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# The Catocalinae (Lepidoptera: Noctuidae) of Israel

# Catocalinae (Lepidoptera: Noctuidae) Израиля

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КЛЮЧЕВЫЕ СЛОВА: Зоогеография, Lepidoptera, Noctuidae, Catocalinae, Израиль, фауна, экология.

ABSTRACT: The distribution, flight period and abundance of 82 species in 42 genera of Catocalinae revealed in Israel by intense light trapping over the past 18 years are summarized, including ten species new to the fauna of the country: *Catocala conjuncta, Clytie delunaris, Epharmottomena eremophila, Armada nilotica, Armada maritima, Tarachephia hueberi, Aedia leucomelas, Autophila anaphanes, Scoliopterix libatrix* and *Acantholipes circumdata*. Only four species recorded previously have not been found in this survey: *Minucia wiskotti, Autophila limbata, Anomis sabulifera* and *Rivula tanitalis*. Of all the species recorded, 38 are Eremic, 37 Palearctic and 11 tropical in origin. The greatest species diversity (54) was found in arid areas, less (30) in the temperate zone. The distribution pattern, phenology, ecology and the association of these species with the main phytogeographical zones of Israel are described.

РЕЗЮМЕ: Обобщены данные о распределении, периоде лёта и обилии 82 видов из 42 родов совок подсемейства Catocalinae, выявленных в Израиле интенсивными учётами световыми ловушками за последние 18 лет, в т.ч. 10 видов, новых для фауны страны: *Catocala conjuncta, Clytie delunaris, Epharmottomena eremophila, Armada nilotica, Armada maritima, Tarachephia hueberi, Aedia leucomelas, Autophila anaphanes, Scoliopterix libatrix* и *Acantholipes circumdata*. Лишь четыре ранее отмеченных вида отсутствовали в наших сборах: *Minucia wiskotti, Autophila limbata, Anomis sabulifera* и *Rivula tanitalis*. Среди отмеченных видов 38 относятся к эремическим, 37 — к палеарктическим и 11 — к тропическим по происхождению. Самое высокое видовое разнообразие катокалин (54) характерно для аридных территорий, меньшее (30) — для умеренной зоны. Для всех видов описаны тип ареала, фенология, экология и связь с основными фитогеографическими зонами Израиля.

## Introduction

Israel is located in the eastern part of the Mediterranean Basin in the northern part of the Syrian East African Rift Valley. The character of the country is mainly determined by the position within the Mediterranean zone as a crossroads between three continents and two oceans and by being a boundary of cultivated land and desert. Because of the alternating geographical and climatic zones, Israel supports plants and animals of very different origins; it also provides range limits to many species.

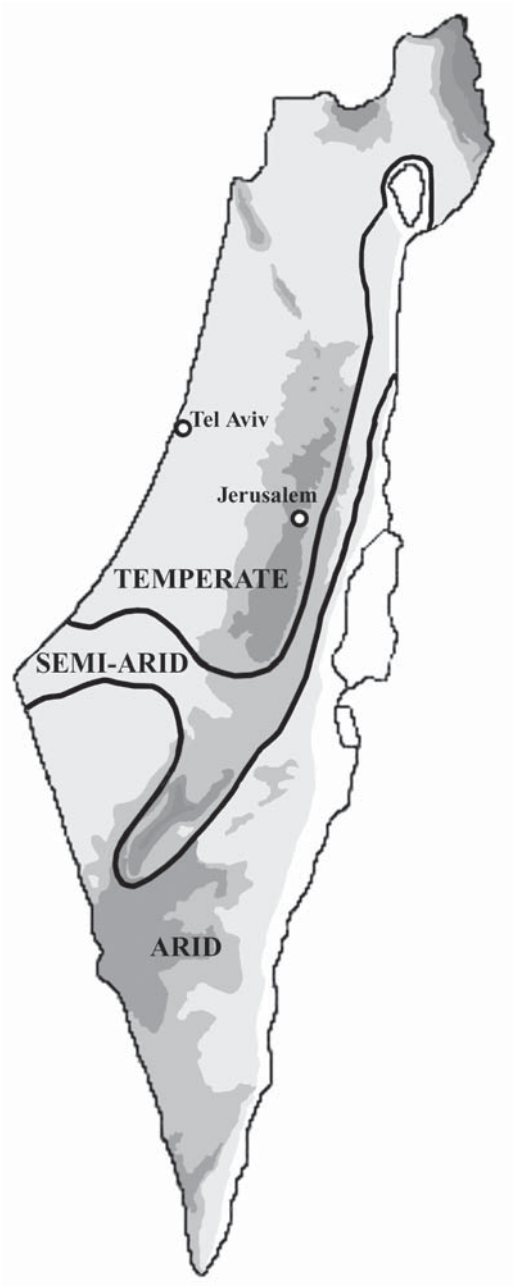
The northern part of Israel includes Mt. Hermon 2,200 m above sea-level with tragacanth vegetation on the top, while the Dead Sea is 400 m below sea-level. The area of temperate climatic zones (see Map) is a Mediterranean part with dry and warm summers and rainy and mild winters. The semi-arid region includes a steppe area with mostly Irano-Turanian faunas and floras. The arid region is a part of the eremic Saharo-Arabian District with high temperatures, low and irregular precipitations and poorly covered with vegetation [Kugler, 1988].

Catocalinae are one of the largest subfamilies of the family Noctuidae. The global number of species is estimated at about 7000 [Speidel at al., 1996], most of them occurring in the tropics. Thus, 35 species have been recorded in Central Europe [Nowacki, 1998], 66 in the Balkans [Hacker, 1989], 42 in Iraq [Wiltshire, 1957] and 127 in Saudi Arabia [Wiltshire, 1990].

In the early 20th century, 42 species of Catocalinae were known from Israel, summarized by Amsel [1933]. Since then a further 13 species were added. In this survey, another 31 species have been added, 21 of which have already been published elsewhere [Hacker et al., 2000; Kravchenko et al., 2001; Hacker & Schreier, 2001]. In this study, a complete checklist of the currently known Catocalinae of Israel is presented, including ten species new to the fauna of the country.

## Material and methods

In the framework of a joint Israeli–German project for the study of the Israeli fauna of Lepidoptera, intense 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 and the Zoologische Staatssammlung Munich in Germany. Material was deposited in the National Entomological Collection, Tel Aviv University and the Zoologische Staatssammlung Munich. Lepidoptera were collected during a period of 18 years totalling about 3000 nights of mobile light traps powered by generator (250 W bulbs HQL & ML) and about 1500 nights of mobile light trap systems powered by batteries (12V 8 W & 20W 6 V 4 W Black light UVB tubes) moved on a daily basis. In addition, an intense network of permanent light traps (220V 20W Black light UVB & UVC tubes) was maintained. Traps were relocated on an annual basis. From year to year, 10–34 traps were operated.




Map. Climatic regions of Israel (after Jaffe [1988], modified).
Карта. Климатические районы Израиля (по Jaffe [1988], с изменениями).

Characterization of abundance:

Rare: less than 10 specimens per year at all sites.

Fairly common: an average of 11–50 specimens per site per year and in less than 20% of the collecting sites in the zone of occurrence.

Common: an average of 51–200 specimens per site per year and from 20 to 60% of the collecting sites in the zone of occurrence.

Abundant: an average of more than 200 specimens per site per year and in more than 60% of the collecting sites in the zone of occurrence.

Local: only found in one zone in less than 4 locations.

Locally common: in less than 20% of the surveyed sites.

Locally abundant: in more than 20% of the surveyed sites.

Species, recorded in the Israel fauna for the first time mark off by '*' .

In this paper, the order of presentation follows that of Hacker [2001].

## Faunistic survey of the subfamily Catocalinae

### 1. *Catocala lesbia* Christoph, 1887

DISTRIBUTION. Irano-Turanian. Throughout the Middle East in regions without severe winters. In Turkey, it only occurs in lowlands southeast of the Anatolian Plateau [Hacker, 2001]. In Iraq, it is typically found in oases at desert foothills [Wiltshire, 1957], reaching Sinai and Egypt in the south. In Israel it is local and rare in the Rift Valley and the Negev (‘En Ziq), inhabiting oases with poplar trees.

BIONOMICS. Univoltine, summer, oasis species. In Iraq, the moth is supposedly bivoltine [Wiltshire, 1957]. Flight period: June to September. Host plant: larvae are monophagous on *Populus euphratica*.

### 2. *Catocala elocata* (Esper, 1787)

DISTRIBUTION. Ponto-Mediterranean. Widespread from Central and Southern Europe to the Near and Middle East and Central Asia. In Israel: in dense riverine forests/thickets in the north of the Temperate zone (Nahal Keziv, Tel Dan Nature Reserve). Rare.

BIONOMICS. Univoltine, summer, riverine, sylvicolous species. Flight period: June to August. Host plants: the larva feeds on *Populus* and *Salix*.

### 3. *Catocala puerpera* (Giorna, 1791)

DISTRIBUTION. Ponto-Mediterranean. Widespread in the Mediterranean and sub-Mediterranean zones of the Near and Middle East and in northern

Africa. In Israel: represented by the subspecies *syriaca* Schultz, 1909. So far found only in the Rift Valley, in oases with poplar trees, mainly in the Dead Sea area (Ne'ot Ha Kikar), the Jordan Valley and the Hula Valley (Banyas Nature Reserve). Local and rare.

BIONOMICS. Univoltine, summer, riverine, sylvicolous, oasis species. Flight period: May to June. Host plants: in the Dead Sea area, larvae feed on *Populus euphratica*.

4. *Catocala conjuncta* (Esper, 1787) *

DISTRIBUTION. Mediterranean. Southern Europe, Turkey and northern Africa. Throughout the Mediterranean sclerophyllous forest zone. In Israel: oak forests at medium and higher elevations of the Temperate zone (Carmel Mt. Ridge, Mt. Meron, Mt. Hermon). Rare.

BIONOMICS. Univoltine, summer, sylvicolous species. Flight period: July to October. Host plants: larvae are monophagous, feeding on oaks.

5. *Catocala conversa* (Esper, 1787)

DISTRIBUTION. Mediterranean. Throughout the Mediterranean sclerophyllous forest zone and parts of the sub-Mediterranean zone. In Israel: oak forests at medium and higher elevations. Fairly common.

BIONOMICS. Univoltine, summer, sylvicolous species. Flight period: June to August. Host plants: larvae are monophagous, feeding on oaks.

6. *Catocala nymphagoga* (Esper, 1787)

DISTRIBUTION. Mediterranean. Throughout the Mediterranean sclerophyllous forests zone. In Israel: in all oak forests of the Temperate zone. Abundant.

BIONOMICS. Univoltine, summer, sylvicolous species. Flight period: June to August. Host plants: larvae are monophagous, feeding on oaks.

7. *Catocala hymenaea* (Denis & Schiffermüller, 1775)

DISTRIBUTION. Ponto-Mediterranean. From the Middle East to western Asia. In Israel: from the foothills of Mt. Hermon to the peak, also the adjacent parts of Upper Galilee (Mt. Meron). Rare.

BIONOMICS. Univoltine, summer, sylvicolous species. Flight period: May to July. Host plants: larvae are monophagous, feeding on *Prunus* spp.

8. *Catocala (Ephesia) nymphaea* (Esper, 1787)

DISTRIBUTION. Ponto-Mediterranean. From the European zone of Mediterranean sclerophyllous forests in the West to Afghanistan and Kashmir in the East. In Israel: forests of the Judean Mountains. Rare.

BIONOMICS. Univoltine, summer, sylvicolous species. Flight period: June to August. Host plants: larvae are monophagous, feeding on oaks.

9. *Catocala (Ephesia) diversa* (Geyer, 1828)

DISTRIBUTION. Ponto-Mediterranean. Spain, southeastern France, Italy, the Balkans and the European part of southern Russia. In Israel: from the foothills of Mt. Hermon up to 1600 m, also the adjacent parts of Upper Galilee (Mt. Meron). Rare.

BIONOMICS. Univoltine, summer, sylvicolous species. Flight period: May to July. Host plants: larvae are monophagous, feeding on oaks.

10. *Catocala (Ephesia) separata* (Freyer, 1848)

DISTRIBUTION. Mediterranean. The southern Balkans, Macedonia, Greece, the Mediterranean part of southern Turkey and the Levant. In Israel: oak forests of the Carmel Mt. Ridge and the Galilee.

BIONOMICS. Univoltine, summer, sylvicolous species. Flight period: May to July. Host plants: larval development probably on oaks.

11. *Catocala (Ephesia) eutychea* (Treitschke, 1835)

DISTRIBUTION. Mediterranean. East Mediterranean, especially in the Balkans. In Israel: oak forests all over the Temperate zone. Rare.

BIONOMICS. Univoltine, summer, sylvicolous species. Flight period: June to August. Host plants: larvae are monophagous, feeding on oaks.

12. *Ulotrichopus tinctipennis stertzi* (Püngeler, 1907)

DISTRIBUTION. Afro-Tropical. Widespread in the tropical part of southern, western and eastern Africa; in the north to Sudan, Egypt, Israel, Jordan and the Arabian Peninsula. In Israel: arid parts of the Rift Valley (Arava Valley and Dead Sea area). Rare.

BIONOMICS. Univoltine, winter, deserticolous species. Flight period: December to April. In Yemen, in April and June [Hacker, 2001]. Host plants: unknown.

13. *Minucia lunaris* (Denis & Schiffermüller, 1775)

DISTRIBUTION. Ponto-Mediterranean. From the southern shores of the Baltic Sea to Morocco, Algeria, Israel, Jordan and Iran. In Israel: oak forests of Mt. Meron and Mt. Hermon. Rare and local.

BIONOMICS. Univoltine, early summer, sylvicolous species. Flight period: March to June. Host plants: larvae feed on oaks.

14. *Minucia wiskotti* (Püngeler, 1902)

DISTRIBUTION. Probably endemic to the mountains flanking the Rift Valley. Described from Jerusalem (Judean Mt.), not recorded since. Recently, commonly found in an oak forest across the Rift Valley at higher elevations (1000 m) in the Jordanian Mountains of Moab (unpublished data of the authors).

BIONOMICS. Probably univoltine, early summer, sylvicolous species. Flight period: in Jordan, all specimens have been collected in May. Host plants: unknown, probably oaks.

15. *Crypsotidia maculifera* (Staudinger, 1898)

DISTRIBUTION. Afro-Tropical. Israel, Egypt, Sudan, Ethiopia, Nigeria. In Israel: all over the Mediterranean zone. Rare.

BIONOMICS. In Israel, probably univoltine, early summer, sylvicolous species. Flight period: in Israel, March to May. In southern Egypt, from May to June, in Sudan from March to August [Hacker, 2001]. Host plants: unknown.

16. *Ophiusa tirhaca* (Cramer, 1777)

DISTRIBUTION. Paleotropical. Throughout Africa, the Mediterranean Basin and most of the Oriental tropics and subtropics. In Israel: all over the country. Fairly common.

BIONOMICS. Multivoltine (in Israel), ubiquitous species. Migrant. Flight period: throughout the year; uncommon from July to October. Host plants: larvae feed on trees: *Rhus coriaria*, *R. cotinus*, *Pistacia lentiscus*, *Cistus*, *Myrtus*, *Pelargonium* and others. Its biology in Israel was described by Berlinger et al. [2001].

17. *Clytie illunaris* (Hübner, 1813)

DISTRIBUTION. Mediterranean. France, Spain, North Africa and the Arabian Peninsula. In Israel: only a few specimens have been collected in oases in the southern part of the Dead Sea (Ne'ot Ha Kikar).

BIONOMICS. Multivoltine, oasis species. Flight period: in Israel all specimens were taken in November. Host plants: unknown, larvae probably monophagous, feeding on *Tamarix* sp. [Hacker, 2001].

18. *Clytie sancta* (Staudinger, 1898)

DISTRIBUTION. Afro-Eremic. Throughout the deserts of North Africa, including central Sahara and the Arabian Peninsula. In Israel: all over the Arid zone and Coastal Plain. Abundant.

BIONOMICS. Probably multivoltine, oasis species. Flight period: all the year round, peak in April to May and in September to November. Host plants: larvae are monophagous, feeding on *Tamarix* sp.

19. *Clytie syriaca* (Bugnion, 1837)

DISTRIBUTION. Mediterranean. Coastal regions of the eastern Mediterranean Basin. From the Balkans to Turkey, Lebanon, Syria, Israel. In Israel: all over the Arid zone and Coastal Plain. Rare.

BIONOMICS. Bivoltine, oasis species. Flight period: April, May and September. Host plants: in Israel larvae are monophagous, feeding on *Tamarix nilotica*; in Romania, on *Tamarix gallica* and *T. ramosissima* [Rakosy, 1996].

20. *Clytie scotorrhiza* Hampson, 1913

DISTRIBUTION. Irano-Turanian Eremic. Only known from Israel, Sinai, Egypt and Saudi Arabia. In Israel: all over the Arid zone and Coastal Plain. Locally common in oases of the Arava Valley with *Tamarix aphyla*, rare elsewhere.

BIONOMICS. Probably univoltine, oasis species. Flight period: from October through the winter to April. Host plants: unknown, larvae probably monophagous, feeding on *Tamarix* sp., obviously *T. aphyla*.

21. *Clytie haifae* (Habich, 1905)

DISTRIBUTION. Afro-Eremic. Along the North African coast. Algeria, Morocco, Sudan, Egypt, Lebanon, Israel. In Israel: in the coastal sand dunes. Rare.

BIONOMICS. Multivoltine, oasis species. Flight period: March to May and in September. Host plants: larvae are monophagous, feeding on *Tamarix* sp.

22. *Clytie delunaris* (Staudinger, 1889) *

DISTRIBUTION. Irano-Turanian Eremic. Central Asia, Mongolia, Afghanistan, Iran. In Israel: known only from oases in the hottest parts of the Rift Valley (Arava Valley and the Dead Sea area). Locally common.

BIONOMICS. Probably univoltine, oasis species. Flight period: May to July. Host plants: unknown, presumably *Tamarix* sp. [Hacker, 2001].

23. *Clytie arenosa* Rothschild, 1913

DISTRIBUTION. Afro-Eremic. Widespread all over the North African deserts. In Israel: represented by the ssp. *nabataea* Hampson, 1913. Only in oases in the hottest parts of the Rift Valley (Arava Valley and the Dead Sea area). Locally common.

BIONOMICS. Probably univoltine, oasis species. Flight period: April to June. Host plants: unknown, presumably *Tamarix* sp. [Hacker, 2001].

24. *Clytie terrulenta* (Christoph, 1893)

DISTRIBUTION. Irano-Turanian Eremic. Widespread in the Near and Middle East. In Israel: the Rift Valley and the adjacent canyons: 'En Gedi, Wadi Kelt, Jericho, Hammat Gader, the delta of Jordan River at the Sea of Galilee. Rare.

BIONOMICS. Multivoltine, oasis species. Flight period: March to May. Host plants: unknown, probably monophagous feeding on *Tamarix* sp. [Hacker, 2001].

25. *Clytie infrequens* (Swinhoe, 1884)

DISTRIBUTION. Pan-Eremic. All eremic areas from the eastern Sahara through the Arabian Peninsula to Pakistan and India. In Israel: all over the Arid zone and the Coastal Plain. Abundant.

BIONOMICS. Multivoltine, oasis species. Flight period: all year round. Peaks in April to May and in September to November. Host plants: larvae are monophagous, feeding on *Tamarix* sp.; in captivity reared on *T. articulata* [Wiltshire, 1944].

26. *Cerocala sana* Staudinger, 1901

DISTRIBUTION. Saharo-Sindian. Widespread in the Near and Middle East. Northern Africa, Iran, Iraq, Bahrain. In Israel: sandy areas all over the Arid zone and the sand dunes of the Coastal Plain. Locally common.

BIONOMICS. Bivoltine, deserticolous species, psammophile. Flight period: from October thought winter to April. Peaks in November and March. Host plants: larvae are monophagous, feeding on *Helianthemum kahiricum* and *H. lippii* (Cistaceae). Larval development from November to March, feeding at night [Wiltshire, 1962].

27. *Dysgonia algira* (Linnaeus, 1767)

DISTRIBUTION. Ponto-Mediterranean. The Mediterranean and sub-Mediterranean zones of Europe, the Near and Middle East. In North Africa, in Morocco and Algeria. In Israel: all over the Temperate zone. Common at low altitudes, rare or absent at higher elevations.

BIONOMICS. Multivoltine species of shrubs and forest. Flight period: from March through summer to

November. Peaks in May to June and in August to September. Host plants: larvae are polyphagous, feeding on numerous plants, including *Ricinus communis*, *Rubus*, *Salix*, *Genista*, *Lythrum*, *Punica*, *Parietaria* spp.

28. *Dysgonia torrida* (Guenée, 1852)

DISTRIBUTION. Paleotropical and Subtropical. From African tropics and subtropics to Spain, southern Italy, Greece, Syria, Israel, Iran, Uzbekistan. In Israel: around springs of the River Jordan (Tel Dan and Banyas nature reserves), one specimen collected near Jerusalem. Local and rare.

BIONOMICS. Multivoltine, riverine, sylvicolous species. Flight period: May to June and September. Host plants: larvae feed on *Zea mays*, *Ricinus communis* and probably some other plants.

29. *Dysgonia rogenhoferi* (Bohatsch, 1880)

DISTRIBUTION. Irano-Turanian Eremic. Lebanon, Israel, Iraq, Arabia, Turkmenistan, northern Iran, Uzbekistan, the European part of southern Russia, Azerbaijan and Pakistan. In Israel: wetlands at low altitudes in the Temperate zone: Hammat Gader (Sea of Galilee), ‘En Afeq Nature Reserve (northern Coastal Plain), Maagan Mikhael (central Coastal Plain). Local and rare.

BIONOMICS. Probably univoltine, summer, wetland species. Flight period: April to June Host plants: larvae are probably monophagous, feeding on *Tamarix* [Wiltshire, 1951].

30. *Scodionyx mysticus* Staudinger, 1900

DISTRIBUTION. Afro-Eremic. Widespread throughout the Sahara and the Arabian Peninsula. In Israel: all over the Arid zone. Common in *Acacia* stands in the Arava Valley and the Dead Sea area.

BIONOMICS. Univoltine, winter, deserticolous species. Flight period: October to April, peak in January to March. Host plants: larvae monophagous, feeding on *Acacia raddiana* [Wiltshire, 1948].

31. *Prodotis stolida* (Fabricius, 1775)

DISTRIBUTION. Paleotropical and Subtropical. Throughout Africa, most of Asia and Australia. Resident in the Mediterranean Basin from where it migrates to Central and Northern Europe as far as England, Denmark and Finland. In Israel: along the Rift Valley from the Dead Sea to the foothills of Mt. Hermon; local along the Coastal Plain. Rare.

BIONOMICS. Multivoltine, oasis species. Flight period: almost all year round from February to October. Peaks in March to April and in September to October. Host plants: larvae feed on *Rubus*, *Quercus*, *Paliurus*, *Tribulus*, *Coriaria* and other herbs and shrubs.

32. *Prodotis boisdeffrii* (Oberthür, 1867)

DISTRIBUTION. Afro-Eremic. From the northern and western Sahara to Egypt, Israel and Lebanon. In Israel: represented by the ssp. *palaestinensis* (Staudinger, 1898). In oases with halophytic vegetation in the arid part of the Rift Valley (Arava Valley and the Dead Sea area). Locally common and abundant in some of the oases (‘En Zin), always rare in the desert.

BIONOMICS. Multivoltine, oasis, halophilous species. Flight period: in oases throughout the year with three peaks in summer (May, August and October). In the desert, only in March. Host plants: unknown.

33. *Grammodes bifasciata* (Petagna, 1788)

DISTRIBUTION. Afro-Tropical. Madagascar, East Africa, North Africa and other parts of the Mediterranean Basin. In Israel: humid localities in the northern part of the Rift Valley (Hammat Gader, Tel–Dan) and all over the Coastal Plain. Rare.

BIONOMICS. In Israel, probably univoltine, summer, wetland species. In Africa, multivoltine. Flight period: May to August; peak in May to June. Host plants: larvae feed on *Cistus*, especially *C. salviifolius*, as well as on *Polygonum*, *Smilax* and *Rubus* spp.

34. *Anydrophila stuebeli* (Calberla, 1891)

DISTRIBUTION. Irano-Turanian Eremic. Sinai, Egypt, central Arabia, United Arab Emirates, Israel, Jordan. In Israel: northern Arava Valley (Shezaf Nature Reserve; Hazeva). Local and rare.

BIONOMICS. Univoltine, spring, deserticolous species. Flight period: March to May. Host plants: unknown, perhaps *Calligonum comosum* [Falkovitch, 1979].

35. *Anumeta spilota* Ershov, 1874

DISTRIBUTION. Pan-Eremic. From West Sahara to Sinai. Israel, Central Asia, Pakistan and India. In Israel: the Arava Valley. Local and rare.

BIONOMICS. Probably univoltine, spring, deserticolous species. Flight period: most of the specimens have been collected from March to May, with few occurring until September. Host plants: unknown.

36. *Anumeta atrosignata* (Walker, 1858)

DISTRIBUTION. Irano-Turanian Eremic. Widespread in the Arabian Desert, Sinai (Egypt) and Israel. In Israel: the Arava Valley and the Dead Sea area. Fairly common.

BIONOMICS. Probably bivoltine, deserticolous species. Flight period: March to July; peaks in March and May. Host plants: larvae feed on *Calligonum* [Hacker, 2001].

37. *Anumeta straminea* (A. Bang-Haas, 1906)

DISTRIBUTION. Afro-Eremic. Throughout the Sahara and the Arabian Desert to Bahrain and northern Oman. In Israel: the Arava Valley (Grofit, ‘En Zin) and the Dead Sea area (Ne’ot HaKikkar, En Gedi). Specimens from the southern and northern parts of the Arava show different colour patterns. Local and rare.

BIONOMICS. Univoltine, winter, deserticolous species. Probably psammophile. Flight period: December to March; peak in January. In North Africa, there is a second generation in June [Wiltshire, 1990]. Host plants: larvae feed on *Calligonum*. They are adapted to life in

sand dunes, and are able to bury themselves quickly in sand [Wiltshire, 1990].

38. *Anumeta arabiae* Wiltshire, 1961

DISTRIBUTION. Arabian Endemic. Saudi Arabia, Jordan, Israel. In Israel: the Arava Valley. Rare.

BIONOMICS. Probably bivoltine, deserticolous species. Flight period: January to February and in April. Host plants: unknown.

39. *Anumeta asiatica* Wiltshire, 1961

DISTRIBUTION. Irano-Turanian Eremic. Southwestern Iran, Iraq, Kuwait, Saudi Arabia, Oman and the United Arab Emirates. In Israel: in the Arava Valley. Rare.

BIONOMICS. Univoltine, summer, deserticolous species. Flight period: May to August. Host plants: unknown. In the United Arab Emirates, this is probably *Calligonum* [Hacker, 2001].

40. *Anumeta hilgerti* Rothschild, 1909

DISTRIBUTION. Afro-Eremic. Widespread in the deserts of North Africa. From Morocco to the Arabian Peninsula. In Israel: represented by the ssp. *popovi* Wiltshire, 1982. In sandy areas in the southern part of the Arava Valley. Locally common.

BIONOMICS. Univoltine, spring, deserticolous species. Probably psammophile. Flight period: February to May; peak in March. Host plants: unknown.

41. *Pericyma albidentaria* (Freyer, 1842)

DISTRIBUTION. Ponto-Mediterranean. Southeastern Europe, the Near and Middle East, Afghanistan, Iran, Iraq, Syria, Turkey, Cyprus. In Israel: throughout the Rift Valley from the Dead Sea area to the foothills of Mt Hermon (Banyas Nature Reserve), also all over the Coastal Plain. Rare.

BIONOMICS. Bivoltine, oasis species. Flight period: March to June and August to September. Host plants: larvae monophagous, feeding on *Alhagi* sp. [Wiltshire, 1952]. Larval development from May to August [Falkovitch, 1979].

42. *Pericyma squalens* Lederer, 1855

DISTRIBUTION. Ponto-Mediterranean. Southeastern Turkey, Iraq, Iran, Afghanistan, Turkmenistan, Kuwait, Saudi Arabia, Egypt, Lebanon, Israel, Jordan. In Israel: the Rift Valley from the Dead Sea area to the foothills of Mt. Hermon (Banyas Nature Reserve), also in the northern Negev (Be'er Sheva) and all over the Coastal Plain. Locally common.

BIONOMICS. Multivoltine, oasis species. Flight period: from March to August; peaks in May and July. Host plants: unknown, possibly *Alhagi,* like in *P. albidentaria*.

43. *Rhabdophera arefacta* (Swinhoe, 1884)

DISTRIBUTION. Irano-Turanian Eremic. India, Pakistan, Egypt, Israel, Jordan, Iraq. In Israel: the Rift Valley from the Dead Sea area to the Golan Heights (Buqata), as well as the northern part of the Coastal Plain ('En Afeq Nature Reserve). Locally common.

BIONOMICS. Multivoltine, oasis species. Flight period: from March through summer to November (absent during the cold months); several peaks during the year: in May, July, September and November. Host plants: larvae are monophagous, feeding on *Prosopis stephaniana*, reared by Wiltshire [1944] on *Acacia farnesiana* in captivity.

44. *Heteropalpia profesta* (Christoph, 1887)

DISTRIBUTION. Ponto-Mediterranean. The Near and Middle East, Iraq, Iran, Afghanistan, Transcaucasia, Turkmenistan and the Arabian Peninsula. In Israel: represented by the ssp. *sacra* (Staudinger, 1898). In the arid parts of the Rift Valley as far north as the Sea of Galilee (Arava Valley, Dead Sea area, Judean Desert, Jordan Valley), also all over the Coastal Plain. Only common in the Judean Desert and in oases of the northern part of the Arava Valley, rare elsewhere.

BIONOMICS. Probably multivoltine, oasis species. Flight period: from March through summer to November (absent during the cold months); peaks in June, August and September. Host plants: unknown, possibly *Acacia* [Wiltshire, 1970].

45. *Heteropalpia acrosticta* (Püngeler, 1904)

DISTRIBUTION. Afro-Eremic. Widespread from the western Sahara to Egypt, Israel, Jordan and most of the Arabian Peninsula. In Israel: *Acacia* stands in the Arava Valley and the Dead Sea area. Abundant.

BIONOMICS. Multivoltine, deserticolous species. Flight period: throughout the year; peaks in May, October and November. Host plants: larvae are monophagous, in Israel feeding on *Acacia geraldi*. In Morocco, on *Acacia raddiana* and *A. gummifera* [Wiltshire, 1970].

46. *Tytroca dispar* (Püngeler, 1904)

DISTRIBUTION. Saharo-Sindian. Widespread in the semi-deserts and deserts throughout the Sahara, all the Arabian Peninsula, Israel, Jordan and Sinai. In Israel: the Arava Valley and the Dead Sea area. Abundant.

BIONOMICS. Multivoltine, deserticolous species. Flight period: throughout the year; peaks in January, March, May and November. Host plants: larvae monophagous, feeding on *Acacia*.

47. *Tytroca leucoptera* (Hampson, 1896)

DISTRIBUTION. Irano-Turanian Eremic. The Arabian Peninsula and all North African deserts. In Israel: few specimens have been collected in the northern part of Arava Valley ('Iddan).

BIONOMICS. Multivoltine, deserticolous species. Flight period: in Israel, taken in October only. Host plants: unknown, probably *Acacia*.

48. *Gnamptonyx innexa* (Walker, 1858)

DISTRIBUTION. Saharo-Sindian. From Morocco to the Arabian Peninsula, Israel, Iran, Afghanistan, Pakistan and western India. In Israel: the northern part of the Arava Valley (Hazeva, 'Iddan, Zuqim Reservoir). Rare.

BIONOMICS. Multivoltine, deserticolous species. The species inhabits the *Acacia* zone of stony semi-deserts and deserts [Hacker, 2001]. Flight period: in Israel, collected in February, June and October. Host plants: unknown, probably *Acacia*.

49. *Drasteria cailino* (Lefèbvre, 1827)

DISTRIBUTION. Ponto-Mediterranean. Southern Europe, the Near and Middle East, up to the western Himalayas in the East. In Central Asia and Yemen, collected up to 2700–3250 m a.s.l. [Hacker, 1999]. In the Levant, several isolated populations have been recorded in the mountains of Lebanon, Syria and Israel. In Israel: canyons with sparse forest vegetation on Mt Hermon. Rare.

BIONOMICS. Bivoltine, mountain meadow-steppe with shrubs. Flight period: all specimens in Israel have been collected in May and June. In Southern Europe, occurring from May to July and in early autumn. Host plants: larvae feed on *Salix viminalis*, *Rosa canina* and other shrubs.

50. *Drasteria flexuosa* (Ménétriés, 1847)

DISTRIBUTION. Irano-Turanian Eremic. Through the semi-deserts and deserts of the Old World from eastern Egypt to Israel, Jordan, Syria, Kazakhstan, China, Mongolia, Afghanistan. In Israel: all over the Arid and Semi-arid zones. In the Arid zone, mainly confined to oases. Locally common.

BIONOMICS. Bivoltine, oasis species. Flight period: February to May and October to November. Host plants: in Central Asia, including Uzbekistan, during the entire summer larvae have been found on leaves of *Alhagi sparsifolia* [Falkovitch, 1979].

51. *Drasteria herzi* (Alphéraky, 1895)

DISTRIBUTION. Irano-Turanian Eremic. Transcaucasia, Turkmenistan, Kirghizia, Turkey, northern Iran, Israel, Jordan, Sinai (Egypt). In Israel: represented by the ssp. *judaica* (Hampson, 1926). All over the Arid and Semi-arid zones. In the Arid zone, mainly in oases. Common.

BIONOMICS. Bivoltine, oasis species. Flight period: February to April and October to December. During the hot summer months observed only in small numbers in the Judean Desert. Host plants: unknown.

52. *Drasteria oranensis* Rothschild, 1920

DISTRIBUTION. Afro-Eremic. From Algeria to Libya, Egypt, Israel and Saudi Arabia. In Israel: represented by the ssp. *arabica* Wiltshire, 1990. Only two specimens have been collected in the Arid zone: one in an oasis near the Dead Sea ('En Gedi), the other in the northern Negev (Mishor Rotem).

BIONOMICS. Probably univoltine, spring, deserticolous species. Flight period: in Israel the specimens have been taken in March and April; in Tunisia from June to September [Hacker, 2001]. Host plants: larvae feed on *Calligonum comosum*.

53. *Drasteria kabylaria* (A. Bang-Haas, 1906)

DISTRIBUTION. Saharo-Sindian. From the West and Central Sahara to the Arabian Peninsula, Jordan, Sinai (Egypt), to Oman in the South. In Israel: the Arava Valley and northern Negev. Common in the Arava, but rare in the Negev.

BIONOMICS. Bivoltine, deserticolous species. Flight period: March to May and October to November. Host plants: unknown, probably *Tamarix* [Hacker, 2001].

54. *Epharmottomena eremophila* (Rebel, 1895) *

DISTRIBUTION. Afro-Eremic. From Morocco and West Sahara to Egypt (Sinai), Syria. In Israel: sandy areas of the northern Negev (Retamim). Locally common.

BIONOMICS. Probably bivoltine, deserticolous species, likely psammophilic. Flight period: September through winter to April; peaks in October and March. Host plants: unknown.

55. *Iranada turcorum* (Zerny, 1915)

DISTRIBUTION. Irano-Turanian Eremic. Known from Syria, Lebanon, Israel, Jordan, Egypt, Iraq, Oman and southwestern Iran. In Israel: sandy areas in the northern Negev (Retamim), only one specimen has been collected in the central Negev (Avedat). Rare and local.

BIONOMICS. Univoltine, spring, deserticolous species, probably psammophile. In Syria, collected in the coastal dunes [Hacker, 2001]. Flight period: March to April. Host plants: unknown.

56. *Armada panaceorum* (Ménétriés, 1849)

DISTRIBUTION. Pan-Eremic. Throughout the arid parts of North Africa, the Near and Middle East, Kazakhstan, eastern Afghanistan, Mongolia and Tibet, also reported from southeastern Turkey. In Israel: along the Rift in the Arava Valley, the Dead Sea area and the lower Jordan Valley (Brosh). Locally common in the southern part of the Arava, rare elsewhere.

BIONOMICS. Univoltine, spring, deserticolous species. Flight period: March to April. Host plants: in Uzbekistan, larvae feed on *Arnebia decumbens*, *Heterocaryum rigidum* and *Lappula ceratophora* [Falkovitch, 1979].

57. *Armada nilotica* A. Bang-Haas, 1912 *

DISTRIBUTION. Probably endemic to northern Sinai, Egypt and to the Negev. Until recently, this species was only known from the El Arish oasis in Sinai [Hacker, 2001]. It has since been found regularly in Israel in the sand dunes of the northern Negev (Retamim). Rare.

BIONOMICS. Univoltine, spring, deserticolous species. Flight period: March to May. Host plants: larvae feed on *Heliotropium luteum* and *H. arabense* [Wiltshire, 1948, 1979].

58. *Armada maritima* Brandt, 1939, new to Israel*

DISTRIBUTION. Irano-Turanian Eremic. Saudi Arabia, Oman, the United Arab Emirates. In Israel: only one specimen has been collected in an oasis in the southern part of the Dead Sea (Ne'ot HaKikkar).

BIONOMICS. Probably multivoltine, deserticolous species. Flight period: in Israel taken in April. In Saudi Arabia, observed all year round except for August and September [Wiltshire, 1990]. Host plants: unknown.

59. *Tarachephia hueberi* (Ershov, 1874) *

DISTRIBUTION. Irano-Turanian Eremic. Syria, Iraq, Iran, trans-Caspian region, Uzbekistan, Turkmenistan, Afghanistan. In Israel: only few specimens have been collected in the northern part of the Dead Sea area (Jericho). Rare.

BIONOMICS. Univoltine, spring, deserticolous species. Flight period: all specimens in Israel were taken in March. In Central Asia, found from March to May. Host plants: unknown.

60. *Catephia alchymista* (Denis & Schiffermüller, 1775)

DISTRIBUTION. Mediterranean. Widespread in Central and Southern Europe, North Africa and the Near East. In Israel: only few specimens have been collected: in the foothills and at medium elevations of Mt. Hermon (Tel Dan Nature Reserve and a woody canyon at 1600 m a.s.l.), only one record from the Judean Mts.

BIONOMICS. Bivoltine (in the southern part of the distribution range), sylvicolous species. Flight period: all specimens have been taken in April and May. Host plants: larvae feed on oaks.

61. *Aedia leucomelas* (Linnaeus, 1758) *

DISTRIBUTION. Asiatic-Tropical. Throughout subtropical and tropical Asia and in Australia. Resident in the Mediterranean Basin. In Israel: all over the Temperate zone. Rare.

BIONOMICS. Multivoltine species of meadow-steppes with shrubs, where it prefers water-rich habitats. Host plants: larvae feed on *Convolvulus* spp.

62. *Aedia funesta* (Esper, [1786])

DISTRIBUTION. Ponto-Mediterranean. Common in the Mediterranean in Italy, Greece and Spain. From Central Europe and Central Siberia to Iran, also in Lebanon, Israel and Syria. In Israel: the northern part of the Temperate zone (foothills of Mt. Hermon, Golan Heights and Galilee). Rare.

BIONOMICS. Bivoltine species of meadow-steppes with shrubs. Inhabits humid and warm places with luxuriant vegetation [Hacker, 2001]. Flight period: April to June and August to October. Host plants: larvae feed on *Convolvulus* spp.

63. *Tyta luctuosa* (Denis & Schiffermüller, 1775)

DISTRIBUTION. Ponto-Mediterranean. From Central Europe to North Africa, the Near and Middle East, Kazakhstan, Kirghizia, Uzbekistan, the Altai Mts, western China, Iran and Afghanistan. Widespread in the Mediterranean. In Israel: all over the Temperate zone and in oases of the Semi-arid zone. Rare.

BIONOMICS. Bivoltine, ubiquitous, in all kinds of open areas. Flight period: April to June and September to October. Host plants: larvae feeding on *Convolvulus arvensis, Linum* spp. and numerous other herbs.

64. *Lygephila lusoria* (Linnaeus, 1758)

DISTRIBUTION. Ponto-Mediterranean. Southern Europe, the Near and Middle East, the European part of southeastern Russia, the Caucasian region, Turkey and Israel. In Israel: represented by the ssp. *amasina* (Staudinger, 1879). Restricted to the top of Mt. Hermon (2000 m a.s.l., tragacanth vegetation). Sporadic at medium elevations (Majdal Shams). Rare.

BIONOMICS. Bivoltine, mountainous steppe species. Flight period: May to September; peaks in June and September. Host plants: larvae feed on *Vicia* and *Astragalus* spp.

65. *Lygephila craccae* (Denis & Schiffermüller, 1775)

DISTRIBUTION. Trans-Palearctic. Throughout the temperate parts of Europe, North Asia, the Altai Mts, Korea, Japan and China. In Israel: from the foothills of Mt Hermon (Tel Dan and Banyas nature reserves), a sparsely forested canyon on Mt Hermon (1600 m a.s.l.) and the lower Jordan Valley (Hammat Gader). Rare and local.

BIONOMICS. Univoltine (in Israel), early-summer species of meadow-steppes with shrubs. The species inhabits water-rich places with shrubs and luxurious herbaceous vegetation, mainly at middle to higher altitudes, but also occurring in plains [Hacker, 2001]. Flight period: in Israel all specimens have been collected in March or May. Host plants: larvae feed on various Leguminosae, usually *Vicia*, *Coronilfa*, *Astragalus*, *Lathyrus*.

66. *Autophila einsleri* Amsel, 1935

DISTRIBUTION. Irano-Turanian. Turkey, Lebanon, Israel, Syria, Jordan, northern Iran, Turkmenistan, the Caucasus, southern Iran and Oman. In the Levant, local and rare. In Israel: on Mt. Hermon at 1400–2000 m a.s.l., also in the hills and mountains of the Judean Desert ('En Perat, Alon, Herodion Nature Reserve). Rare.

BIONOMICS. Bivoltine, steppe species of medium elevations. Flight period: on Mt Hermon: May to July and October, in the Judean Desert: March to May. Host plants: unknown.

67. *Autophila libanotica* (Staudinger, 1901)

DISTRIBUTION. Ponto-Mediterranean. Widespread from Turkey to Turkmenistan, Afghanistan, Pakistan and Iran, found also in northern Greece, Lebanon and Israel. In Israel: on top of Mt. Hermon (2000 m a.s.l., tragacanth vegetation). Common.

BIONOMICS. Univoltine, summer, mountainous steppe species. Flight period: June to October, peak in July. Host plants: unknown.

68. *Autophila limbata* (Staudinger, 1871)

DISTRIBUTION. Ponto-Mediterranean. Widespread in the Near East, Iran, Transcaucasia and Turkmenistan. In Israel: not recorded since Amsel [1933].

BIONOMICS. Probably univoltine, summer, steppe species. Flight period: from May to July, then aestivating until October and then over-wintering until March or April. Host plants: larvae feeding on *Onobrychis* sp.

69. *Autophila cerealis* (Staudinger, 1871)

DISTRIBUTION. Irano-Turanian. Widespread in the Near and Middle East, from Turkey and the Levant

to Central Asia and all over the Arabian Peninsula. In Israel: all over the Arid and Semi-arid zones. In the Temperate zone, restricted to hot and dry slopes of canyons of southern exposition. In the Arid zone, common and occasionally abundant, elsewhere rare.

BIONOMICS. Bivoltine, steppe species. Flight period: October through winter to June (absent during the hot summer months), peak in May. Host plants: larvae feeding on *Salvia* and probably on other low herbs.

70. *Autophila ligaminosa* (Eversmann, 1851)

DISTRIBUTION. Ponto-Mediterranean. Widely distributed from the Near and Middle East to southeastern Russia, the Balkans, Afghanistan, the United Arab Emirates and Oman. In Israel: top of Mt. Hermon (2000m a.s.l., tragacanth vegetation). Rare.

BIONOMICS. Univoltine, summer, steppe species. Flight period: in Israel, all specimens have been collected in July. In the Balkans, from May to July and in September, over-wintering up to March. Host plants: unknown.

71. *Autophila anaphanes* Boursin, 1940 *

DISTRIBUTION. Mediterranean. Restricted to the eastern part of the Mediterranean such as the Balkans, Turkey, Lebanon and Cyprus. In Israel: medium elevations of the Temperate zone (mainly Carmel Mt. Ridge, Galilee and the Golan Heights). Locally common.

BIONOMICS. Univoltine, summer species of park forests. Flight period: April to June. Host plants: larvae feeding on *Ulex* and *Genista*.

72. *Autophila pauli* Boursin, 1940

DISTRIBUTION. Endemic to the arid areas of Jordan, Israel, Sinai and Egypt. In Israel: all over the Arid zone. Common in the Negev, rare in the Arava Valley.

BIONOMICS. Probably bivoltine, deserticolous species. Flight period: January to August, peak from April to May. Host plants: unknown.

73. *Apopestes spectrum* (Esper, 1787)

DISTRIBUTION. Mediterranean. From the Maghreb within the Mediterranean Basin to western Turkey and Lebanon, Israel and Jordan. In Israel: all over the Temperate and Semi-arid zones. Locally common.

BIONOMICS. Univoltine, summer, ubiquitous, all kinds of open areas. Flight period: April and May. Host plants: larvae feed on Papilionaceae shrubs, including *Genista*, *Sarothamnus*, *Spaltium*, *Glycyrrhiza.* In Israel, larvae feeding on *Retama raetam*. Larvae pupate in cocoons on the plant [Yatom, 1989]. In Turkmenistan, the larva is a known pest on some cultivated Fabaceae species [Ronkay, 1990].

74. *Tathorhynchus exsiccata* (Lederer, 1855)

DISTRIBUTION. Paleotropical. Throughout the tropics and subtropics of the Old World. In Israel: all over the Arid and Semi-arid zones. Fairly common.

BIONOMICS. Multivoltine, deserticolous species. Flight period: throughout the year; peaks in March to May and in November to December. Host plants: larvae feeding on *Spartium junceum*, *Medicago sativa*, *Indigofera tinctoria* (Liguminosae) and probably on many other herbs and shrubs.

75. *Exophila rectangularis* (Geyer, 1828)

DISTRIBUTION. Ponto-Mediterranean. Ukraine (Crimea), the Balkans, northern Italy, Romania, Mediterranean parts of Turkey, Lebanon and Israel, Turkmenistan. In Israel: collected only in the foothills of Mt. Hermon (Tel Dan and Banyas nature reserves). Rare and local.

BIONOMICS. Univoltine (in Israel), early-summer species of meadow-steppes with shrubs. Flight period: all specimens have been collected in April. Host plants: larvae feed on *Celtis* spp., usually *C. australis*.

76. *Scoliopterix libatrix* (Linnaeus, 1758) *

DISTRIBUTION. Trans-Palearctic. From almost all over Europe to Korea, Japan, North America to Central Asia and northern Africa (Morocco, Algeria, Tunisia). In Israel: collected only in the foothills of Mt. Hermon (Tel Dan and Banyas nature reserves). Rare and local.

BIONOMICS. In Israel, bivoltine, riverine, sylvicolous species. Flight period: March to April and June to August. Host plants: *Salix* spp., *Populus* spp.

77. *Acantholipes regularis* (Hübner, 1813)

DISTRIBUTION. Ponto-Mediterranean. Widespread in Southern Europe, the Near and Middle East, western China, Afghanistan, Iran and northern Saudi Arabia. In Israel: only few specimens have been collected in canyons of the Judean Desert. Rare.

BIONOMICS. Probably bivoltine, steppe species. Flight period: in Israel, April to May and November. Host plants: larvae feeding on *Glycyrrhiza glabra.*

78. *Acantholipes circumdata* (Walker, 1858) *

DISTRIBUTION. Irano-Turanian Eremic. From India and Pakistan through Afghanistan, Iran to the Arabian Peninsula and East Africa. In Israel: only one specimen has been collected in the central Negev (Mizpe Ramon).

BIONOMICS. Multivoltine, deserticolous species. Flight period: in Israel in April. In Yemen, probably multivoltine [Hacker, 2001]. Host plants: larvae feed on *Taverniera spartea* at night [Wiltshire, 1962].

79. *Africalpe intrusa* Krüger, 1939

DISTRIBUTION. Afro-Eremic. Saudi Arabia, Oman, the UAE, Yemen, eastern and northeastern Africa and West Sahara. In Israel: the Rift Valley from the southern part of the Arava Valley to the lower Jordan Valley (Brosh), as well as some of the connecting canyons. Rare.

BIONOMICS. Multivoltine, deserticolous species. Flight period: all the year round except for December and January; peaks in April to June and in October to November. Host plants: unknown.

80. *Anomis sabulifera* (Guenée, 1852)

DISTRIBUTION. Paleotropical. Common and widespread in the Ethiopian and Oriental regions, also recorded from Morocco and Afghanistan. In Israel: the only record is by Amsel from Haifa [1933].

BIONOMICS. Multivoltine, grassland species. Host plants: in agriculture larvae feed on cotton, *Althaea*.

81. *Pandesma robusta* (Walker, 1858)

DISTRIBUTION. Paleotropical. Throughout Africa and the subtropical parts of the Near and Middle East, Pakistan, India. In Southern Europe, it is probably only a migrant. In Israel: all over the country. Abundant in the Arid and Semi-arid zones, especially in the Arava Valley, Judean Desert and Jordan Valley. Rare at medium and higher elevations.

BIONOMICS. Multivoltine, steppe species. Flight period: throughout the year; peaks in May, August, September and November. Host plants: larvae polyphagous, feeding on trees and bushes, such as *Acacia, Populus euphratica* and *Albizzia lebbek*. Often abundant as a migrant in deserts and semi-deserts without host trees [Fibiger, 1986].

82. *Plecoptera inquinata* (Lederer, 1857)

DISTRIBUTION. Irano-Turanian. Turkey, Azerbaijan, Iran, Lebanon and Israel. In Israel: only few specimens have been caught in a forested canyon in the Upper Galilee (Nahal Keziv).

BIONOMICS. Bivoltine, foothill, sylvicolous species. Flight period: in Israel so far in May and October. Host plants: unknown.

83. *Plecoptera reflexa* Guenée, 1852

DISTRIBUTION. Asiatic-Tropical. An Oriental species mainly distributed in India. In Israel: the central and northern parts of the Coastal Plain. Rare.

BIONOMICS. Probably multivoltine, grassland species. In India, inhabiting subtropical and tropical oases [Hacker, 2001]. Flight period: May to October, peak in July. Host plants: unknown.

84. *Antarchaea erubescens* (A. Bang-Haas, 1910)

DISTRIBUTION. Saharo-Sindian. From Morocco to the Arabian Peninsula, southern Iran and Afghanistan. In Israel: only once few specimens have collected in the foothills of Mt. Hermon in June (Tel Dan Nature Reserve).

BIONOMICS. Bivoltine, grassland species. Flight period: April to June and autumn. Host plants: unknown.

85. *Zethes insularis* Rambur, 1833

DISTRIBUTION. Mediterranean. Restricted to the hottest parts of the Mediterranean Basin, the Armenian-Caucasian region, Iraq, southwestern Iran, Lebanon, Israel, Syria and Jordan. In Israel: all over the Temperate zone. Common at medium elevations (Judean Mt., Carmel Mt. Ridge, Galilee, Golan Heights), rare elsewhere.

BIONOMICS. Multivoltine, foothill, sylvicolous species. Flight period: from March to October; peaks in April to May and in August to September. Host plants: unknown.

86. *Rivula tanitalis* Rebel, 1912

DISTRIBUTION. Afro-Eremic. Egypt, Morocco, Algeria, Malta, Crete, Greece, Turkey, Lebanon, Iraq, Iran, Saudi Arabia, Yemen. In Israel: only recorded by Amsel [1933].

BIONOMICS. Multivoltine, wet grassland species, usual in oases. Host plants: unknown.

## Results and discussion

Of the ten catocaline species recorded as new to Israel, six have been found in the Arid zone, two each in deserts with clay and stony soils (*T. hueberi*, *A. circumdata*), sandy areas (*E. eremophila, A. nilotica*) and oases (*C. delunaris, A. maritima*). Only four species occur in the Temperate zone. Two belong to the oak forest group (*C. conjuncta, A. anaphanes*), one to the river forest group (*S. libatrix*) and one species (*A. leucomelas*) seems to be without any obvious preferences.

About two-thirds of the Catocalinae in Israel are rare (56/86) and almost half of them (18/38) are also local. Only one-third (31/86) are common (25/86) and/or abundant (6/86). Even the common ones (25) are mainly common locally (14) or only fairly common (5). It is hardly surprising that four of the old records by Amsel [1933] have not been reconfirmed. Two were from the Arid zone, one (*R. tanitalis*) from an oasis and one more (*A. limbata*) from a steppe habitat. One species (*M. wiskotti*) from the Temperate zone belongs to the oak forest group, while the other (*A. sabulivera*) seems to be rather unspecific.

The Israeli Catocalinae are highly specific for their climatic and vegetation preferences (Tabl. 1). About two-thirds (54/86) are found in the arid and/or semi-arid areas of the country, while about one-third (30/86) inhabit the Temperate zone. Only two species show no clear preferences and are distributed all over the country.

Almost half (38) of the species are Eremic in origin (Irano-Turanian Eremic, Afro-Eremic, Saharo-Sindian, Pan-Eremic and Endemic to Sinai); about the same number (37) are mainly of West Palearctic origin (Mediterranean, Irano-Turanian); only two show a trans-Palearctic distribution. The tropical group contains only 11 species (Paleotropical, Afro-Tropical, Asiatic-Tropical).

In the two larger climatic zones, the Catocalinae of Israel demonstrate very clear preferences to different types of landscape and vegetation. Accordingly they form some rather compact groups. The highest species diversity (54) is found in the arid parts of Israel (Arava Valley, Dead Sea area and the Negev). Larvae of the psammophilic species (8) develop on plants like *Calligonum* and *Helianthemum,* which are characteristic of sandy desert soils [Zohary, 1973]. All species of *Anumeta* (6) and *A. stuebeli* occur only in the Arava Valley, and the adults are typically found in spring. *C. sana* is found in spring and in autumn after aestivation in the Arava and the Negev.

Another group of deserticoles are monophages on different *Acacia* species (5). They are common in the Arava and Dead Sea area and, with the exception of the winter species *S. mysticus*, they are multivoltine, occur-

Table. Number of Catolinae species in different climatological zones of Israel.
Таблица. Чилсо видов Catolinae в разных климатических зонах Израиля.

| Climatic preference | Landscape or biotopic preference | Host plants | Genera / Species | Zoogeographic regions | | |
|---|---|---|---|---|---|---|
| | | | | Palearctic | Eremic | Tropical |
| Indifferent | Ubiquitous | Various trees | *O. tirhaca* | | | 1 |
| | | | *P. robusta* | | | 1 |
| | Total (2 species): | | | | | 2 |
| Semi-arid / Arid | Deserts with stone or clay soils | *Calligonum comosum* | *Anumeta* spp. | | 6 | |
| | | | *A. stuebeli* | | 1 | |
| | | *Acacia* spp. | *Tytroca* spp. | | 2 | |
| | | | *G. innexa* | | 1 | |
| | | | *H. acrosticta* | | 1 | |
| | | | *S. mysticus* | | 1 | |
| | | Unknown (8 species): | | | 8 | |
| | Oases | *Prosopis farcta* | *H. profesta* | 1 | | |
| | | *Tamarix* spp. | *Clytie* spp. | 2 | 7 | |
| | | *Alhagi maurorum* | *Pericyma* spp. | 2 | | |
| | | | *D. flexuosa* | | 1 | |
| | | Unknown (6 species): | | 2 | 2 | 2 |
| | Sandy areas | *Helianthemum* spp. | *C. sana* | | 1 | |
| | | Unknown (2 species): | | | 2 | |
| | Steppes, open areas | Papilionaceae: (*Genista* spp., *Onobrychis* spp.) | *Autophila* spp. | 6 | 1 | |
| | | | *A. spectrum* | 1 | | |
| | | | *T. exsiccata* | | | 1 |
| | | Unknown (3 species): | | 1 | 2 | |
| | Total (54 species): | | | 15 | 36 | 3 |
| Temperate | Forests, groups of trees | Mainly *Quercus* spp., also *Populus euphratica*, *Salix* spp. | *Catocala* spp. | 11 | | |
| | | | *Minucia* spp. | 2 | | |
| | | | *Catephia* spp. | 1 | | |
| | River forests River banks Wet grassland | Herbaceous plants, *Convolvulus arvensis* | *Aedia* spp. | 1 | | 1 |
| | | | *Lygephila* spp. | 2 | | |
| | | | *T. luctuosa* | 1 | | |
| | | *Celtis* spp. | *E. rectangularis* | 1 | | |
| | | *Populus euphratica* | *S. libatrix* | 1 | | |
| | | Unknown (9 species): | | 2 | 2 | 5 |
| | Total (30 species): | | | 22 | 2 | 6 |
| Total (86 species): | | | | 37 | 38 | 11 |

ring virtually all the year round. In other areas of the Negev they are either rather rare or absent.

Most of the oasis species (13) also show an Eremic distribution pattern (8). The genus *Clytie* is the most common and widespread group (9). Their larvae develop on different *Tamarix* species, which form an obligatory component of almost any oasis system. Some other Catocalinae species (4) develop in oases on other common shrubs like *Prosopis farcta* and *Alhagi maurorum*.

In the Semi-arid zone, species of the genus *Autophila* are common. They are a typical element of steppe areas. They penetrate the Temperate zone through large canyons were they are mainly found on south-facing slopes. Adults are on the wing at the beginning of summer or at the beginning and end of autumn, aestivating in the hot months. This group of species (9) develops mainly on different plants of the family Papilionaceae (*Genista* spp., *Onobrychis* spp.).

In the temperate part of the country, fewer genera and species (30) are found. In this zone, *Catocala* spp. (11) are dominant. Most of them are monophagous on oaks (*Quercus*), only a few feed on poplar or Rosaceae trees and bushes. Together with the two *Minucia* species and the only *Cathephia* species, they form the forest group (14).

The adults of this group are found typically in early summer or in early autumn, avoiding the hot and dry mid-summer period [Yela & Herrera, 1993]. The main habitats are all different types of oak forest from the Costal Plain to the peak of Mount Hermon, all river forests in the Temperate zone and gallery forests along some of the rivers draining into the Rift Valley. Along these gallery forests, some species penetrate the Irano-Turanian zone. Isolated populations of *C. puerpera* and *C. lesbia* are found in some of the oases in the Rift Valley and, to a smaller extent, in the Negev. There they accompany small groups of poplar trees.

Another group (7 spp.) is typical for springs and rivers with their accompanying forests, humid riverbanks and nearby wet meadows. These species are rather rare, local and very much restricted to river forests and wet grasslands in canyons of the Upper Galilee, the Golan Heights and the Hula Valley. Hotspots for this group are the River Jordan springs, as well as the Tel Dan and Banyas nature reserves. Their host-plants are herbaceous plants (*Convulvulus* spp., *Celtis* spp.).

Only two species, *O. tirhaca* and *P. robusta*, seem to show no special preferences. They are truly ubiquitous and occur throughout the country. Both are of tropical origins and are polyphagous dendrophages.

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