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The tribes Prodeniini and Caradrinini of Israel (Lepidoptera: Noctuidae, Xyleninae)

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Abstract

Thirty-four Prodeniini and Caradrinini species are presently known from Israel, *Caradrina hypostigma* (Boursin, 1932) is recorded for the first time. Most of the Prodeniini and Caradrinini (23 of 34) are bi-, or multivoltine with their highest rate of occurrence in spring (April, May) and in autumn (October, November). Most of the univoltine species are deserticolous, autumnal (November) species. About one third of the species (11) are of Eremic origin (Arabian eremic, Irano-Turanian eremic, North African eremic and Pan-eremic), six species are Irano-Turanian, five Mediterranean, or Mediterranean - Central Asian, four are Afro-, or Paleo-Tropical, three Western Palearctic, and five are endemics of the Levant. The distribution, phenology, habitat preferences and known host plants are summarized.
KEY WORDS: Lepidoptera, Noctuidae, Prodenini, Caradrinini, Israel.

Las tribus Prodeniini y Caradrinini de Israel (Lepidoptera: Noctuidae, Xyleninae)

Resumen

Treinta y cuatro especies de Prodeniini y Caradrinini son actualmente conocidas de Israel, se cita por primera vez *Caradrina hypostigma* (Boursin, 1932). La mayor parte de las especies de los Prodeniini y Caradrinini (23 de 34) son bi o multivoltinas con una mayor abundancia en primavera (abril, mayo) y en otoño (octubre, noviembre). La mayor parte de las especies univoltinas son desertícolas y otoñales (noviembre). Cerca de un tercio de las especies (11) son the origen oriental (Arábico, Irano-Turaniano, Norteafricano y Pan-oriental), seis especies son Irano-Turaniano, cinco mediterráneas, o mediterráneas-centro-asiático, cuatro son Afro-, o Paleo-Tropicales, tres del oeste Paleártico y cinco son orientales. Se da un resumen de la distribución, fenología, hábitat preferentes y plantas nutricias conocidas.
PALABRAS CLAVE: Lepidoptera, Noctuidae, Prodenini, Caradrinini, Israel.

Introduction

The faunistic data presented here are mainly based on the outcomes of the Israeli-German project for the study of the Israeli lepidopteran fauna. In its context, extensive collecting was conducted from 1986 to 2004. This project was a joint effort of The Hebrew University, the Tel Aviv University, The Nature Reserves and Park Authority of Israel, the Zoologische Staatssammlung, Munich, Germany and the Museum Witt, Munich, Germany. Lepidoptera were collected during a period of 18 years totalling about 3000 nights of collecting with mobile light traps powered by generator (250 Watt bulbs HQL & ML) and about 1500 nights of collecting with mobile light traps powered by batteries (12 Volt 8 Watt & 20 Watt, 6 Volt 4 Watt Black light UVB tubes). Traps were rotated on a daily basis. In addition, a widespread network of permanent light traps (220 V 20 W Black light UVB & UVC tubes) was maintained. Permanent traps were relocated on an annual basis. From year to year, 10–34 traps were operated.

Phenology is given based on the data obtained during the Israeli-German project as well as informa-

tion drawn from the literature. Larval host-plants are taken from the literature, the authors' own observations and personal communications by other colleagues.

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 wide variety of different habitats (KOSSWIG, 1955). The northern part of Israel includes Mt Hermon (2200 m above sea-level) which receives annual snow fall and contains typical Tragacanth vegetation, whereas the Dead Sea area is about 400 m below sea-level with Ethiopian pockets rich in afro-tropical fauna and flora (BYTINSKI-SALZ, 1961; 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 their numerous natural and artificial oases (ORNI & EFRAT 1980). Consequently, these alternating geographical and climatic zones could be conducive to the establishment of a rich faunal and floral assemblage of different origins (EIG, 1926; LATTIN, 1967; ZOHARY, 1962, 1966). As well, many species found in Israel are at their furthest point of geographical distribution (BODENHEIMER, 1930; 1932; FURTH, 1975; JAFFE, 1988).

Israel can be divided in five Phyto-geographic regions (ZOHARY, 1966): the Mediterranean temperate zone, the Irano-Turanian zone, the Saharo-Arabian eremic zone, the Ethiopian tropical zone, and the Tragacanth high altitude zone.

The Mediterranean temperate zone covers those areas which 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, where precipitation is greater (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 south west border in Israel through Iran, Turkistan and inner Asia to the Gobi desert. The average annual rainfall is 200-300 mm and occurs only during winter. Low brush or dwarf bushes with Artemisia plant associations are characteristic of this region.

The Saharo-Arabian eremic zone is a true desert which centers on the Arabian Peninsula. Winter rainfall of up to 200 mm is followed by a short period of blooming, and afterwards the vegetation dries up rapidly. The vegetation is also very sparse averaging 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 summers create specific plant communities dominated by spiny, round, dense, cushion like shrubs such as *Astragulus* 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 foot hills and within canyons.

The Prodenini and Caradrinini

The Prodeniini is a monobasic tribe containing only the type genus *Spodoptera* Guenée, 1852 (= *Prodenia* Guenée, 1852). It includes some very serious pests distributed in the warmer parts of all global zoogeographical regions. Israel supports three polyphagous, multivoltine, abundant species found throughout the country, often in high densities, in oases of the arid region.

The Tribe Caradrinini Boisduval, 1840 is taxonomically difficult due to the great uniformity in the

habitats of many species. In Israel, Caradrinini are represented by 31 species belonging to 6 genera: *Caradrina* Ochsenheimer, 1816, *Hoplodrina* Boursin, 1937, *Scythocentropus* Speiser, 1902, and three other tentatively included genera. Genitalic dissections are necessary for an exact identification in many cases.

The genus *Caradrina*, containing 155 currently known species, is the most species-rich genus of the tribe, treated here in the broad sense (HACKER, 2004). In the past, the subgenera were often treated as full-rank genera. Distribution is focused on the Holarctic and Afrotropical regions, with a few representatives entering the Indo-Pacific region. So far, 25 species have been recorded in Israel. As far as is known, the larvae are polyphagous. Most species are multivoltine with activity peaks in spring and autumn. *Caradrina* tend to prefer open habitats in the temperate region, but exceptions such as the recently described *Caradrina fibigeri* have an extremely local distribution in large oases in the Dead Sea area. The subgenus *Eremodrina* Boursin, 1937, contains deserticolous species that usually fly in the autumn.

Faunistic survey of the Prodenini and Caradrinini

Subfamily Xyleninae Guenée, 1837
Tribe Prodeniini Forbes, 1954

Spodoptera exigua (Hübner, 1808)

General distribution pattern: Paleo-Tropical. This species is found in the Mediterranean Basin, the Near and Middle East, Tropical and Subtropical Africa, Southern Asia and Indo-Australia, and is also a known migrant in Central and Northern Europe. In Israel *S. exigua* can be found in all climatological regions throughout the country; they are abundant in lowlands and common at medium altitudes.

Bionomics: in Israel *S. exigua* is a multivoltine, ubiquitous species, flying year round with the highest rate of occurrence in May and from September to November. Host Plants: in Israel, this species is extremely polyphagous feeding mainly on herbaceous plants, and is a known pest of many crops and ornamental plants including sugar beet, broad beans, cotton, hibiscus, legumes and corn. To a lesser extent, they also feed on bushes and trees including *Populus euramericana*. In Israel and elsewhere they are often a serious pest.

Spodoptera cilium (Guenée, 1852)

General distribution pattern: Paleo-Tropical. *S. cilium* can be found from the Mediterranean Basin in Northern Africa, Spain, Southern Italy, Greece, Turkey, Israel, Lebanon, Jordan, Syria, Sinai (Egypt) eastwards to Iraq, Afghanistan, Southern Asia, and Japan, southwards to Subtropical and Tropical Africa. This species can be found in all climatological regions throughout Israel. They are common in lowlands of the Semi-arid region and in oases of the Arid region but are rare in the Temperate region.

Bionomics: in Israel *S. cilium* is a trivoltine – multivoltine, ubiquitous species, depending on the altitude. They fly year round with the highest rate of occurrence in May, August and November. Host Plants: in Israel host plants consist of different Gramineae species. Occasionally, *S. cilium* are pests in lawns and gardens, and in the Oriental Region, a pest of rice.

Spodoptera littoralis (Boisduval, 1833)

General distribution pattern: Afro-Tropical. *S. littoralis* can be found in Tropical and Subtropical Africa, the Mediterranean Basin (in the north mainly as a migrant), Turkey, Israel, Lebanon, Syria, Jordan, Iraq, the Arabian Peninsula, Transcaucasia, Turkmenistan and Iran. In Israel they can be found in all climatological regions throughout the country. This species is common, often abundant in lowlands but less common at medium altitudes.

Bionomics: in Israel *S. littoralis* is a multivoltine, ubiquitous species that flies year round with the highest rate of occurrence in May and October. In Israel this species develops on cotton in the summer and produces about one generation each month. Host Plants: *S. littoralis* is extremely polyphagous; they are a known agricultural pest and they also feed on ornamental plants, including cabbages, *Chrysanthemum*, *Hibiscus*. Other host plants include alfalfa, beet, peanuts and cotton, leaves of *Populus* spp. and *Ulmus* spp.,

Atriplex halimus and *Nitraria retusa* trees and bushes. The larvae feed at night and hide in the soil during day time.

Tribe Caradrinini Boisduval, 1840
Subtribe Caradrinina Boisduval, 1840
Genus *Caradrina* Ochsenheimer, 1816
Subgenus *Caradrina* Ochsenheimer, 1816

Caradrina agrotina (Staudinger, 1892)

General distribution pattern: Irano-Turanian. Turkey, Armenia, Israel and Lebanon. In Israel they inhabit the Temperate region, on Mt. Hermon from its foothills to its upper parts (2000 m a.s.l.). *C. agrotina* are fairly common on the medium elevations of Mt. Hermon but are otherwise rare.

Bionomics: in Israel they are a bivoltine, steppe species that flies from May to October with the highest rate of occurrence in June and in September. Host Plants: unknown.

Subgenus *Platyperigea* Smith, 1894

Caradrina aspersa (Rambur, 1834)

General distribution pattern: Western Palearctic. *C. aspersa* can be found in Morocco, Algeria, from Southern and South-eastern Europe to Southern Siberia, Israel, Lebanon, Iran, Turkmenistan and Egypt. In Israel they inhabit the Temperate region, and have so far only been reported by KALCHBERG (1897) from Haifa and by AMSEL (1933) from the Judean Mts. Not seen since the 1930's.

Bionomics: in Israel unknown; probably a grassland or steppe species. In Europe they are bivoltine, flying from April to June and from September to October. Host Plants: in Europe *C. aspersa* are polyphagous on low herbs.

Caradrina kadenii (Freyer, 1836)

General distribution pattern: Mediterranean. *C. kadenii* can be found in Southern and South-eastern Europe, Turkey, Israel, Lebanon, Caucasia and Transcaucasia. In Israel they inhabit the Temperate region and have so far only been collected on the Upper Golan Heights and in the Hula Valley. This species is rare and localized.

Bionomics: in Israel *C. kadenii* is a steppe species, so far only collected in May. In Europe this species is bivoltine, flying from April to June and from September to October. Host Plants: unknown but they are probably polyphagous on low herbs like other congeners.

Subgenus *Boursinidrina* Hacker, 2004

Caradrina syriaca (Staudinger, 1892)

General distribution pattern: Irano-Turanian. *C. syriaca* can be found in Rhodes (Greece), Cyprus, South-eastern Turkey, Israel, Lebanon and Jordan. In Israel they inhabit medium elevations of the Temperate region, mainly in the Judean Mts. in the vicinity of Jerusalem. This species is rather localized and is only occasionally more common.

Bionomics: *C. syriaca* is a bivoltine, spring-autumn, grassland species in the Judean Mts. They fly from March to April and from September to November with the highest rate of occurrence in October. Host Plants: unknown, but they are probably polyphagous on low herbs like other congeners.

Caradrina panurgia (Boursin, 1939)

General distribution pattern: Irano-Turanian. *C. panurgia* is presently known only from three disjunct areas: South-western Iran (Zaghros Mountains), Eastern Turkey, and Israel. In Israel this species has so far only been collected on Mt. Hermon (1200 m a.s.l.) and in the northern part of the Arava Valley (Hazeva

Field School) but is probably more widespread along the Rift Valley. *C. panurgia* is a rare and localized species.

Bionomics: in Israel *C. panurgia* is probably a bivoltine, steppe species, that has so far been collected in April in the Arava Valley and in September on Mt. Hermon. Host Plants: unknown, but they are probably polyphagous on low herbs like other congeners.

Caradrina oberthuri (Rothschild, 1913)

General distribution pattern: Pan Eremic. *C. oberthuri* can be found in Northern Africa, Sudan, the Arabian Peninsula, Israel, Syria, Jordan, Sinai (Egypt) and Iran. In Israel they inhabit the Arid region and are therefore found throughout the arid part of the Rift Valley. This species is uncommon in the Arava Valley and the Dead Sea area.

Bionomics: in Israel *C. oberthuri* is a bivoltine, oasis species, possibly multivoltine, that flies from March to December with the highest rate of occurrence from March to April and from October to December. Host Plants: in Israel and elsewhere unknown, but they are probably polyphagous on low herbs like other congeners.

Subgenus *Kalchbergiana* Hacker, 2004

Caradrina ingrata (Staudinger, 1897)

General distribution pattern: North African, Arabian Eremic. *C. ingrata* can be found in South-Western Europe, Mauretania, Morocco, Algeria, Egypt, Saudi Arabia, Bahrain, Iraq, Israel, Lebanon, Syria and Jordan. In Israel they can be found along the Rift Valley, throughout all the climatological regions, from the Dead Sea area to the Hula Valley. *C. ingrata* are fairly common.

Bionomics: in Israel they are probably a multivoltine, oasis and wetland species that flies from March to May and from October to December. In Iraq they fly in April and October. Host Plants: WILTSHIRE (1957) suggested *Salix* spp. as host plants. In captivity larvae were reared on *Taraxacum*.

Subgenus *Paradrina* Boursin, 1937

Caradrina flavirena (Guenée, 1852)

General distribution pattern: Mediterranean. *C. flavirena* can be found in the Mediterranean basin in Morocco, Algeria, Southern Europe, Turkey, Israel, Lebanon, Jordan, Syria, Armenia and Iran. In Israel they can be found throughout the Temperate and Semi-arid regions. This species is fairly common and widespread in lowlands, but is rare elsewhere.

Bionomics: in Israel *C. flavirena* is a bivoltine, grassland species that flies from March to May and from September to October. HACKER (2004) suggested this species may be univoltine in Northern Africa. Host Plants: in Europe they are polyphagous on low herbs.

Caradrina scotoptera (Püngeler, 1914)

General distribution pattern: Irano-Turanian. This species can be found in Turkey, and Southwestern Iran. In Israel they inhabit the Rift Valley throughout all the climatological regions from the Dead Sea area to the Hula Valley, the Golan Heights and the Galilee. They are fairly common.

Bionomics: in Israel *C. scoptera* are a multivoltine, wetland species that fly from March to October with the highest rate of occurrence from March to May and from September to October. Host Plants: unknown.

Caradrina hypostigma (Boursin, 1932)

New record for the fauna of Israel.

General distribution pattern: probably endemic of the Levant. *C. hypostigma* is found in Lebanon and has now been recorded in Israel where it was collected only in the Upper Galilee. It is a rare and localized species.

Bionomics: *C. hypostigma* is probably a univoltine, sylvicolous species in Israel and has so far only been collected here in May. In Lebanon, it can be found from May to June. Host Plants: unknown.

Caradrina amseli (Boursin, 1936)

General distribution pattern: probably endemic of the Levant. *C. amseli* can be found in Israel, Lebanon and Jordan. In Israel this species can be found in all climatological regions throughout the country. Wide spread but only locally common.

Bionomics: in Israel *C. amseli* is a bivoltine, ubiquitous species that flies from March to May and from October to November. Host Plants: unknown.

Caradrina clavipalpis (Scopoli, 1763)

General distribution pattern: Western Palearctic. This species can be found in almost all of Europe to Northern Africa, the Near and Middle east to Southern Siberia, Afghanistan, Mongolia and Western China. In Israel *C. clavipalpis* can be found throughout the country, in all climatological regions, concentrating in the oases and agricultural places of arid areas. This species is common in lowlands and fairly common elsewhere.

Bionomics: this is a multivoltine, grassland species that flies year round with the highest rate of occurrence from March to April and from October to November. Host Plants: in Europe *C. clavipalpis* are polyphagous on numerous herbaceous plants including *Stellaria*, *Taraxacum*, *Campanula*, *Plantago*, *Lamium* and sometimes damage stacks of wheat, other grains and peas. In Israel it is not a pest.

Caradrina selini Boisduval, 1840

General distribution pattern: Mediterranean - Central Asian. This species can be found from Morocco, Algeria and Europe to Israel, Jordan and Central Asia**.** In Israel *C. selini* inhabits the Rift Valley throughout all the climatological regions. In the Temperate and Semi-arid part of the Rift Valley, it is fairly common and widespread. In the arid parts of the south, it is uncommon and localized. In the Negev it is also rare and localized.

Bionomics: in Israel *C. selini* is a univoltine, spring, wetland species that flies from March to May. In Central and Northern Europe, it flies from May to July. Host Plants: this species is polyphagous on numerous herbaceous plants including *Rumex Taraxacum* and *Plantago*.

Caradrina levantina Hacker, 2004

General distribution pattern: Mediterranean. This species can be found in the Eastern part of the Mediterranean basin including Israel where it inhabits all the climatological regions throughout the country. This species is widespread but only locally common in the Arid and Semi-arid regions and along Coastal plain.

Bionomics: in Israel this is a univoltine, autumn, steppe species that flies from August to October. Host Plants: unknown.

Caradrina zandi (Wiltshire, 1952)

General distribution pattern: Irano-Turanian. Southwestern Iran, Israel, Lebanon and Jordan. In Israel: all over the Arid and Semi-arid regions. Locally common.

Bionomics: in Israel bivoltine, steppe species, flying from February to April and from October to December with the highest rate of occurrence in autumn. Host Plants: on *Taraxacum*, *Calendula* and other low plants.

Caradrina fibigeri Hacker, 2004

General distribution pattern: probably Arabian Endemic. This species is found in Israel and possibly in Jordan (Dead Sea area and the northern Arava Valley). In Israel it is found in the Arid region in some large oases in the Dead Sea area, mainly in Ne'ot Hakikkar and the northern Arava Valley. *C. fibigeri* is a rare and localized species.

Bionomics: in Israel this is a bivoltine, oasis species that flies from March to April and from October to November. Host Plants: unknown.

Caradrina atriluna (Guenée, 1852)

General distribution pattern: Afro-Tropical. *C. atriluna* is widespread in Tropical and Subtropical Africa, the Arabian Peninsula, Iran, Turkey, Israel, Lebanon, Jordan and Sinai (Egypt). In Israel this species is found along the Rift Valley throughout all the climatological regions in the Northern Negev and in the Southern Coastal Plain. It is widespread and common in the Rift Valley but elsewhere is rare and localized.

Bionomics: in Israel *C. atriluna* is a multivoltine, steppe species that flies from October through the winter to June with the highest rate of occurrence from January to March. In the Yizre'el Valley and the Dead Se area, it can be found year round. Host Plants: in Israel this species is probably polyphagous, but so far larvae were only found on *Pistacia atlantica* trees and on *Prosopis farcta* bushes.

Subgenus *Eremodrina* Boursin, 1937

Caradrina zernyi (Boursin, 1936)

General distribution pattern: Irano-Turanian. *C. zernyi* Southern Russia, Greece, Turkey, Iraq, Western Iran and southwards to Israel where, in the Temperate region, it can be found on Mt. Hermon from about 1000-2000 m a.s.l. This is a rare and localized species.

Bionomics: in Israel *C. zernyi* is a univoltine, autumn, grassland species, so far observed only in October. In Turkey, they fly from August to September. Host Plants: unknown.

Caradrina flava (Oberthür, 1876)

General distribution pattern: Pan Eremic. *C. flava* can be found throughout the Sahara to the Arabian Peninsula, Israel, Jordan, Levant, Iran and Iraq. In Israel they inhabit the Rift Valley throughout all the climatological regions. They are fairly common in the arid part of the Rift Valley but become increasingly rare and localized towards the north.

Bionomics: in Israel *C. flava* is a bivoltine, deserticolous species which flies from October to December and from February to April. Specimens of the spring generation are generally larger and darker. Host Plants: unknown.

Caradrina casearia (Staudinger, 1900)

General distribution pattern: North African Eremic. *C. casearia* can be found in Morocco, Algeria, Tunisia, Libya, Israel and Jordan. In Europe it is found only in Spain. In Israel this species can be found throughout the Arid region and along the Southern Coastal Plain. It is locally common in the Arava Valley and along the Southern Coastal Plain but is rare elsewhere.

Bionomics: in Israel *C. casearia* is a univoltine, autumn, deserticolous species that flies from October to December. Host Plants: unknown.

Caradrina kravchenkoi Hacker, 2004

General distribution pattern: probably endemic of the Levant. So far this species has only been recorded from Israel but is probably also found in Jordan. In Israel it can be found in the Arid region in the Northern Arava Valley, mainly in Nahal Neqarot. It is uncommon and very localized.

Bionomics: *C. kravchenkoi* is a univoltine, autumn, deserticolous species that flies from October to November. Host Plants: unknown.

Caradrina vicina (Staudinger, 1870)

General distribution pattern: East Mediterranean - Central Asian. *C. vicina* can be found from Central Italy eastwards to Bulgaria, the European part of Southern Russia, Eastern and Central Turkey, Israel, Lebanon, Iran to Central Asia. In Israel it can be found in the Temperate region on Mt. Hermon from about 1000 m a.s.l. upwards. It is a rare and localized species.

Bionomics: in Israel *C. vicina* is a univoltine, autumn, grassland species that flies from August to October. Host Plants: unknown.

Caradrina alfierii (Boursin, 1937)

General distribution pattern: Irano-Turanian, Arabian Eremic. This species can be found in Iran, Israel, Jordan, Sinai (Egypt) and Saudi Arabia. In Israel it inhabits the Arid region along the Arava Valley and its larger tributaries. It is rare and localized.

Bionomics: in Israel *C. alfierii* is a univoltine, autumn, deserticolous species that flies in November. Host Plants: unknown.

Caradrina melanurina (Staudinger, 1901)

General distribution pattern: Irano-Turanian Eremic. This species can be found on the Arabian Peninsula, in Israel, Syria, Jordan and East Egypt. In Israel, it is found along the arid part of the Rift Valley. It is abundant in the Dead Sea area but elsewhere is only locally common.

Bionomics: in Israel *C. melanurina* is a univoltine, autumn, deserticolous species that flies from October to November and only occasionally in spring. Host Plants: according to WILTSHIRE (1948) they are polyphagous on different low plants or even grasses.

Subgenus *Levantrina* Hacker, 2004

Caradrina bodenheimeri (Draudt, 1934)

General distribution pattern: Irano-Turanian - Central Asian, Arabian. This species is widespread in the Near and Middle East. It can be found from South-east Turkey, Israel, Lebanon, Jordan and Iran to Central Asia and Saudi Arabia. In Israel it is common, or even abundant in the Semi-arid region but is less common and more localized in the Coastal Plain.

Bionomics: in Israel *C. bodenheimeri* is a bivoltine, deserticolous species that flies from October to December and from February to April. The flight period in autumn can be reduced or absent. Host Plants: unknown.

Genus *Hoplodrina* Boursin, 1937

Hoplodrina ambigua ([Denis & Schiffermüller], 1775)

General distribution pattern: Western Palearctic. This species can be found in Southern and Temperate Europe, Morocco, Algeria, Tunisia, Egypt, Israel, Lebanon, Jordan, Syria, Iraq, Iran, towards Central Asia and Southern Siberia. In Israel *H. ambigua* can be found throughout the Temperate and Semi-arid regions and is generally a lowland species. It is uncommon in the Temperate region, in the Hula Valley and is elsewhere rare.

Bionomics: in Israel this species is a multivoltine, steppe species that flies year round with the highest rate of occurrence from April to May and to a smaller extent from October to November. Host Plants: in Europe it is polyphagous on low plants including *Rumex* spp.Genus *Scythocentropus* Speiser, 1902

Scythocentropus eberti Hacker, 2001

General distribution pattern: probably endemic of the Levant. *S. eberti* has only been recorded from Israel and Jordan. In Israel it can be found in the Arid region; in the arid parts of the Rift Valley along the Arava Valley and the Dead Sea area. It is uncommon and localized.

Bionomics: in Israel this is a univoltine, autumn, deserticolous species that flies from October to November with the highest rate of occurrence in November. Host Plants: unknown.

Scythocentropus inquinata (Mabille, 1888)

General distribution pattern: Pan-Eremic. This species can be found in Morocco, Algeria, Tunisia, the Western and Central Sahara, Israel, Syria, Jordan, Sinai (Egypt), the Arabian Peninsula, Iraq, Iran, Turkey,

Pakistan and Northern India. In Israel it is widespread in the Arid and Semi-arid regions and is also found in the Temperate region along the Southern Coastal Plain. It is uncommon in the Semi-arid region and rare along the Coastal Plain.

Bionomics: in Israel *S. inquinata* is a univoltine, autumn, deserticolous species that flies from September to December with the highest rate of occurrence in November. Host Plants: unknown.

Genus *Diadochia* Püngeler, 1914

Diadochia stigmatica Wiltshire, 1984

General distribution pattern: Arabian Eremic. Western Saudi Arabia, Israel and Jordan. In Israel: in the Arid region, along the arid part of the Rift Valley from Eilat to the northern part of the Arava Valley, especially in Shezaf Nature Reserve and Hazeva. Wide spread but only locally common.

Bionomics: in Israel univoltine, autumn, deserticolous species, flying in November. Host Plants: the larvae of Central Asian congeners develop from April to May on *Salsola arbuscula* and *Salsola richteri*.

Genus *Heterographa* Staudinger, 1877

Heterographa puengeleri Bartel, 1904

General distribution pattern: North African, Arabian Eremic. This species can be found from Mauretania and Morocco to Libya, Israel, Jordan and the Arabian Peninsula. In Israel it is found in the Arid region, along the arid part of the Rift Valley. Locally, it is fairly common in the Dead Sea area but is elsewhere rare.

Bionomics: in Israel *H. puengeleri* is probably a bivoltine, deserticolous species that flies from October through winter to May with the highest rate of occurrence in October and March. Host Plants: unknown.

Genus *Catamecia* Staudinger, 1897

Catamecia minima (Swinhoe, 1889)

General distribution pattern: Pan-Eremic. This species can be found in Mauretania, Morocco, Algeria, Tunisia, Libya, Egypt, Sudan, the Arabian Peninsua, Israel, Jordan, Sinai (Egypt), Iraq towards North-western India. In Israel it is found in the Arid region. In the Dead Sea area, it can be found in the large oases especially in Jericho, 'En Gedi and Ne'ot Hakikkar. It is locally common.

Bionomics: in Israel *C. minima* is a multivoltine, oasis species that flies year round with the highest rate of occurrence in March, May, July and from September to November. Host Plants: unknown.

Results and discussion

Today 3 species of the tribe Prodeniini, genus *Spodoptera*, and 31 species of the tribe Caradrinini, 25 of these belonging to the genus *Caradrina*, are known from Israel. *Caradrina hypostigma* is new for the fauna of Israel and was previously known only from Lebanon (HACKER, 2004). Three species collected within the Israeli-German project were recently described from the Arava Valley: *Caradrina fibigeri*, *Caradrina kravchenkoi* and *Scythocentropus eberti* (HACKER, 2001; 2004).

About one third of the species (11) are of Eremic origin (Arabian Eremic, Irano-Turanian eremic, North African eremic and Pan-Eremic). Six species are Irano-Turanian; five are Mediterranean, or Mediterranean - Central Asian; four are Afro-, or Paleo-Tropical; three are Western Palearctic. Five must probably be considered as endemics of the Levant: *Caradrina hypostigma* is only recorded from Lebanon and northern Israel; *Caradrina amseli* from Israel, Lebanon and Jordan, *Caradrina fibigeri* from Israel and so far only from some big oases in the Dead Sea area, mainly in Ne'ot Hakikkar and the northern Arava Valley; *Caradrina kravchenkoi* from Israel in the Northern Arava Valley, mainly in Nahal Neqarot; and *Scythocentropus eberti* which occurs in Israel and Jordan along the Arava Valley and the Dead Sea area.

Three species of genus *Spodoptera* (*S. exigua*, *S. littoralis* and *S. cilium*) are abundant or at least com-

mon throughout most of the country, avoiding only extreme deserts and the upper part of Mt. Hermon. Another three species: *Caradrina levantina*, *Caradrina amseli* and *Caradrina clavipalpis* are widely distributed but rare or only fairly common in certain localities. Two species are locally abundant: *Caradrina melanurina* is often one of the dominant noctuid species in the Dead Sea area in November, while *Scythocentropus inquinata* is one of the dominant species in the Northern Negev. Other species range from common to localized and rare. *Caradrina aspersa* which was first reported by KALCHBERG (1897) from Haifa has not been seen since the 1930's.

Seventeen species occur predominantly in Arid regions, rarely penetrating the Semi-arid parts of the country; seven of them are restricted to the Arid and Semi-arid parts of the Rift Valley (Arava Valley, Jordan Valley). Most of the Arid species occur in the periphery of oases and wet salinas, in different shrub and semi-shrub communities often dominated by *Atriplex* ssp. Only species of the subgenus *Eremodrina* (genus *Caradrina*), the genera *Scythocentropus* and *Diadochia* are true deserticolous species typically found in shallow wadis with gravel, rocks, and scattered trees and bushes like *Tamarix aphyla*, *Acacia tortilis*, *Ochradenus baccatus*, and patches of different annuals and perennial grasses. *Scythocentropus eberti* is a psammophilous species which is mainly found on un-consolidated sand dunes in the southern Arava Valley.

Only four species: *Caradrina panurgia*, *Caradrina agrotina*, *Caradrina zernyi* and *Caradrina vicina* are specific for Mt. Hermon occurring on montane steppes on medium elevations.

Most (23 of 34) of the Prodeniini and Caradrinini are bi-, or multivoltine species with the highest rate of occurrence in spring (April, May) and in autumn (October, November). The univoltine species are predominantly deserticolous, autumnal (November) species.

The host plants of most of species (22 of 34) are unknown. The species of the genus *Spodoptera* are extremely polyphagous. *Spodoptera* (*Prodenia*) *littoralis* is a well known pest of cabbages, *Chrysanthemum*, *Hibiscus*, alfalfa, beet, peanuts and cotton, and even some trees and (*Populus* spp. and *Ulmus* spp., *Atriplex halimus* and *Nitraria retusa*). Species of the genus *Hoplodrina* are often polyphagous on low herbs (*Rumex* sp. *Taraxacum* sp., *Plantago* sp., *Stellaria* sp., *Campanula* sp., *Lamium* sp.).

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