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# Contribution to the Erebidæ of Jordan (Lepidoptera: Erebidæ)

A. Katbeh-Bader

## Abstract

The Erebidæ of Jordan were collected by fixed UV light traps from localities representing the main ecological zones of Jordan. The duration of the traps ranged from several weeks to more than 2 years for some locations. The traps were placed in Dibe'en Nature Reserve (North Jordan), Al Shoumari Nature Reserve (Eastern Desert), Dana Nature Reserve (South Jordan). Traps were also placed in two University of Jordan farms in the Central Jordan Valley and one near Amman in the high lands. Some traps were placed in or near private farms or gardens. Specimens of Erebidæ collected previously from Jordan and deposited in the University of Jordan Insect Museum (UJIM) were examined. As a result of this research, a large collection for the members of this family was established in the UJIM, which is the largest collection in the country so far. A total of 20 species in 12 genera were recorded from the different parts of Jordan. *Catocala separata* (Freyer, 1848) and *Autophila ligaminosa* (Eversmann, 1851) are new to Jordan. The data contributed to our knowledge of the spatial and temporal distribution of the Jordanian Erebidæ. Available biological, ecological, distributional or zoogeographical data are given.

KEY WORDS: Lepidoptera, Erebidæ, Jordan.

## Contribución a los Erebidæ de Jordania (Lepidoptera: Erebidæ)

## Resumen

Los Erebidæ de Jordania se colectaron en distintas localidades que representan las principales zonas ecológicas de Jordania, utilizando trampas fijas de luz UV. La duración de las trampas varió desde algunas semanas hasta más de dos años en algunas localidades. Las trampas se colocaron en la Reserva Natural Dibe'en, (Norte de Jordania); la Reserva Natural Al Shoumari (Desierto del Este) y la Reserva Natural Dana (Jordania del Sur). También se colocaron trampas en dos granjas de la Universidad de Jordania en el Valle Central y en otra cerca de Amman, en las tierras altas. Algunas trampas se colocaron dentro o cerca de granjas o jardines privados. Se examinaron ejemplares de Erebidæ colectados anteriormente en Jordania y depositados en el University of Jordan Insect Museum (UJIM). Como consecuencia de esta investigación, se estableció una importante colección de miembros de esta familia en la UJIM, que es la colección más importante del país en estos momentos. Se registró un total de 20 especies en 12 géneros de distintas partes de Jordania. *Catocala separata* (Freyer, 1848) y *Autophila legaminosa* (Eversmann, 1851) son nuevas para Jordania. Los datos obtenidos han contribuido a nuestro conocimiento de la distribución temporal y espacial de los Erebidæ de Jordania. Los datos biológicos, ecológicos, zoogeográficos o de distribución disponibles se incluyen.

PALABRAS CLAVE: Lepidoptera, Erebidæ, Jordania.

## Introduction

The Family Erebidæ belongs to the superfamily Noctuoidea which currently include several

subfamilies from the former family Noctuidae (FIBIGER & LAFONTAINE, 2005). Taxonomic and faunistic revision of the Noctuidae of the Levant included 586 species with data on their distribution and bionomics (HACKER, 2001). HACKER & SCHREIER (2001a) studied the collection of J. Klapperich (who collected from 1956 to 1969 about 8000-10000 noctuids in Jordan) and recorded 228 species many of them were new to Jordan and the Levant. HACKER & SCHREIER (2001b) listed 99 species from Jordan which were collected from 1987 to 1999. FABIANO & ZELLI (2001) listed 69 species based on two Italian surveys. The first was to Southern Jordanian desert in October 1991 and between end of March and the beginning of May from 1992-1996. The second was the collection of A. Vigna-Taglianti (University of Rome "La Sapienza"), S. de Felici and collaborators during a zoological survey of the Dana Nature Reserve in March-May 1995. STADIE & LEHMANN (2012) studied some of the winter and spring Macrolepidoptera of Jordan and presented remarks on the biology of some species. KATBEH-BADER (2013) presented a contribution to the Noctuidae of Jordan in the XVIII European Congress of Lepidopterology with several new records. Recently, (KRAVCHENKO *et al.*, 2015a, b, c, d, e) published a series of papers on the Noctuoidea of Jordan including checklists of the different families (including the Erebidae) with remarks on species ecology, phenology and zoogeography.

The objectives of this paper was to contribute to the spatial and temporal distribution of the Erebidae of Jordan by presenting the species recorded during a survey of the moths of Jordan project which was sponsored by the Deanship of Scientific Research at the University of Jordan.

## Materials and Methods

A survey for the moths of Jordan, including the Erebidae, was started in 2007. Light traps were placed in localities in the Jordan Valley, Highland and the Desert. In addition, erebid specimens collected previously from Jordan and preserved at the University of Jordan Insects Museum were examined. Such specimens were collected by entomology students or by the museum staff. The collected specimens are mentioned in the "Specimens" paragraph after each species followed by "previous records" section. Localities in Jordan were arranged alphabetically and dates were arranged chronologically according to the month. The number of specimens was placed after the date between brackets which was followed by the collector. Unless otherwise mentioned, the museum staff or the author of this article was the collector. All specimens were deposited at the University of Jordan Insects Museum. The world distribution is after KRAVCHENKO *et al.* (2007) while bionomics are after (HACKER, 2001).

## Results

### CATOCALINAE

#### CATOCALINI

##### *Catocala conjuncta* (Esper, 1787)

Specimens: Ajlune Reserve, 18-VIII-1-IX-2009 (1).

Previous Records: KRAVCHENKO *et al.* (2015) from oak / pine forests.

Bionomics: Univoltine, June to October. The larvae feed on evergreen *Quercus* species.

Distribution: North Africa, Southern Europe including the islands of Corsica, Sardinia, Sicily, Malta, and Crete, Turkey and the Levant.

##### *Catocala diversa* (Geyer, [1828])

Specimens: Ajlune Reserve, 23-VII-2-VIII-2009 (1).

Distribution: Spain, south-eastern France, Italy, the Balkans, European southern Russia and Palestine. It is recorded from Jordan for the first time.

Bionomics: Univoltine, adults fly from May to July. The larvae feed on *Quercus* species.

*Catocala nymphagoga* (Esper, 1787)

Specimens: Ajlune Reserve, I-2010 (1), 2-18-VIII-2009 (1); Amman, 6-X-2010 (1); Ar Rumman Valley, Royal Botanical Garden, 14-15-V-2013(1), 29-31-V-2012 (1), 5-6-VI-2012 (1), Wadi Shu'ayb, 15-16-V-2013 (1); Dana Reserve, 6-8-VI-2011 (1), 6-10-VII-2011 (1), 15-17-VII-2011 (2); Shaumari Reserve, 25-IV-8-V-2010 (1).

Previous Records: HACKER & SCHREIER (2001a): Wadi As Sayr, 6-VII-1956; Jarash, 29-V-1957; Amman, 12-VII-1964. KRAVCHENKO *et al.* (2015b) from oak / pine forests and scrub / woodlands.

Distribution: Mediterranean. Morocco, Algeria, Southern Europe, southern Russia, Turkey, Levant, Armenia, and Caucasian region. Migrants reach as far north as England.

Bionomics: Univoltine, June to August. This species is known to be migratory. The larva feeds on *Quercus*, usually shrubs.

*Catocala olgaorlovae* Kravchenko, Speidel, Witt, Mooser & Muller, 2007

Specimens: Dana Reserve, 7-8-V-2010 (1), 26-X-2010 (2).

Previous Records: KRAVCHENKO *et al.* (2015b) from dry steppe vegetation areas.

Distribution: Palestine and Sinai (Egypt).

Bionomics: Very rare in Palestine. It was found in fresh water oasis and along deep canyons with poplar trees. In Sinai, it was recorded from Santa Catharina oasis near poplar trees. It may be uni-voltine, collected from September to mid-October in Palestine while in Sinai from mid-August to October (KRAVCHENKO *et al.*, 2007). This species was first recorded in Jordan from one specimen collected in May from Dana Reserve which may indicate an earlier generation.

*Catocala separata* (Freyer, 1848)

Specimens: Ajlune Reserve, 2-18-VIII-2009 (2).

Distribution: Mediterranean. Balkans, Mediterranean part of southern Turkey and Levant. **New record in Jordan.**

Bionomics: Univoltine summer species in Palestine flying from July to October. It feeds on *Quercus calliprinos* (Fagaceae). The only record in Jordan so far is from an oak forest in Ajloun Reserve.

MELIPOTINI

*Drasteria flexuosa* (Menetries, 1847)

Specimens: Ash Shaumari Reserve, 13-IV-2009 Lt. (1).

Previous Records: HACKER & SCHREIER (2001b): E-Jordan, Asraq ed Shushan, 80 km E Amman, 400 m, 22-23-IV-1999; 10 km S Dead Sea, Safi, 380 m, 2-V-1999; Asraq ed Duruz, 80 km E Amman, 400 m, 22-IV-1999; Asraq ed Shushan, 80 km E Amman, 400 m, 23-IV-1999. KRAVCHENKO (2015b): from all vegetation areas except oak and shrub.

Distribution: (East-) Eremic. Through the semi-deserts and deserts of the old world from eastern Egypt through the Levant to Kazakhstan, China, Mongolia and Afghanistan.

Bionomics: Bivoltine, March to May and Autumn. The larvae and the early stages are still unknown.

OPHIUSINI

*Clytie infrequens* (Swinhoe, 1884)

Specimens: Al-Mafraq, 6-17-X-2010 (1).

Previous Records: HACKER & SCHREIER (2001a): Qasr Al Azraq (Al Azraq oasis), 5-11-V-1964. HACKER & SCHREIER (2001b): Asraq ed Shushan, 80 km E Amman, 400 m, 23-IV-1999;

Wadi Ram, E. Aqaba, 1200 m, 21-IV-1999. KRAVCHENKO *et al.* (2015b): from all vegetation areas except oak / pine and woodlands.

Distribution: East-Eremic. Eastern Sahara through the Levant and the Arabian Peninsula to Pakistan and India.

Bionomics: Multivoltine, the larvae feed on tamarisk, *Tamarix articulata*. The species inhabits the oases and tamarisk plantations of the desert.

*Clytie sancta* (Staudinger, 1898)

Specimens: Wadi Shu'ayb, 12-15-V-2011 (1).

Previous Records: HACKER & SCHREIER (2001a): Asraq, 80 km E Amman, 400 m, 23-IV-1999 Jordan Valley, Dead Sea, 380 m u. M., 19-IX-1966; to 3-XI-1966); do., 3-XI-1966; 7-X-1966; 3-XI-1966; do., 21-VII-1966; Amman, 800 m, 19-IX-1966; Wadi al Hidan, 6-V-1995; HACKER & SCHREIER (2001b): Asraq ed Shushan, 80 km E Amman, 400 m, 23-IV-1999; Jebel et Tafila, N Ghor Feifa (12 km S Dead Sea), 100 m, 8-IV-1999; 10 km S Dead Sea, Safi, 380 m, 2-V-1999; Asraq ed Duruz, 80 km E Amman, 400 m, 22-IV-1999; Asraq ed Shushan, 80 km E Amman, 400 m, 23-IV-1999. KRAVCHENKO *et al.* (2015b): from semi desert, desert Saharo-Arabian and Sudanian penetration vegetation areas. STADIE & LEHMANN (2012): Fayfa 23-III-2009 (12).

Distribution: North Africa including the Sahara, Turkey, Iran and the Levant.

Bionomics: Probably multivoltine, appearing in March-May, August-September and December-January. The larvae feed on *Tamarix*.

*Dysgonia torrida* (Guenée, 1852)

Specimens: Hay Nazzal, Amman, 26-IV-2008.

Previous Records: HACKER & SCHREIER (2001a): Amman, 11-28-VIII-1967; 4-IX-1967; 21-IX-1967; 23-VI-1968. KRAVCHENKO *et al.* (2015b) from oak-oak / pine forest areas.

Distribution: Paleotropical and Subtropical. From the African tropics and subtropics to Spain, southern Italy, Balkans, Turkey, Levant, Iran, Iraq and Uzbekistan.

Bionomics: Multivoltine. The larvae feed on *Zea mays*, *Ricinus communis* and probably also on numerous other plants.

*Grammodes boisdeffrii* (Oberthür, 1867)

Specimens: Baptism site, Dead sea, 16-V-2000 (3), 16-VI-2000 (4), 23-VII-2000 (1).

Previous Records: HACKER & SCHREIER (2001a): Jarash, 13-XI-1964; Aqaba, 14-XI-1968; 9-VIII-1968; 6-XI-1969; 26-III-1967. HACKER & SCHREIER (2001b): Jebel et Tafila, N Ghor Feifa (12 km S Dead Sea), 100 m, 8-IV-999; 10 km S Dead Sea, Safi, 380 m, 2-V-1999; Asraq ed Shushan, 80 km E Amman, 400 m, 23-IV-1999. KRAVCHENKO *et al.* (2015b) from Sudanian penetration zone. STADIE & LEHMANN (2012): Fayfa, 23-III- 2009 (1).

Distribution: West-Eremic. From the northern and western Sahara to Egypt.

Bionomics: Probably bivoltine or multivoltine, halophilous. In Palestine and Jordan, from February to June, in Egypt May to September, in Sinai April and September, in Morocco in April and May and October and June. The early stages and bionomics are unknown.

*Minucia lunaris* ([Denis & Schiffermüller], 1775)

Specimens: Dana Reserve, 17-18-III-2011 (11), 24-27-III-2011 (2), 27-29-III-2011 (5).

Previous Records: HACKER & SCHREIER (2001b): Jebel Ajlun, 15 km E Jarash, 1000 m, 22-IV-1999. KRAVCHENKO *et al.* (2015b): from oak / pine vegetation areas.

Distribution: Sub-Mediterranean. Morocco, Algeria, Central and Southern Europe, turkey Iran and Levant.

Bionomics: Univoltine, March to June. The larvae feed on species of *Quercus*, mostly on shrubs and usually on young leaves.

*Minucia wiskotti* (Püngeler, 1902)

Specimens: Dana Reserve, 17-18-III-2011 (11), 24-27-III-2011 (2), 27-29-III-2011 (5).

Previous Records: FABIANO & ZILLI (2001): Dana Reserve, Camp Site, 20-III-1995. KRAVCHENKO *et al.* (2015b): from scrub / woodland vegetation areas. STADIE & LEHMANN (2012): Dana Nature Reserve (150).

Distribution: Jordan and Palestine.

Bionomics: The early stages and bionomics are unknown. For a long time, this species was only known by the type series of three females, in coll. Püngeler, NHMU. However, FABIANO & ZILLI (2001) reported it from Dana Reserve, Jordan. The record in this paper is the second from the same locality. However, the species may occur in other oak forests in the north of Jordan.

*Ophiusa tirhaca* (Cramer, 1777)

Specimens: Amman, 19-X-2009 (1); University of Jordan Farm, 25-II-2009 (1).

Previous Records: HACKER & SCHREIER (2001a): Amman, 15-X-1964; 29-XI-1964. HACKER & SCHREIER (2001b): Asraq ed Duruz, 80 km E Amman, 400 m, 22-IV-1999. FABIANO & ZILLI (2001): Qa ed Disa, 31-X-1991, 23-IV-1992, 29-III-1994, 30-III-1995. KRAVCHENKO *et al.* (2015b): from oak / pine and scrub / woodland and dry steppe vegetation areas. STADIE & LEHMANN (2012): Al Azraq, (1).

Distribution: Paleotropical. Throughout Africa, the Mediterranean basin and most of the Oriental tropics and subtropics.

Bionomics: Multivoltine. The larvae are polyphagous, feeding on *Rhus coriaria*, *Pistacia lentiscus*, *Gotinus coggyria* (= *Rhus cotinus*), *Gistus*, *Myrtus*, *Pelargonium* and various other plants.

*Zethes insularis* (Rambur, 1833)

Specimens: Ajlun Reserve, 18-VIII-1-IX-2009 (2).

Previous Records: HACKER & SCHREIER (2001a): Amman, 25-IV-1963; Arda Road, 600 m, 8-X-1965. HACKER & SCHREIER (2001b): Badran, 20 km N Amman, 1000 m, 15-VI-1999. KRAVCHENKO *et al.* (2015b): from oak / pine and scrub / woodland vegetation areas.

Distribution: Mediterranean-Iranian. In North Africa from Morocco to Libya, northern Mediterranean, Turkey, Levant, Caucasus / Transcaucasia, Iran and Iraq.

Bionomics: Multivoltine in the Mediterranean evergreen zone, in Middle East (Iraq) the species may be univoltine.

## TOXOCAMPINI

*Apopestes spectrum* (Esper, 1787)

Specimens: Al Jubaihah, 5-XI-1977 (1); As-Salt, 16-VI-2008 (1); Old Jarash Road um Ar-Rumman, 22-IV-1983 (1)

Previous Records: HACKER & SCHREIER (2001a): Jarash, 11-VIII-1956; 5-V-1957, in numbers. KRAVCHENKO *et al.* (2015b): from scrub / woodland and dry steppe vegetation areas.

Distribution: Mediterranean-Turanian. In North Africa from Morocco to Algeria, from the Mediterranean part of Europe to western Turkey and the Levant, in the East to Central Asia.

Bionomics: A characteristic species of the Mediterranean evergreen sclerophyllous forest. The larvae usually feed in spring on Fabaceae (Papilionaceae) shrubs including *Genista*, *Sarothamnus*, *Spartium*, *Glycyrrhiza* or *Lygos* (*Retama*) spp. The species is univoltine, from early summer, aestivating, to autumn and then overwintering to late winter. As in the genus *Autophila*, the imagines of *A. spectrum* rest in caves, holes and buildings and rarely come to light or sugar.

*Autophila cerealis* (Staudinger, 1871)

Specimens: Wadi Shu'ayb, 10-12-IV-2011 (1).

Previous Records: HACKER & SCHREIER (2001a): Amman, 1-I-958; 28-II-1958; 2-XII-

1957; 13-XI-1957; 1-XI-1957 (in large numbers); 18-11-1958 (in large numbers); 23-1-1959; 18-IV-1958; 23-XI-1957; 14-17-I-1967; Rumman, 30-V-1957; 29-III-1965 (in large numbers); Jarash, 24-XI-1957; 29-V-1957; Fuhays, 7-III-1956; Wadi Dulail, 11-XII-1968; Rusayfah, 29-XI-1968; Shawbak, 22-IV-1969; Karak, 19-XI-1957; Petra, 6-V-1968. HACKER & SCHREIER (2001b): Aqaba, 14-IV-1995 (leg. Mitter) (gen. prep. 1713 f); Azraq esh Shushan, 80 km E Amman, 400 m, 23-IV-1999; Jebel et Tafila, Ghor Feifa (12 km S Dead Sea), 100 m, 8-IV-1999; 10 km S Dead Sea, Ghor Feifa, 320 m, 8-IV-1999; 10 km S Dead Sea, Safi, 380 m, 2-V-1999; Asraq ed Duruz, 80 km E Amman, 400 m, 22-IV-1999. FABIANO & ZILLI (2001): Qa ed Disa, 27-IV-1992, 29-IV-1992, 1-V-1992, 2-V-1992, 3-V-1992, 4-V-1992, 18-IV-1993, 26-III-1994, 27-III-1994, 28-III-1994, 31-III-1994, 4-IV-1994, 9-V-1994, 2 F, 23-III-1995, 30-III-1995, 1-IV-1995, 7-IV-1995, 23-IV-1995, Wadi al Khaynei, 6-IV-1994, Wadi el Hassaya, 6-IV-1995, Wadi Madsus, 5-IV-1995, Dana Reserve, Camp Site, 20-III-1995. Wadi Araba, Camp Site, 16-IV-1995; Petra, 19-20-IV-1993 (w. TEN HAGEN leg.). (Gen. prep.: AZ 554-556, 564-568, 584). KRAVCHENKO *et al.* (2015b): from all vegetation areas.

Distribution: East Eremic. From Turkey and the Levant to Central Asia, in the south all over the Arabian Peninsula.

Bionomics: Bivoltine, late winter and early spring and early summer. The larvae feed on *Salvia* and probably other low herbs. The species inhabits rocky localities in the semi desert and also in mountainous areas.

*Autophila ligaminosa* (Eversmann, 1851)

Specimens: Dana Reserve, 24-27-III-2011 (1).

Distribution: (East-) Mediterranean-Iranian. From the Balkans to the European part of southern Russia, Turkey, Levant, Iran, Afghanistan, in the south to the United Arab Emirates and Oman. **New record for Jordan.**

Bionomics: An inhabitant of rocky and hot places. *A. ligaminosa* avoids light and light traps more than other species of the genus *Autophila* Hübner, [1823]. The moths rest in caves, holes and buildings, as do some well-known Rhopalocera. The early stages are undescribed. Univoltine, May to July and September, overwintering, to March.

*Autophila pauli* Boursin, 1940

Specimens: Dana Reserve, 17-18-III-2011 (1); 9-10-IV-2010 (2). Wadi Rum, 25-IV-8-V-2010 (1).

Previous Records: HACKER & SCHREIER (2001a): Amman, 13-IV-1959; 8-IV-1958; Rumman, 19-VIII-1966; 24-XI-1965; Shawbak, 22-IV-1969; 17-24-V-1968; Petra, 21-IV-1969; 6-V-1968. HACKER & SCHREIER (2001b): Southern desert, Wadi of Jebel Sureibit, 950 m, 12-III-1999 (gen. prep. Hacker 11274 m). FABIANO & ZILLI (2001): Qa ed Disa, 13-IV-1993, 4-IV-1994, 27-IV-1994, 28-IV-1994, 2-V-1994, 8-IV-1995, 26-IV-1995; Jebel el Khaz'ali, 14-IV-1992; Wadi el Khaynei, 6-IV-1994; Wadi el Hassaya, 6-IV-1995; Wadi Madsus, 5-IV-1995; Dana Reserve, Camp Site, 20-III-1995; El Barraha, 8-V-1995; Wadi Araba, Camp Site, 16-IV-1995: 3 F. (Gen. prep.: AZ 547, 549-550, 552-553, 557-563, 706). KRAVCHENKO *et al.* (2015): from all vegetation areas except oak / pine and woodlands. STADIE & LEHMANN (2012): Rahma (1); Gharandal I (1); Fayfa (1); Al Azraq (1); Dana Nature Reserve (1).

Distribution: (Central) Eremic. Endemic to the Levant.

Bionomics: The species may be bivoltine; specimens have been collected especially in early spring and in autumn to late autumn. The early stages and bionomics are unknown.

## EUBLEMMINAE

*Eublemma ostrina* (Hübner, [1808])

Specimens: Ar-Rumman Valley, Royal Botanical Garden, 12-13-III-2013 (1).



Previous Records: HACKER & SCHREIER (2001a): Amman, 25-VII-1958; 20-VIII-1958; 8-IV-1958; 5-IV-1958; 12-19-III-1958; 30-V-1958; 10-VI-1958; 19-VI-1959; 10-VI-1959; 7-IX-1967; 8-V-1963; 14-VIII-1966; Jarash, 13-VI-1963; Fuhays, 3-VIII-1958; Rusayfah, 12-VI-1963; Aqabah, 19-XI-1966. HACKER & SCHREIER (2001b): Badran, 20 km N Amman, 1000 m, 15-V-1999; Jebel Ajlun, 15 km E Jarash, 1000 m, 22-IV-1999; Wadi of Jebel Sureibit, 1000 m, 12-III-1999; Asraq ed Duruz, 80 km E Amman, 400-m, 22-IV-1999. FABIANO & ZILLI (2001): Qa ed Disa, 30-IV-1996; Iraq el Amir, 29-III-1995; Jebel el Khalal, 21-IV-1995. KRAVCHENKO *et al.* (2015b): from all vegetation areas. STADIE & LEHMANN (2012): Wadi Rayyan (1); Fayfa (1); Dana Nature Reserve (4); Fayfa, 23-III-2009 (1).

Distribution: Mediterranean-Turanian, north Africa, Southern Europe, near and Middle East and Central Asia.

Bionomics: Tri- or multivoltine. The larvae are oligophagous on Asteraceae (Compositae) including *Helichrysum*, *Carduus* and *Carlina*.

## HYPENINAE

*Hypena obsitalis* (Hübner, [1813])

Specimens: Ash-Shaumari Reserve, 24-V-2010 (1).

Previous Records: HACKER & SCHREIER (2001a): Madaba, 30-VIII-1968. KRAVCHENKO *et al.* (2015b) from oak – oak / pine forest areas.

Distribution: Mediterranean-Iranian, north Africa, Southernmost central and Eastern Europe, Mediterranean basin, Iran Iraq and the Levant.

Bionomics: Multivoltine, every month except the cold winter season in the mountains. The larva feeds on *Parietaria* and *Urtica*. This is a characteristic species of the Mediterranean evergreen sclerophyllous forest.

## Discussion

This paper presents the result of a several years of collecting moths from the different parts of Jordan. With the two new records, the Erebidae of Jordan currently includes 96 species. The total number of collected species (20 species) is less than that recorded by KRAVCHENKO *et al.* (2015b) (94 species). This is most likely due to the more extensive collecting by KRAVCHENKO *et al.* (2015b) especially the large number of mobile light traps which were moved on daily basis, in addition to the use of permanent light traps that were moved from year to year. This shows that the use of mobile light traps could be very important in sampling sites far from inhabited areas such as forests and desert areas. In addition, KRAVCHENKO *et al.* (2015b) collected for 12 years which is double the time period of this research project.

Some of the collected species were apparently rare such as *Catocala olgaorlovae*, *Catocala diversa* and *Apopestes spectrum*. However, some of the collected species may be agricultural pests such as *Dysgonia torrida* on *Zea mays* and *Catocala* species that may reach outbreak situations in some oak forests.

KRAVCHENKO *et al.* (2015a) discussed many aspects of the Erebidae of Jordan and mentioned that Most of the Erebidae of Jordan were found in one phytoecological zone such as species of *Anumeta* and *Clytie* which occurred in southern Jordan Valley. *Catocala* and *Minucia* species were monophagous on broad leaved trees. Species of *Eublemma* occurred in all vegetation zones of Jordan. The Jordanian Erebidae composed about two thirds of the Levantine species. The Eremic elements represent 84%, the Irano-Turanian 75%, the Mediterranean 51% and the Palearctic 35%. Almost half of the species were uni-voltine flying in March / April while the other species were found to be multi-voltine with at least two flight peaks in March / April and in October / November.

Future studies of the Erebidae of Jordan may be directed towards finding new records that may



be found when a more extensive collecting in areas not satisfactorily surveyed like the northern and southern oak forests, some areas near the southern tip of the Dead see, Wadi Arabah, Aqaba, and the eastern desert. The unknown food plants for the immatures may be studied to determine the ecological status of such species especially in natural reserves from which the species were collected. Using other collecting methods such as sugar baits on robes and use of fermenting fruit traps may reveal new records for diurnal moth species.

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