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The Apameini of Israel (Lepidoptera: Noctuidae)

V. D. Kravchenko, M. Fibiger, J. Mooser, A. Junnila & G. C. Müller

Abstract

In Israel, 20 species of tribe Apameini belonging to 10 genera have been found to date. Four species are endemic of the Levant (*Sesamia ilonae*, *Luperina kravchenkoi*, *Gortyna gyulaii* and *Lenisa wiltshirei*). Others are mostly Palaearctic, Mediterranean, Iranian and Irano-Turanian elements. Grassland species of the Apameini are mainly associated with the Temperate region and are univoltine with highest rate of occurrence in May, or in autumn. Most wetland and oases species are multivoltine and occur in oases and riverbeds over the country, though few of the species are extremely localized. The *S. ilonae* is presently known only from northern area of the Sea of Galilee, while *A. deserticola* is from oases of the Dead Sea area. Four species inhabit the higher altitudes of Mt. Hermon.

KEY WORDS: Lepidoptera, Noctuidae, Apameini, zoogeography, Israel.

Los Apameini de Israel (Lepidoptera: Noctuidae)

Resumen

20 especies de la tribu Apameini que pertenecen a 10 géneros, han sido encontradas, hasta la fecha, en Israel. Cuatro especies son endémicas del Próximo Oriente (*Sesamia ilonae*, *Luperina kravchenkoi*, *Gortyna gyulaii* y *Lenisa wiltshirei*). Otras son principalmente elementos Paleárticas, Mediterráneas, Iránicas e Irano-Turánicas. Las especies de las praderas de Apameini están relacionadas con regiones templadas y son univoltinas con una mayor abundancia en mayo o en otoño. La mayoría de las especies en las zonas húmedas y en los oasis, son multivoltinas y se localizan en los oasis y en los lechos de los ríos del país, aunque son pocas las especies extremadamente localizadas. *S. ilonae* es actualmente conocida sólo de la zona norte del Mar de Galilea, mientras que *A. deserticola* es de los oasis del Mar Muerto. Cuatro especies habitan en las zonas más altas del Monte Hermon. PALABRAS CLAVE: Lepidoptera, Noctuidae, Apameini, zoogeografía, Israel.

Introduction

Within the Israeli-German project for the study of the Israeli Lepidopteran fauna, intensive collecting was conducted from 1986-2004. This project was a joint effort of the Tel Aviv University, the Hebrew University, the Nature Reserves and Park Authority of Israel, the Zoologische Staatssammlung Munich in Germany and the Museum Witt, Munich, Germany.

The Geography of Israel

Israel is located in the eastern part of the Mediterranean Basin in the northern part of the Syrian East African Rift Valley. In contrast to the more uniform and monotonous landscapes of the Levant, Israel is morphologically distinctive with a large variety of different habitats (KOSSWIG, 1955). The northern part of Israel includes Mt Hermon (2200 m above sea level) with annual snow and typical

Tragacanth vegetation, while the Dead Sea area is about 400 m below sea-level with Ethiopian pockets rich in afro-tropical fauna and flora (ZOHARY & ORSHANSKY, 1949). The centre of the country is Mediterranean while in the south and east Irano-Turanian grassland and deserts are found. The Arava Valley and the Negev are known for numerous natural and artificial oases. In consequence of these alternating geographical and climatic zones, a rich fauna and flora of different origin could establish itself (ZOHARY, 1962, 1966). Many species in Israel are found at their furthest point of geographical distribution (BODENHEIMER, 1932; FURTH, 1975; JAFFE, 1988). Israel can be divided into five Phyto-geographic regions (ZOHARY, 1966).

The Mediterranean temperate Zone covers those areas that receive an annual average precipitation of 350 mm or more. The hills of Jerusalem and the coastal plain at the same latitude are the most southern parts of the Mediterranean territory in the Near East (ZOHARY, 1962). The Mediterranean vegetation is divided into two distinct types: That of the hills and that of the coastal plain. In the hills with its higher precipitation (about 500-700 mm) maquis is dominant. Today, most of the coastal plain consists of agricultural areas and human habitation.

The Irano-Turanian Zone is a semi-arid area, a dry steppe or desert steppe, which stretches from its southwest border in Israel through Iran, Turkestan and inner Asia to the Gobi desert. The average annual rainfall is 200-300 mm during winter only. Low brush or dwarf bushes with *Artemisia* plant associations are characteristic for this region.

The Saharo-Arabian eremic zone is a true desert which centres on the Arabian Peninsula. Winter rainfall of up to 200 mm is followed by a short period of blooming, and afterwards the vegetation dries rapidly up. The vegetation is very sparse averaging over large areas in one plant per one to ten square metres (KUGLER, 1988).

The Ethiopian tropical zone in Israel is only represented in small enclaves in the lower Jordan valley, the Dead Sea area and the Arava Valley where they are surrounded by extreme desert or halophytic vegetation. High temperature, abundant fresh water and rich soil conditions are typical of these oases (ZOHARY & ORSHANSKY, 1949).

The Tragacanth high altitude zone is restricted to the peak of Mt. Hermon (above 1900 m). Snow coverage with very low temperatures in winter and hot, dry summer create specific plant communities dominated by spiny, round, dense, cushion like shrubs such as *Astragalus* and *Onobrychis*. The main water source in this area is melting snow, consequently most of this karstic mountain area is rather arid. Different types of forest are only found along the foothills and within canyons.

Tribe Apameini Guenée, 1841

Larvae of this tribe feed as cutworms or borers on monocots (FIBIGER & LAFONTAINE, 2005). The tribe Apameini is well represented throughout the Holarctic region; in Europe there is about 110 species (ZILLI, RONKAY & FIBIGER, 2005) while in Israel, 20 species have hitherto been recorded. Most of the Apameini species belong to genus *Apamea* Ochsenheimer, 1816, with some 60 species currently recognized in the Nearctic region and 90 in the Palaearctic region. The larvae are usually polyphagous, preferring Poaceae, but they also feed on Cyperaceae and Juncaceae (ZILLI RONKAY & FIBIGER, 2005).

Material and methods

From 1986 to 2005, members of this project put forth an intensive effort to collect Lepidoptera using generator powered mobile light traps (250 Watt bulbs HQL & ML) for approximately 3000 nights and an additional extensive network of permanent light traps (220V 20W Black light UVB & UVC tubes) was maintained for approximately 1500 nights. Traps were relocated on an annual basis. From year to year 10-34 traps were operated.

Faunistic survey of the Apameinae

Apamea monoglypha (Hufnagel, 1766)

Distribution: Palaearctic. Widespread in Europe, in the East to Siberia and China, in the South to

Turkey, Iran, Israel, Lebanon, Syria and Cyprus. In Israel, rare and local in the temperate region: medium elevations of Mt. Hermon, Golan Heights and upper Galilee.

Bionomics: in Israel a univoltine spring grassland species, collected so far only in April; in Europe flying from June to September. Host-plants: roots of Poaceae (Gramineae) grasses, including *Bromus*, *Elymus*, *Festuca*, *Deschampsia*, *Lolium*, *Calamagrostis*, *Corynephorus*, *Brachypodium* and *Dactylis* spp.

Apamea syriaca (Osthelder, 1933)

Distribution: Mediterranean-Iranian, disjunct. Spain, France, southeastern Europe, Turkey, Levant, Iran, Iraq, Israel, Lebanon, Syria and Cyprus. In Israel: all over the temperate and semi-arid regions. Abundant in the temperate region, especially in the Sea of Galilee area, Hula Valley, Golan Heights and Galilee; in the semi-arid region rare.

Bionomics: in Israel probably bivoltine grassland species, flying all year round with the highest rates of occurrence from April to May and from November to December. Host-plants unknown, probably the roots of Poaceae, like in other congeners.

Apamea polyglypha (Staudinger, 1892)

Distribution: Iranian. Southeastern Turkey, Iran, Israel, Syria and Jordan. In Israel: widespread but rare in the temperate and semi-arid regions: preferring medium elevations, especially Golan Heights and Judean Desert.

Bionomics: in Israel a univoltine spring steppe species, flying from April to May. Host-plants unknown, probably roots of Poaceae (Gramineae), like in other congeners.

Apamea leucodon anatolica (Rebel, 1933)

Distribution: Irano-Turanian. From Mongolia to Turkmenistan, southern Siberia, Kazakhstan, Ukraine, Caucasus, Transcaucasia, Turkey, southwestern Iran and Israel. In Israel: rare and local in the temperate region: upper Golan Heights (El Rom area).

Bionomics: in Israel a univoltine spring steppe-dwelling species collected so far only in May. Host-plants: unknown, probably roots of Poaceae (Gramineae), like in other congeners.

Apamea platinea armena (Eversmann, 1856)

Distribution: West-Palaeartic. Morocco, Southern and Central Europe, Turkey, Armenia, Levant, Iran, Turkmenistan and Transcaucasia, Lebanon and Israel. In Israel: rare and local in the temperate region: medium and higher altitudes of Mt. Hermon.

Bionomics: in Israel a univoltine a montane steppe species collected so far only in June. Host-plants: unknown, probably roots of Poaceae (Gramineae), like in other congeners.

Apamea anceps ([Denis & Schiffermüller, 1775])

Distribution: Palaeartic. Widespread in Europe, North Africa, Turkey, Levant, in the East to Central Asia, Siberia, Mongolia and China, Israel and Lebanon. In Israel: rare and local in the temperate region: medium and higher altitudes of Mt. Hermon.

Bionomics: in Israel an univoltine, late spring a montane steppe species flying from May to June. Host-plants: polyphagous on Poaceae (Gramineae) including *Dactylis* and *Brachypodium*; in Kazakhstan a minor pest of corn.

Mesoligia literosa subarctica (Staudinger, 1898)

Distribution: West-Palaeartic. From Morocco, Algeria, Europe, Turkey, Iran, Levant and Iraq to Central Asia, southwestern Siberia and the western Himalayas, Israel, Lebanon and Syria. In Israel: rare and local in the temperate region.

Bionomics: in Israel a univoltine, late spring-summer a grassland species flying from May to July.

Host-plants: polyphagous on various Poaceae (Gramineae) including *Elymus arenaria*, *Dactylis glomerata*, and *Carex* spp.

Luperina dumerilii sancta (Staudinger, 1892)

Distribution: Mediterranean. Mediterranean basin, including the Levant, in the North to the southern parts of Central and Eastern Europe, Israel, Jordan and Cyprus. As migrant as far North as England. In Israel: uncommon in the semi-arid and temperate regions, mainly along the Rift Valley and the upper part of the Judean Desert, in the North to the medium elevations of Mt. Hermon and its adjacent parts both of the Golan Heights and the Galilee, over the northern Coastal Plain, local.

Bionomics: in Israel a univoltine autumn grassland species flying from September to January with the highest rate of occurrence in November. Host-plants: unknown, probably on roots of Poaceae.

Luperina kravchenko Fibiger & Müller, 2005

Distribution: endemic to the Levant, recorded only from Israel. In Israel: in the temperate region: uncommon on the Golan Heights and at the medium to higher elevations of Mt. Hermon; rare on Mt. Meron (Galilee).

Bionomics: in Israel a univoltine autumn montane steppe species flying from September to November. Host-plants: unknown, probably roots of Poaceae (Gramineae), like in other congeners.

Luperina rjabovi (Kljutschko, 1967)

Distribution: Iranian. Daghestan, Caucasus region, Transcaucasia, central and southern Turkey, and Levant and Israel. In Israel: locally common in the temperate region: upper Galilee, especially medium and higher elevations of Mt. Hermon, and the adjacent parts of the Golan Heights.

Bionomics: in Israel a univoltine autumn grassland species flying from September to October. Host-plants: unknown, probably roots of Poaceae (Gramineae), like in other congeners; in Azerbaijan a minor pest of corn.

Margelana flavidior F. Wagner, 1931

Distribution: Iranian. Turkey, Levant, Iran, Turkmenistan, Afghanistan and Israel. In Israel: uncommon and local in the temperate region: Mt. Hermon, above 1800 m a.s.l.

Bionomics: in Israel a univoltine autumn tragacanth-dwelling species flying from September to October. Host-plants: unknown.

Gortyna gyulai Fibiger & Zahiri, 2007

Distribution: endemic to the Levant, known from Israel and Syria. In Israel: rare and local in the temperate region: along the Hula Valley to the foothills of Mt. Hermon.

Bionomics: in Israel a univoltine autumn wetland species flying from September to October. Host-plants: unknown, probably endophagous within the stems of large biennial or perennial herbaceous plants, like *Cirsium gaillardotii*, *C. phyllocephalum* and *Onopordum carduiforme* (all Asteraceae = Compositae) like European sister-species *Gortyna flavago* ([Denis & Schiffermüller], 1775).

Oria musculosa (Hübner, 1809)

Distribution: Mediterranean-Turanian. From Southern Europe, (southernmost) Central Europe and Morocco across northern Africa to Turkey, Levant, Iraq, Iran, in the East to Central Asia and Afghanistan, Israel, Lebanon, Syria, Jordan and Cyprus. In Israel: widespread but only locally common all over the temperate and semi-arid regions.

Bionomics: in Israel a univoltine, late spring species grassland species flying from March to June with the highest rate of occurrence in May. Host-plants: mainly on *Calamagrostis epigeios*; in southern Russia a minor pest of various wheat species; according to SHETKIN (1965), in Uzbekistan the eggs laid on old dry stems of cereals during autumn, the young larvae remaining in their eggs until early spring, and hatching after the appearance of the first fresh shoots.

Nonagria typhae (Thunberg, 1784)

Distribution: West-Palaeartic. From all over Europe and parts of North Africa to the Near and Middle East, Turkmenistan, Uzbekistan, western Siberia, Israel, Lebanon and Cyprus. In Israel: widespread but always rare; in the temperate region probably in all lowland areas with suitable habitats, over the Coastal Plain, especially in the 'En Afeq Nature Reserve and near Tel Aviv, along the Jordan Valley at Hammat Gader and in the Jordan River Park, in the Dead Sea area at 'En Fashkha, Enot Quane and Ne'ot Hakikkar, and even in the Negev but here confined to deep canyons and oases with water and suitable host-plants, like in 'En Avedat.

Bionomics: in Israel a univoltine, late spring-summer wetland species flying from May to July with the highest rate of occurrence in June; in Central Europe flying from July to September. Host-plants: in stems of *Typha* and *Schoenoplectus* spp.

Lenisa geminipuncta (Haworth, 1809)

Distribution: European-West Asiatic. Europe, Turkey, Levant, Iraq and Transcaucasia, Israel, Lebanon, Syria and Cyprus. In Israel: rare and local in the temperate region: the Hula Valley, along the River Jordan to the Sea of Galilee.

Bionomics: in Israel a univoltine, late spring wetland species flying from late April to mid-June; in Europe multivoltine, a summer species flying from July to September, larvae feeding from May to July. Host-plants: larvae endophagous in stems of *Phragmites australis* (Poaceae = Gramineae).

Lenisa wiltshirei (Bytinski-Salz, 1936)

Distribution: endemic to the Levant. Known from Israel, Lebanon and Syria. In Israel: rare and very local in the temperate region: central Coastal Plain, near Yavne. No records since the 1980's.

Bionomics: in Israel a univoltine summer wetland species collected so far only in June. Host-plants: unknown, probably endophagous in stems of *Phragmites*, like in other congeners.

Arenostola deserticola modesta (Staudinger, 1900)

Distribution: (West-) Eremic. From the western Sahara across North Africa to Israel and Jordan. In Israel: uncommon and local in the arid region: oases of the Dead Sea area and of the northern Arava Valley; one of the type specimens collected in the late 1890's by Bacher near 'Jordan (river)'.

Bionomics: in Israel multivoltine wetland species flying from February to November with the highest rates of occurrence in January, from April to May and from July to August. Host-plants: unknown.

Sesamia ilonae Hacker, 2001

Distribution: probably endemic to the Levant. Recorded only from Israel. In Israel: rare and very local in the temperate region: northern area of the Sea of Galilee.

Bionomics: in Israel probably a univoltine spring wetland species collected so far only in April. Host-plants: unknown, probably herbaceous plants, like in other *Sesamia* species.

Sesamia cretica Lederer, 1857

Distribution: Mediterranean-Turanian, with extension into the transitional zone to the Afro-tropical region. Widespread in the Mediterranean basin, throughout North Africa from Canary Islands to Egypt, Sudan, Ethiopia, Somalia, Levant, Turkey, Arabian Peninsula, Caucasus region and Transcaucasia, Iran, Iraq, Turkmenistan, Israel, Lebanon, Jordan and Sinai (Egypt). In Israel: all over the country in all climatological regions. Fairly common in lowlands, especially in the temperate part of the Rift Valley, the Hula Valley and the area of the Sea of Galilee, and over the southern and central Coastal Plain; at medium and higher altitudes rare and local.

Bionomics: in Israel multivoltine wetland species flying from April to November with the highest rates of occurrence from April to June, in August, as well as from September to November; larvae observed in April, May, July, September and November, larvae overwintering in the stems of their host-

plants near the ground; the number of generations per year is an adaptive feature depending on the availability of food and on local climate (RONKAY *et al.*, 2001); in Southern Europe probably 3 - 4 generations, in the southernmost part of the distribution range (Africa) possibly up to 12 generations per year (RONKAY *et al.*, 2001). Host-plants: in Israel polyphagous on numerous species of the family Poaceae (Gramineae), often a common pest of sorghum, corn, kafir-corn, sesame, wheat and others, in natural habitats found so far only on *Arundo donax* (RONKAY *et al.*, 2001).

Sesamia nonagrioides (Lefèbvre, 1827)

Distribution: Afro-tropical. From Southern Europe to Turkey, Israel, Arabian Peninsula, Mauritania, Egypt, Somalia, tropical and subtropical Africa. Probably introduced with agricultural products to Southeast Asia and the southern parts of China. In Israel: locally common along the Rift Valley, through all of the climatological regions, from the northern Arava Valley to the Hula Valley.

Bionomics: in Israel at least bivoltine wetland species flying from March to July and in October. Host-plants: polyphagous on numerous species of the family Poaceae (Gramineae), a common pest of maize, sorghum and other crops.

Results and discussion

In Israel, 20 species belonging to 10 genera have been found to date. Most species belong to four genera *Apamea* (six species), *Luperina* (three species), *Sesamia* (three species) and *Lenisa* (two species). Another six genera include one species each. Six species are Palaearctic elements. The Mediterranean group includes four species, the Iranian and Irano-Turanian account for four, and four additional species are endemic of the Levant (*Sesamia ilonae*, *Luperina kravchenkoi*, *Gortyna gyulaii* and *Lenisa wiltshirei*). The Eremic and Afro-tropical groups include one species each. Grassland species of the Apameini develop on roots of Poaceae and are univoltine with highest rate of occurrence in May (such as *Apamea* sp., *M. literosa*, and *O. musculosa*), or in autumn (such as *Luperina* sp., *M. flavidior*). They are mainly associated with the Temperate region, though four species penetrate the semi-Arid region (*O. musculosa*, *A. syriaca*, *L. dumerilii*, and *A. polyglypha*). Four species (*A. anceps*, *A. platinea*, *M. flavidior*, *L. kravchenkoi*) inhabit the higher altitudes of Mt. Hermon.

Most wetland and oases species are multivoltine and develop endophagously in stems of reeds and other Poacea. Most (such as *S. cretica* and *N. typhae*) occur in oases and riverbeds over most of the country, though few of the species are extremely localized. The *S. ilonae* is presently known only from northern area of the Sea of Galilee, while *A. deserticola* is from oases of the Dead Sea area.

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