

**An annotated checklist of the Noctuoidea of Jordan with remarks on ecology, phenology and zoogeography. Part VI. Noctuidae: Acontiinae, Acronictinae, Bagisarinae, Bryophilinae, Condicinae, Dilobinae, Eriopinae, Eustrotiinae, Heliiothinae, Metoponiinae, Plusiinae, and Psaphidinae**

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**ABSTRACT**

Within the framework of the German-Israeli *Lepidoptera Fauna of the Levant* project during 1998–2010, a list of the presently known species of the Plusiinae (12 species), Acontiinae (10), Bryophilinae (10), Heliiothinae (8), Metoponiinae (7), Eustrotiinae (4), Acronictinae (3), Condicinae (3), Psaphidinae (2), Bagisarinae (1), Dilobinae (1), and Eriopinae (1) is presented. Altogether 62 species of these subfamilies have been found in Jordan with 22 of them (35.5%) being new records. High representativeness of species in comparison with the Levant fauna shown for the Acontiinae, Bryophilinae, Metoponiinae and Plusiinae ranging from 66.7–71.4%. The Heliiothinae of Jordan are represented by 80% of species found in the Levant. The subfamily Acronictinae represented in Jordan only by 30% of the Levant fauna is substantially impoverished due to the lack of riverine forests, which are uncommon in Jordan. The total fauna of Jordanian Noctuoidea is represented by 364 species.

**KEYWORDS:** Lepidoptera, Noctuidae, Middle East, Jordan, owlet moths, distribution, new records.

**INTRODUCTION**

Within the framework of the German-Israeli *Lepidoptera Fauna of the Levant* project we regularly collected Lepidoptera in Jordan for more than 20 years (1998–2010). This project has been a joint effort of the Hebrew University and Tel Aviv University in Israel and the Zoologische Staatssammlungen und Museum Witt, München, in Germany (Müller *et al.* 2006; Kravchenko *et al.* 2007a, b). Previous publications were mainly based on material collected within the first ten years of the project (Hacker & Schreier 2001; Hacker 2001; Hacker *et al.* 2001). Over last years we intensified our efforts, and other entomologists started

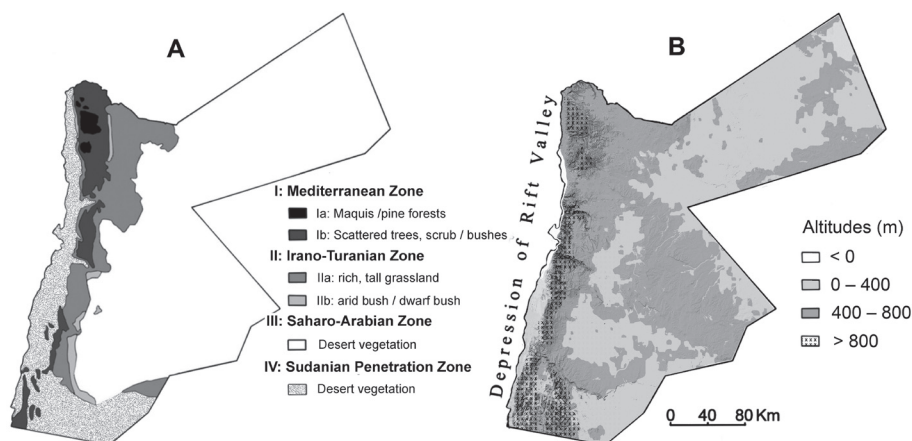
to explore the fauna of Jordan (Fabiano & Zilli 1998; Stadie & Lehmann 2012; Katbeh-Bader 2013). To date, species composition of the subfamilies Catocalinae, Cuculliinae, Oncocnemidinae, Noctuidae, Xyleninae, Noctuidae and Hadeninae have been published (Kravchenko *et al.* 2015a–e). The remaining 12 ‘smaller’ subfamilies are treated here. These are Plusiinae (12 spp.), Acontiinae (10 spp.), Bryophilinae (10 spp.), Heliiothinae (8 spp.), Metoponiinae (7 spp.), Eustrotiinae (4 spp.), Acronictinae (3 spp.), Condicinae (3 spp.), Psaphidinae (2 spp.), Bagisarinae (1 sp.), Dilobinae (1 sp.), and Eriopinae (1 sp.). Altogether 62 species of these subfamilies have been found in Jordan, with 22 spp. (35.5%) being new records.

### MATERIAL AND METHODS

The collected material, methods, and a discussion of phyto-geographical zones, climate and topography of Jordan (Fig. 1) are covered elsewhere (Kravchenko *et al.* 2015a). All species mentioned in the present paper (Table 1) are typically well attracted to UV light after midnight and accordingly well covered by the light trap survey.

### RESULTS AND DISCUSSION

The subfamily Plusiinae includes about 300 species (Speidel *et al.* 1996), which are abundant mostly in mesophilous habitats worldwide. Many species have homodynamic life cycle (continuous development, with no interruption by the diapause), therefore they occur all year around. In the Levant, 18 species are



**Fig. 1:** (A) Map of vegetation and bioclimatic areas of Jordan (modified after Kosswing (1955), Long (1957), Kürschner (1986), Al-Eisawi (1996) and (NCSA. 2006); (B) topographic map of Jordan.

**Table 1:** Species of Noctuidae and their distribution in main vegetation zones of Jordan. Main vegetation zones: I – Mediterranean Zone, Ia – Maquis/pine forests, Ib – Park forests, scattered trees, scrub/bushes; II – Irano-Turanian Zone, IIa – rich, tall grassland, IIb – arid bush/dwarf bush communities; III – Saharo-Arabian Zone; IV – Sudanian Penetration Zone. Abbreviations: X – principal distribution of species, N – new records for Jordan.

SPECIES	N	Vegetation Zones					
		Ia	Ib	IIa	IIb	III	IV
<b>Subfamily Plusiinae</b>							
1. <i>Macdunnoughia confusa</i> (Stephens, 1850)	N	X					
2. <i>Autographa gamma</i> (Linnaeus, 1758)		X	X	X	X	X	X
3. <i>Cornutiplusia circumflexa</i> (Linnaeus, 1767)		X	X	X	X	X	X
4. <i>Thysanoplusia daubei</i> (Boisduval, 1840)	N				X	X	X
5. <i>Thysanoplusia orichalcea</i> (Fabricius, 1775)	N	X	X				
6. <i>Agrapha accentifera</i> (Lefèbvre, 1827)	N	X					
7. <i>Trichoplusia ni</i> (Hübner, 1803)		X	X	X	X	X	X
8. <i>Trichoplusia circumscripta</i> (Freyer, 1831)		X					
9. <i>Chrysodeixis chalcites</i> (Esper, 1789)		X	X	X	X	X	X
10. <i>Euchalcia olga</i> Kravchenko <i>et al.</i> , 2006					X		
11. <i>Euchalcia maria</i> (Staudinger, 1892)					X		
12. <i>Euchalcia paulina</i> (Staudinger, 1892)				X			
<b>Subfamily Eustrotinae</b>							
13. <i>Euloastra diaphora</i> (Staudinger, 1879)			X	X	X		X
14. <i>Pseudozarba bipartita</i> (Herrich-Schäffer, 1850)	N			X			
15. <i>Pseudozarba mesozona</i> (Hampson, 1896)	N						X
16. <i>Ozarba sancta</i> (Staudinger, 1900)							X
<b>Subfamily Bagisarinae</b>							
17. <i>Xanthodes albago</i> (Fabricius, 1794)	N	X					
<b>Subfamily Acontiinae</b>							
18. <i>Acontia trabealis</i> (Scopoli, 1763)		X	X				
19. <i>Acontia titania</i> (Esper, 1798)	N	X					
20. <i>Acontia lucida</i> (Hufnagel, 1766)		X	X	X	X	X	X
21. <i>Acontia biskrensis</i> (Oberthür, 1887)							X
22. <i>Hoplotarache caeruleopicta hemipentha</i> Wiltshire, 1947							X
23. <i>Armada panaceorum</i> (Ménétrières, 1849)						X	X

**Table 1:** Species of Noctuidae and their distribution in main vegetation zones of Jordan. (continued)

24. <i>Armada maritima</i> Brandt, 1939	N						X
25. <i>Tarachephia hueberi</i> (Ershov, 1874)	N						X
26. <i>Aedia leucomelas</i> (Linnaeus, 1758)	N	X					
27. <i>Aedia funesta</i> (Esper, 1786)	N	X					
<b>Subfamily Dilobinae</b>							
28. <i>Diloba caeruleocephala</i> (Linnaeus, 1758)		X	X				
<b>Subfamily Acronictinae</b>							
29. <i>Simyra dentinosa</i> Freyer, 1839		X	X				
30. <i>Acronicta aceris</i> (Linnaeus, 1758)		X	X				
31. <i>Acronicta rumicis</i> (Linnaeus, 1758)		X	X				
<b>Subfamily Metoponiinae</b>							
32. <i>Aegle semicana</i> (Esper, 1798)		X					
33. <i>Aegle rebeli</i> Schawerda, 1923	N					X	X
34. <i>Aegle ottoi</i> (Schawerda, 1923)					X		
35. <i>Megalodes eximia</i> (Freyer, 1845)		X					
36. <i>Tyta luctuosa</i> (Denis & Schiffermüller, 1775)		X					
37. <i>Epharmottomena eremophila</i> (Rebel, 1895)	N					X	
38. <i>Iranada turcorum</i> (Zerny, 1915)						X	
<b>Subfamily Psaphidinae</b>							
39. <i>Allophytes benedictina</i> (Staudinger, 1892)		X					
40. <i>Allophytes asiatica</i> (Staudinger, 1892)	N	X					
<b>Subfamily Heliiothinae</b>							
41. <i>Heliothis viriplaca</i> (Hufnagel, 1766)		X					
42. <i>Heliothis nubigera</i> Herrich-Schäffer, 1851		X	X	X	X	X	X
43. <i>Heliothis peltigera</i> (Denis & Schiffermüller, 1775)		X	X	X	X	X	X
44. <i>Heliothis incarnata</i> (Freyer, 1838)		X					
45. <i>Helicoverpa armigera</i> (Hübner, 1808)		X	X	X	X	X	X
46. <i>Periphanes treitschkei</i> (Frigvaldsky, 1835)	N			X			
47. <i>Aedophron phlebohora</i> Lederer, 1858				X			
48. <i>Masalia albida</i> (Hampson, 1905)	N						X

**Table 1:** Species of Noctuidae and their distribution in main vegetation zones of Jordan. (continued)

Subfamily Condicinae							
49. <i>Condica conducta</i> Walker, 1857			X				
50. <i>Condica viscosa</i> (Freyer, 1831)			X	X			
51. <i>Condica palaestinensis</i> (Staudinger, 1895)	N						X
Subfamily Eriopinae							
52. <i>Calloplistria latreillei</i> (Duponchel, 1827)	N	X					
Subfamily Bryophilinae							
53. <i>Cryphia algae</i> (Fabricius, 1775)	N	X					
54. <i>Cryphia ochsi</i> (Boursin, 1941)	N	X	X				
55. <i>Cryphia tephrocharis</i> Boursin, 1953		X					
56. <i>Cryphia rectilinea</i> (Warren, 1909)	N	X					
57. <i>Cryphia raptricula</i> (Denis & Schiffermüller, 1775)		X					
58. <i>Cryphia petrea</i> (Guenée, 1852)		X					
59. <i>Cryphia maeonis</i> (Lederer, 1865)			X				
60. <i>Cryphia paulina</i> (Staudinger, 1892)						X	X
61. <i>Cryphia amasina</i> (Draudt, 1931)		X					
62. <i>Victrix klapperichi</i> Hacker, 2001		X					

presently known with 12 of them found in Jordan. Four species are new for the country (*M. confusa*, *T. daubei*, *T. orichalcea*, and *A. accentifera*). A set of polyphagous species (*A. gamma*, *T. orichalcea*, *T. ni*, and *C. chalcites*) inhabiting lush herbaceous vegetation is found all over country in the Mediterranean Zone and in oases and garden vegetation in settlements in the arid part of the country. Three species of the genus *Euchalcia* occur in the steppe biome, in tall grassland and arid bush/dwarf bush communities. Five of the Levantine species are not found in Jordan. Those are two rare local *Euchalcia* species, viz. *E. augusta* (Staudinger, 1891) and *E. hedeja* Dufay, 1978; *Diachrysis chrysitis generosa* (Staudinger, 1900) known only from Lebanon (Hacker 2001); *Abrostola clarissa* (Staudinger, 1900) inhabiting forest clearings and edges in Israel, Lebanon and Syria, but being unseen in the Levant for over 100 years; and *Trichoplusia vittata* (Wallengren, 1856), a well known Afrotropical migrant and pest of vegetables in Africa, which has been rarely collected on the Mediterranean coastal plain of Israel (Kravchenko *et al.* 2007b).

Species of the subfamily Eustrotiinae inhabit arid and semi-arid zones of Jordan and occur mostly in spring and autumn. The subfamily is represented in the Levant by eight species (Hacker 2001) with four found in Jordan. Two species, *P. bipartita*

and *P. mesozona*, are new for the country. Four Levantine species are not recorded in Jordan. These are *Ozarba lascivalis* (Ledere, 1855) known only from Lebanon, *Eulocastra tapina* (Hampson, 1910) collected only once and labelled "Palestine", *Thalerastria alferii* Wiltshire, 1948 and *Th. insignis* (Butler, 1884) recorded only from Sinai.

The subfamily Bagisarinae comprises only about 30 species worldwide (Speidel *et al.* 1996). The only species rarely found in Mediterranean habitats of Lebanon, Israel and Jordan is *Xanthodes albago*.

The subfamily Acontiinae includes 14 species in the Levant (Hacker 2001), with 10 of them found in Jordan. One polyphagous species, *Acontia lucida*, occurs practically in all vegetation zones of Jordan while in deserts it concentrates in oases. Four species, *Acontia trabealis*, *A. titania*, *A. leucomelas* and *A. funesta*, are locally common in grasslands of the Mediterranean Zone in Maquis/pine forests, parks and on scattered trees and scrub/bushes. Five species are eremic and occur only in the Saharo-Arabian and Sudanian Penetration zones. These are *Acontia biskrensis*, *Hoplotarache caeruleopicta hemipentha*, *Armada panaceorum*, *A. maritima* and *Tarachephia hueberi*. Four species inhabiting Middle Eastern deserts and occurring also on Sinai are still unknown in Jordan: *Armada nilotica* A. Bang-Haas, 1912, *Armada philbyi* Wiltshire, 1979, *Acontia crassivalva* Wiltshire, 1947 and *Acontia carnescens* (Hampson, 1910).

The monobasic subfamily Dilobinae is represented by the only species *Diloba caeruleocephala*, which is polyphagous on a variety of broadleaf trees and wide spread all over the Mediterranean Zone of Jordan.

The subfamily Acronictinae is represented by only three species occurring in the Mediterranean Zone of Jordan compared to 10 species known in the Levant (Hacker 2001). These are grassland species *Simyra dentinosa*, *Acronicta aceris* and *A. rumicis* occurring mainly in riverine forests. Other seven Levantine species of *Acronicta* are found mainly in riverine forests of Lebanon and northern Israel.

The subfamily Metoponiinae is represented by seven species, with *Aegle rebeli* and *Epharmottomena eremophila* being new for the country. Compared to 10 species known from the Levant in general, three species are absent. These are *A. exquisita* Boursin, 1969 from the Negev desert and two Mediterranean species of the genus *Haemerosa*, *H. renalis* (Hübner, 1813) and *H. vassilini* A. Bang-Haas, 1912, known from the Mediterranean part of Israel and Lebanon.

The subfamily Psaphidinae is represented by two rare winter species of the genus *Allophyes*, *A. benedictina* and *A. asiatica*, both new for the country and occurring in the Mediterranean Zone of Jordan. Other three Levantine species of the Psaphidinae belong to the genus *Valeria* and are found in Lebanon and northern Israel.

The subfamily Heliiothinae is represented by eight grassland species, with two species new for the country. These are *Periphanes treitschkei* inhabiting montane steppes in the Irano-Turanian Zone and *Masalia albida* occurring locally in the Sudanian Penetration Zone. *Helicoverpa armigera*, *Heliiothis nubigera* and

*H. peltigera* can be found practically all over the country concentrating in desert oases. Two rare *Heliopsis* species, *H. viriplaca* and *H. incarnata*, are collected in the Mediterranean Zone. Two Levantine species still not collected in Jordan are *Schinia scutosa* (Denis & Schiffermüller, 1775) and *Periphanes delphinii* (Linnaeus, 1758).

The subfamily Condicinae is represented in the Levant by three species, i.e. *Condica viscosa* (Freyer, 1831) occurring in all countries, *Condica palaestinensis* being new for Jordan and occurring in oases of the Sudanian Penetration Zone and *Condica conducta* (Walker, 1857) known only in Sinai (Hacker 2001).

The subfamily Eriopidae is represented in the Levant by a single species, *Callopietria latreillei*, developing on fern. The species has been known from the Levant and Israel and presently found also in the Mediterranean Zone of Jordan.

The Bryophilinae are mostly small-sized Lepidoptera with larvae feeding on lichens. Out of 14 species known from the Levant (Hacker 2001) ten are found in Jordan. Three of them are new records for the country, viz. *Cryphia algae*, *C. ochsi* and *C. rectilinea*. Most of the Jordanian Bryophilinae species occur in the Mediterranean Zone of the country. Only *Cryphia paulina* is a typical desert species occurring in Jordan in the Sudanian Penetration Zone. Four species are absent from Jordan: *Cryphia amseli* Boursin, 1952 known by a single specimen from its type locality in Jericho, Israel; *Cryphia labecula* (Lederer, 1855), an endemic of the Levant known from Lebanon and northern Israel; and two species of mountain steppes of Lebanon and Anti-Lebanon mountain ridges, *Victrix tabora* (Staudinger, 1892) and *Victrix marginelota* (De Joannis, 1888).

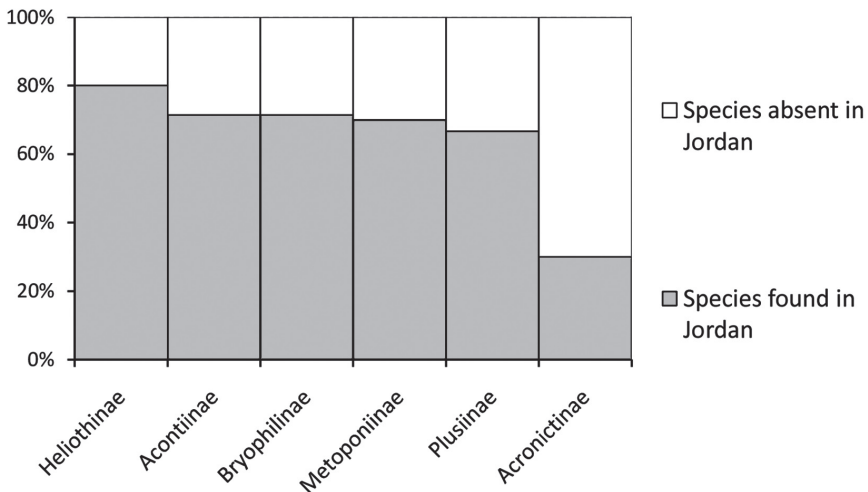


Fig. 2: Shares of selected Noctuidae subfamilies in Jordan.

**Table 2:** Number of Noctuoidea species that occur in the Levant and Jordan.

Family/Subfamily	Levant	Jordan	New for Jordan
Erebidae	133	94	26
Euteliidae	2	2	0
Noctuidae			
Cuculliinae	22	11	2
Oncocnemidinae	40	28	3
Hadeninae	66	39	10
Xyleninae	168	84	33
Noctuinae	93	44	3
Plusiinae	18	12	4
Acontiinae	14	10	5
Bryophilinae	14	10	3
Heliothinae	10	8	2
Metoponiinae	7	7	2
Eustrotinae	8	4	2
Acronictinae	10	3	0
Condicinae	4	3	1
Psaphidinae	5	2	1
Bagisarinae	1	1	1
Dilobinae	1	1	0
Eriopinae	1	1	0
TOTAL:	617	364	98

### CONCLUSION

In total, 62 species of Acontiinae, Acronictinae, Bagisarinae, Bryophilinae, Condicinae, Dilobinae, Eriopinae, Eustrotinae, Heliothinae, Metoponiinae, Plusiinae and Psaphidinae have been found in Jordan, with 22 species (35.5%) being new records. The comparison of the number of species known in the Levant and those found in Jordan for subfamilies with more than 10 species (Fig. 2) shows that the Acontiinae, Bryophilinae, Metoponiinae and Plusiinae are well represented, ranging from 66.7–71.4%. The Heliothinae of Jordan are even better represented, with 80% of species known in the Levant including all ubiquitous and most specific mountain steppe and desert elements. On contrast, the subfamily Acronictinae is impoverished in Jordan, with only 30% of the Levant fauna. This phenomenon is



explained by the ecological preferences of the majority of the subfamily species that dwell in riverine forests, which are uncommon in Jordan.

Summarizing the existing knowledge of the Noctuoidea of Jordan (Kravchenko *et al.* 2015a–e; present paper), one may encounter 364 species out of 617 species known in the Levant (Table 2). Thus the Jordanian fauna represents 59% of the Levantine assemblage and 66% of Israeli fauna, where 550 species of Noctuoidea have been recorded. Eight-and-ninety Noctuoidea species (26.9%) have been recorded in Jordan for the first time during this survey.

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