensive studies about butterflies in the northern region of Iraq were published by Wiltshire (1937a, 1937b, 1939a, 1939b, 1957) and Higgins (1958) with some papers. Koçak and Kemal (2001) presented 145 butterfly species from Iraq and same authors increased this number to 151 species from Iraq (Kemal and Koçak, 2011). Also, Lahony et al. (2013) and Tshikolovets et al. (2014) have given some butterfly species in their studies about the biodiversity of northern Iraq. And, studies on the butterflies of nearby areas were published by: Graves (1925); Hemming (1932); Larsen (1974); Hardy (1995); Kemal and Koçak (2011); Koçak and Kemal (2007); Akın (2008); Seven (2010); Koçak et al. (2011); Koçak and Kemal (2014, 2015a, 2015b) and Abusarhan et al. (2016).

This research is the first study on the butterfly species of Erbil Province. This study aimed to determine the Papilionoidea and Hesperioidea (Lepidoptera) fauna of Erbil province.

2. Materials and Methods

In this study, 1240 specimens of butterflies were collected between April-June 2016 and March-October 2017, from Erbil Province in the north of Iraq. They were caught using a long-handled butterfly sweep net. After being captured, specimens were killed with ethyl acetate and packed. Adults were prepared according to standard entomological procedures. The materials are deposited in the Entomology Laboratory of Department of Biology in Siirt University.

Erbil Province is the capital city of the northern region of Iraq, which borders Turkey and Iran in the north and north-east respectively; it also borders the provinces of Sulaymaniyah and Kirkuk on the east, south-east and south (Figure 1). 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.

The following sources have been used in the taxonomy, distribution, fauna, and identification of the species: Wiltshire (1937a, 1937b, 1939a, 1939b, 1957), Higgins (1958), Aussem (1980), Geiger et al.

*This manuscript is prepared from the first name author's master thesis.

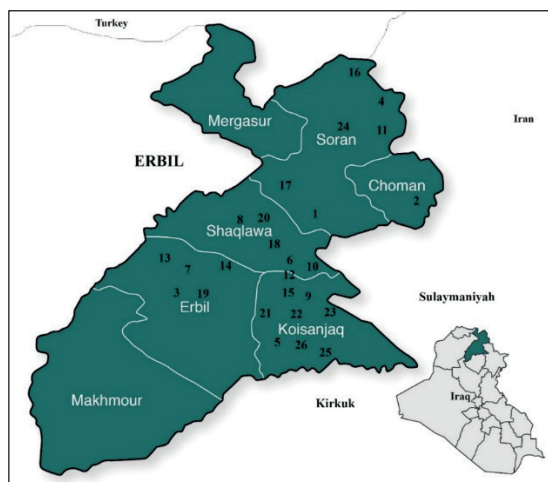


Figure 1. Location of Erbil Province in Iraq [Modified from Anonymous (2017)]

(1988), Seyer (1988), Coenen and Olivier (1989), Hesselbarth et al. (1995), Koçak and Kemal (2001), Freina and De Naderi (2003), Benyamini et al. (2007), Kemal and Koçak (2011), Back (2012), Lahony et al. (2013) and Tshikolovets et al. (2014).

Dates of studies, coordinates and altitudes are presented for detected 26 localities in Table 1. In the results section, the names are given in alphabetical order within the families, and the number of examined specimens and collecting localities that are written according to the codes in Table 1, are provided for each species. In addition, the species are also assessed by their local, rare or widespread distribution in the studied area, according to the evaluations based on the number of captured samples and observations during the field studies.

Table 1. Coordinates, altitudes and studied dates of the localities

Code	Locality	Coordinates	Altitude	Dates of Study
1	Bekhal	36°36'17"N 44°31'41"E	760 m	10/5/2017
2	Choman	36°34'49"N 44°51'37"E	1060 m	12/7/2017
3	Dlope	36°11'26"N 44°07'03"E	750 m	08/5/2017
4	Dole Sakran	36°54'58"N 44°44'53"E	1325 m	09/8/2017
5	Elnjakh	35°58'12"N 44°30'50"E	470 m	01/5/2017
6	Faqayan	36°15'52"N 44°20'15"E	860 m	07/5/2017
7	Gazna	36°14'20"N 43°56'01"E	390 m	09/5/2017
8	Haebat Sultan	36°22'25"N 44°10'26"E	835 m	05/5/2017
9	Hawawan	36°03'32"N 44°42'26"E	700 m	04/4/2017
10	Heran	36°17'04"N 44°29'33"E	850 m	27/4/2017
11	Jale	36°44'25"N 44°36'11"E	740 m	25/4/2016, 27/3/2017, 20/5/2017, 18/6/2017, 06/7/2017
12	Kane Qara	36°04'29"N 44°39'15"E	555 m	04/5/2016, 14/3/2017, 22/4/2017, 08/7/2017
13	Khabat	36°14'40"N 43°43'09"E	400 m	02/8/2017
14	Khalefan	36°36'19"N 44°24'22"E	660 m	11/7/2017
15	Kosar	36°06'30"N 44°40'09"E	900 m	13/5/2017
16	Mala Omer	36°56'56"N 44°42'26"E	570 m	05/4/2017
17	Mawaran	36°27'52"N 44°15'20"E	760 m	29/4/2017
18	Meer Said	36°24'44"N 44°30'51"E	840 m	04/5/2017, 05/7/2017
19	Sami Abdulrahman Park	36°11'32"N 43°59'37"E	420 m	13/7/2017
20	Shaqlawa	36°24'17"N 44°19'38"E	800 m	10/7/2017
21	Shekharwan	36°04'31"N 44°32'39"E	630 m	08/4/2017
22	Shewe Samal	36°06'02"N 44°31'34"E	770 m	18/4/2017
23	Sktan	36°13'57"N 44°36'46"E	695 m	26/4/2017
24	Soran	36°39'28"N 44°30'54"E	550 m	12/5/2017
25	Taq Taq	35°54'45"N 44°36'39"E	400 m	06/4/2017
26	Ttopco	36°01'59"N 44°28'31"E	525 m	19/4/2017, 21/4/2017, 22/4/2017, 15/6/2017

3. Results

3.1. Superfamily: Papilionoidea

3.1.1. Family: Papilionidae

Archon apollinaris (Staudinger, [1892])

Material: 9 specimens. Localities: 11, 17, 12, 25.

Distribution: Local.

Iphiclides podalirius (Linnaeus, 1758)

Material: 19 specimens. Localities: 4. Distribution: Local.

Papilio machaon Linnaeus, 1758

Material: 2 specimens. Localities: 26. Distribution: Rare.

Princeps demoleus Linnaeus, 1758

Material: 4 specimens. Localities: 12. Distribution: Rare.

Zerynthia deyrollei (Oberthür, 1869)
Material: 104 specimens. Localities: 1, 5, 10, 11, 12, 16, 17, 23, 25. Distribution: Widespread.

3.1.2. Family: Pieridae

Anthocharis cardamines (Linnaeus, 1758)
Material: 32 specimens. Localities: 11, 17, 25.
Distribution: Widespread.

Aporia crataegi (Linnaeus, 1758)
Material: 82 specimens. Localities: 1, 6, 15, 18, 24.
Distribution: Widespread.

Colias crocea (Fourcroy, 1785)
Material: 28 specimens. Localities: 1, 4, 6, 11, 12, 19, 20, 25. Distribution: Widespread.

Euchloe belemia (Esper, [1800])
Material: 52 specimens. Localities: 1, 3, 5, 7, 8, 9, 12, 18, 21, 22, 23, 25, 26. Distribution: Widespread.

Pieris brassicae (Linnaeus, 1758)
Material: 71 specimens. Localities: 1, 5, 6, 11, 12, 14, 16, 18. Distribution: Widespread.

Pieris ergane (Geyer, [1828])
Material: 13 specimens. Localities: 12.
Distribution: Local.

Pieris pseudorapae Verity, 1908
Material: 10 specimens. Localities: 3, 12.
Distribution: Local.

Pieris rapae (Linnaeus, 1758)
Material: 112 specimens. Localities: 1, 2, 3, 4, 5, 7, 8, 11, 12, 14, 19, 20, 24. Distribution: Widespread.

Pontia daplidice (Linnaeus, 1758)
Material: 10 specimens. Localities: 11, 12, 20.
Distribution: Local.

Pontia edusa (Fabricius, 1777)
Material: 15 specimens. Localities: 1, 3, 4, 8, 16.
Distribution: Widespread.

Zegris eupheme (Esper, [1804])
Material: 6 specimens. Localities: 26. Distribution: Rare.

3.1.3. Family: Nymphalidae

Argynnis pandora ([Denis & Schiffermüller], 1775)
Material: 6 specimens. Localities: 4. Distribution: Local.

Limenitis reducta Staudinger, 1901
Material: 8 specimens. Localities: 4. Distribution: Local.

Melitaea arduinna (Fabricius, 1787)
Material: 2 specimens. Localities: 17. Distribution: Rare.

Melitaea fascelis (Fabricius, 1787)
Material: 6 specimens. Localities: 17, 21, 25.
Distribution: Local.

Melitaea phoebe (Goeze, 1779)
Material: 5 specimens. Localities: 1, 11, 17.
Distribution: Local.

Polygonia egea (Cramer, [1775])

Material: 10 specimens. Localities: 18, 24.
Distribution: Local.

Vanessa cardui (Linnaeus, 1758)
Material: 35 specimens. Localities: 1, 6, 11, 12.
Distribution: Widespread.

3.1.4. Family: Satyridae

Brintesia circe (Fabricius, 1775)
Material: 5 specimens. Localities: 11, 26.
Distribution: Local.

Coenonympha pamphilus (Linnaeus, 1758)
Material: 33 specimens. Localities: 10, 11, 22, 23.
Distribution: Widespread.

Coenonympha saadi (Kollar, [1849])
Material: 22 specimens. Localities: 11, 18.
Distribution: Widespread.

Hipparchia fatua (Freyer, 1844)
Material: 6 specimens. Localities: 11. Distribution: Rare.

Hyponephele lupina (Costa, [1836])
Material: 6 specimens. Localities: 4. Distribution: Rare.

Hyponephele wagneri (Herrich-Schäffer, [1846])
Material: 1 specimen. Localities: 11. Distribution: Rare.

Kirinia roxelana (Cramer, [1777])
Material: 2 specimens. Localities: 11. Distribution: Rare.

Lasiommata megera (Linnaeus, 1767)
Material: 29 specimens. Localities: 1, 4, 11, 18, 21, 22, 23, 25, 26. Distribution: Widespread.

Maniola jurtina (Linnaeus, 1758)
Material: 6 specimens. Localities: 4. Distribution: Rare.

Maniola telmessia (Zeller, 1847)
Material: 55 specimens. Localities: 1, 11, 24.
Distribution: Widespread.

Melanargia hylata (Klug, 1832)
Material: 38 specimens. Localities: 6, 11, 15.
Distribution: Widespread.

Pararge aegeria (Linnaeus, 1758)
Material: 1 specimen. Localities: 14. Distribution: Rare.

Pseudochazara telephassa (Geyer, [1827])
(confused with *P. anthelea* (Hübner, [1824]) in the thesis) Material: 1 specimen. Localities: 7.
Distribution: Rare.

3.1.5. Family: Lycaenidae

Chilades galba (Lederer, 1855)
Material: 38 specimens. Localities: 2, 11, 12, 13, 19. Distribution: Widespread.

Chilades trochylus (Freyer, [1843])
Material: 4 specimens. Localities: 4. Distribution: Rare.

Glaucopsyche alexis (Poda, 1761)

Material: 116 specimens. *Localities:* 1, 6, 10, 11, 17, 22, 23, 25, 26. *Distribution:* Widespread.

Lampides boeticus (Linnaeus, 1767)

Material: 3 specimens. *Localities:* 11, 12, 18. *Distribution:* Local.

Lycaena phlaeas (Linnaeus, 1761)

Material: 2 specimens. *Localities:* 11. *Distribution:* Rare.

Lycaena tityrus (Poda, 1761)

Material: 13 specimens. *Localities:* 2, 12, 13, 20. *Distribution:* Local.

Plebejus sephirus (Frivaldszky, 1835)

(confused with *Polyommatus icarus* (Rottemburg, 1775) in the thesis) *Material:* 9 specimens. *Localities:* 4. *Distribution:* Rare.

Polyommatus agestis ([Denis & Schiffermüller], 1775)

Material: 9 specimens. *Localities:* 2, 3, 11, 25. *Distribution:* Local.

Polyommatus alcestitis (Zerny, 1932)

Material: 15 specimens. *Localities:* 4. *Distribution:* Rare.

Pseudophilotes vicrama (Moore, 1865)

Material: 4 specimens. *Localities:* 4. *Distribution:* Rare.

Satyrium marcidum (Riley, 1921)

Material: 50 specimens. *Localities:* 1, 24. *Distribution:* Local.

Tarucus balkanicus (Freyer, [1843])

Material: 7 specimens. *Localities:* 16, 4. *Distribution:* Local.

Tomares callimachus (Eversmann, 1848)

Material: 2 specimens. *Localities:* 9. *Distribution:* Rare.

Zizeeria karsandra (Moore, 1865)

Material: 9 specimens. *Localities:* 12, 13. *Distribution:* Local.

3.2. Superfamily: Hesperioidea

3.2.1. Family: HesperIIDae

Carcharodus alceae (Esper, [1780])

Material: 14 specimens. *Localities:* 12, 13, 19, 20. *Distribution:* Local.

Erynnis tages (Linnaeus, 1758)

Material: 4 specimens. *Localities:* 4. *Distribution:* Rare.

Gegenes pumilio (Hoffmannsegg, 1804)

Material: 6 specimens. *Localities:* 12, 13. *Distribution:* Rare.

Spialia orbifer (Hübner, [1823])

Material: 10 specimens. *Localities:* 6, 10, 23. *Distribution:* Local.

Thymelicus sylvestris (Poda, 1761)

Material: 80 specimens. *Localities:* 1, 3, 8, 11, 15, 24. *Distribution:* Widespread.

4. Discussion

Unfortunately, there was no research on butterflies of Erbil until now. Although, Wiltshire (1937a, 1937b, 1939a, 1939b, 1957) has given some butterfly species from northern Iraq in his papers, in which the exact location is problematic, as there is no location information for each species. Comprehensive or/and current studies on butterflies in Iraq was known by these studies: Wiltshire (1957) was recorded 136 butterflies (117 Papilionoidea, 19 Hesperioidea) from north region of Iraq, Koçak and Kemal (2001) mentioned 145 species of butterflies (123 Papilionoidea, 22 Hesperioidea), and in the study "a synonymical, and distributional checklist of the Papilionoidea and Hesperioidea of East Mediterranean countries, including Turkey (Lepidoptera)" (Kemal and Koçak, 2011) the number has risen to 151 butterflies (129 Papilionoidea, 22 Hesperioidea). Tshikolovets et al. (2014) were presented 413 species from Iran and Iraq. Also, Lahony et al. (2013) were studied flora and fauna of north-east of Iraq in general and reported 7 species of butterfly.

With this study, 55 butterfly species (50 Papilionoidea, 5 Hesperioidea) are recorded as new to the fauna of Erbil Province. These species belongs to six families: Lycaenidae (14), Satyridae (13), Pieridae (11), Nymphalidae (7), Papilionidae (5) and HesperIIDae (5). Due to the security conditions in the region, field studies have been insufficient, and the number of species in the families were not at the desired level. This number is expected to increase with future researches.

The majority of the collected 55 species are composed of rare and local individuals (Table 2). Particularly, *Papilio machaon* Linnaeus, 1758, *Melitaea arduinna* (Fabricius, 1787), *Hyponephele wagneri* (Herrich-Schäffer, [1846]), *Pararge aegeria* (Linnaeus, 1758), *Pseudochazara telephassa* (Geyer, [1827]), *Lycaena phlaeas* (Linnaeus, 1761) and *Tomares callimachus* (Eversmann, 1848) species are found very rare in butterfly fauna of Erbil.

Table 2. Distribution of the species in the region according to the families

	Rare	Local	Widespread	Total
Papilionidae	2	2	1	5
Pieridae	1	3	7	11
Nymphalidae	1	5	1	7
Satyridae	7	1	5	13
Lycaenidae	6	6	2	14
HesperIIDae	2	2	1	5
Total	19	19	17	55

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