

Morphology and taxonomy of the species belonging to the genus *Myinodes* Meyrick, 1892 (Lepidoptera : Geometridae)

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Summary

Two new species and one new subspecies of the genus *Myinodes* Meyrick, 1892 are described : *Myinodes interpunctaria atlantica* ssp. n. from Spain, *Myinodes constantina* sp. n. from Algeria and *Myinodes shohami* sp. n. from Jordan. Until recently, the genus was considered to be monotypical, with *M. interpunctaria* (Herrich-Schäffer, 1839) the only known species.

Zusammenfassung

Myinodes interpunctaria (Herrich-Schäffer, 1839) war in der Literatur bisher stets als einzige Art (Typusart) der Gattung *Myinodes* betrachtet worden. Eine genauere morphologische Analyse ergab, daß die aus Nordafrika, Südeuropa und Vorderasien bekannten Populationen einen aus mehreren verschiedenen Arten bestehenden Komplex bilden. In der vorliegenden Arbeit werden zwei neue Arten und eine neue Unterart beschrieben : *Myinodes interpunctaria atlantica* ssp. n. aus Spanien, *Myinodes constantina* sp. n. aus Algerien und *Myinodes shohami* sp. n. aus Jordanien.

Résumé

Description de deux nouvelles espèces et d'une nouvelle sous-espèce du genre *Myinodes* Meyrick, 1892 : *Myinodes interpunctaria atlantica* ssp. n. d'Espagne, *M. constantina* sp. n. d'Algérie et *M. shohami* sp. n. de Jordanie. Jusqu'à tout récemment, ce genre était considéré comme monotypique avec *M. interpunctaria* (Herrich-Schäffer, 1839) comme seule espèce connue.

Until recently, the genus *Myinodes* Meyrick, 1892 was considered to comprise only the species *interpunctaria* (Herrich-Schäffer, 1839). Detailed morphological studies have revealed, however, that the populations known from northern Africa, southern Europe and the Middle East constitute a complex of different species. In this paper two new

species and one new subspecies are described : *Myinodes interpunctaria atlantica* ssp. n. from Spain, *Myinodes constantina* sp. n. from Algeria and *Myinodes shohami* sp. n. from Jordan.

Systematic part

Abbreviations :

BUS : Bet Ussishkin Museum, Tel Dan, N.-Israel.

NHMW : Naturhistorisches Museum Wien, Austria.

NLK : Naturkundliche Landessammlungen Karlsruhe, Germany.

TAU : Tel Aviv University Collection, Israel.

ZFMK : Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany.

ZSM : Zoologische Staatssammlung München, Germany.

Myinodes Meyrick, 1892

Eusarca Herrich-Schäffer, 1847 (partim)

Pseudotagma Staudinger, 1892

Type species : *Sterrha interpunctaria* Herrich-Schäffer, 1839 : pl. 6 and wrapper ; by monotypy.

VENATION : Hindwing Sc + R1 and Rs not fused (as in the subfamily Alsophilinae), M2 tubular. Tongue developed, length about 4 mm. Frons strongly convex. Palpi long. Male antennae with two rows of cilia, female antennae simple, finely ciliate beneath. Male and female hindlegs long and slender, with two pairs of long spurs. In the male genitalia uncus developed, often with a subapical lobe ; juxta with caudal excavation ; costal part of valva strongly sclerotized, harpe prominent ; aedoeagus long, slender, with one cornutus, laterally sclerotized (differently in each species). In the female genitalia apophyses weak ; ductus bursae comparatively long and stout ; bursa copulatrix longitudinally ribbed (not in *M. constantina*), without signa, joins ductus bursae laterally on the latter. Ansa of the tympanon apically pointed. In most of these characters very similar to the genus *Eumegethes* Staudinger, 1898.

The systematic position of the genera *Myinodes* and *Eumegethes* is not the subject of this paper, They are usually placed in the subfamily "Oenochrominae" (s.l.). However, they are not closely related with this subfamily (s.str.), which is mainly distributed in SE Asia and Australia, or with the subfamily Alsophilinae.

Myinodes interpunctaria interpunctaria (Herrich-Schäffer, 1839)

Sterrha interpunctaria Herrich-Schäffer, 1839 : pl. 6 and wrapper. Locus typicus : Sicily.

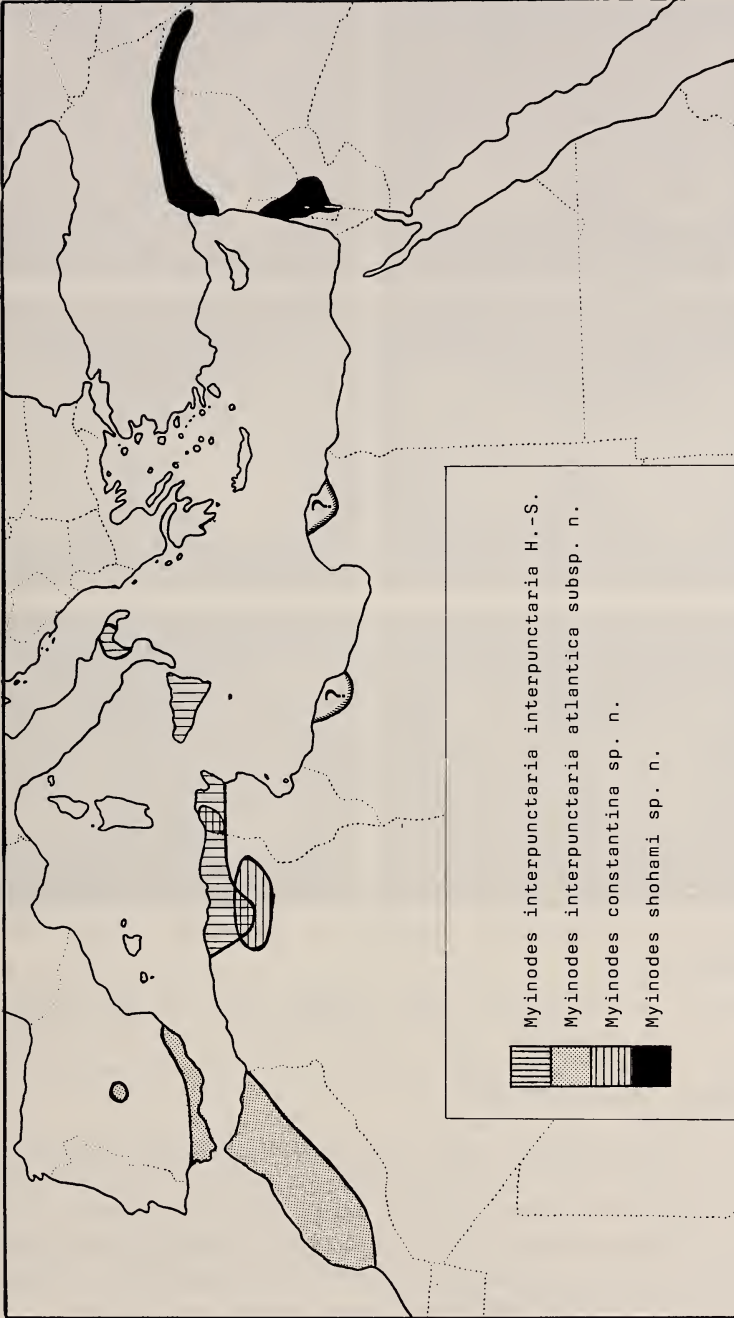


Fig. 1. Distribution of the various taxa of the genus *Myinodes*.

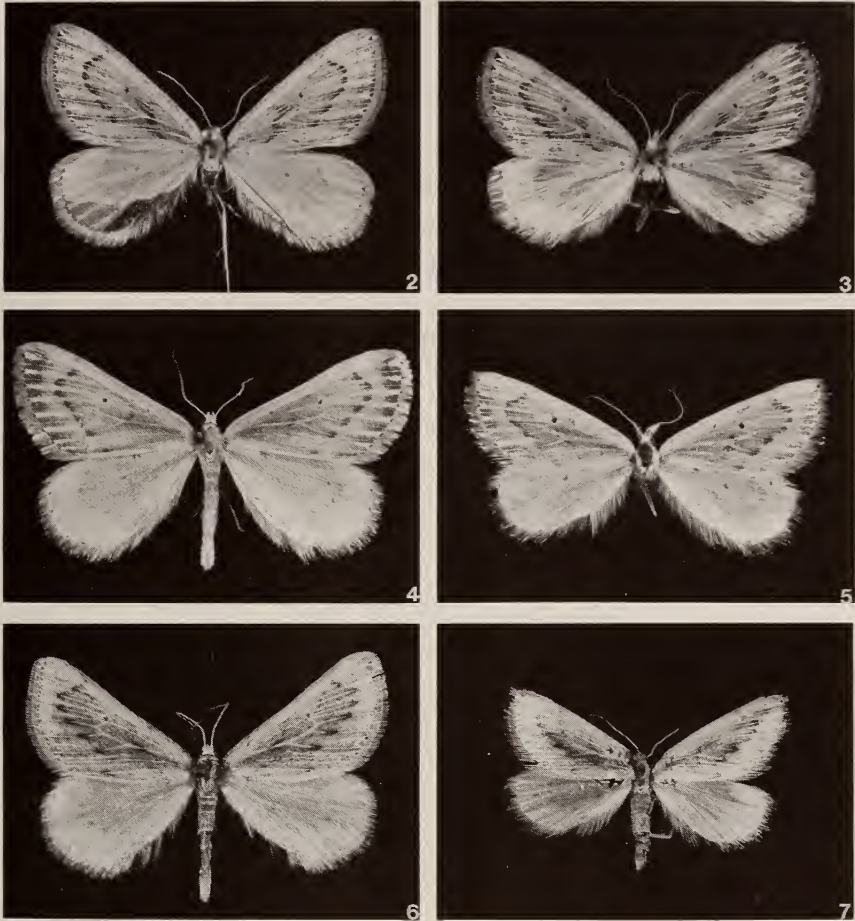
- Sterrha interpunctaria* : Herrich-Schäffer, 1840 : 104.
Eusarca interpunctaria : Herrich-Schäffer, 1847 : 34.
Eusarca interpunctaria : Herrich-Schäffer, 1848 : pl. 64, fig. 390.
Fidonia interpunctaria : Heydenreich, 1851 : 54.
Phasiane? interpunctaria : Lederer, 1853 : 180.
Selidosema? interpunctaria : Guenée, 1857 : 146.
Anisopteryx interpunctaria : Gumpfenberg, 1893 : 396.
Eusarca interpunctaria : Staudinger & Rebel, 1901 : 322.
Eusarca interpunctaria : Spuler, 1904 : 86.
Eusarca interpunctaria : Spuler, 1907 : pl. 71b, fig. 1.
Myinodes interpunctaria : Prout, 1910 : 20, pl. 1, fig. 13.
Myinodes interpunctaria : Prout, 1912a : 4, pl. 1b.
Myinodes interpunctaria : Prout, 1912b : 32.
Eusarca interpunctaria : Culot, 1920 : 49, pl. 45, fig. 932.
Eusarca interpunctaria : Oberthür, 1922 : 307.
?Myinodes interpunctaria : Turati, 1925 : 8.
?Myinos interpunctaria : Krüger, 1939 : 352.
Myinoides interpunctaria : Mariani, 1943 : 81.
Myrinodes interpunctaria : Schmidlin, 1964 : 82.
Myrinodes interpunctaria : Parenzan, 1976 : 162, fig. 6a.
Myinodes interpunctaria : Fletcher, 1979 : 133.

MATERIAL EXAMINED : 1 ♂, Sicily, coll. Failla ; 1 ♂, S. Italy, Basilicata, F. Basento, Trivigno Scalo, 28.III.1977, leg. P. Parenzan, coll. ZSM ; 2 ♂♂, S. Italy, Puglia, Mte. Camplo, Laterza (TA), 21.III.1971, leg. P. Parenzan, coll. ZSM ; 16 ♂♂, Tunisia, Tunis distr., El Gouina, 9.II.-4.III.1960, leg. H.P. Müller, coll. ZSM ; 2 ♀♀, Algeria s., Algier Distr., El Aziza, 26.III.1989, leg. Kuchler jr., coll. K. Kuchler ; 1 ♀, Algeria, Constantine, leg. Olivier, coll. ZFMK ; 1 ♀, Algeria, Guelt-es-Stel, 19.IV.1931, leg. Predota, coll. ZFMK. 7 ♂♂, 3 ♀♀ dissected.

DISTRIBUTION (Fig. 1) : Sicily, S. Italy (Basilicata and Puglia), N. Tunisia, N. Algeria. The local populations of Tripolitania and Cyrenaica have to be preliminarily regarded as belonging to the nominate subspecies.

EXTERNAL MORPHOLOGY : Palpi : length 1.25-1.35 mm, scales dark brown, only upperside white. Frons (Fig. 8) with two projections. Length of cilia of male antenna about 0.14 mm, somewhat exceeding thickness of shaft (0.12 mm).

WINGS : Forewing length, male : 14.0-15.2 mm ; female (Algeria) : 11.4-13.7. Postmedial line very slightly dentate, at inner margin not inclined toward wing base. White intervenal line in subterminal area of forewing apex crossing postmedial fascia. Postmedial line and intervenal lines sharply bordered. Small terminal spots black, trianguliform, surrounded by forked white intervenal line.



Figs 2-7. *Myinodes* spp. 2 — *M. interpunctaria atlantica* ssp. n., ♂, Holotypus ; 3 — *M. interpunctaria atlantica* ssp. n., ♀, Paratypus ; 4 — *Myinodes constantina* sp. n., ♂, Holotypus ; 5 — *M. constantina* sp. n., ♀, Paratypus ; 6 — *M. shohami* sp. n., ♂, Holotypus ; 7 — *M. shohami* sp. n., ♀, Paratypus.

MALE GENITALIA (Fig. 10a-d): Uncus short, with stout subapical processus. In juxta caudal median notch very deep, basis of juxta forked. Valva costa broad, smoothly edged. Caudal directed spine (harpe) prominent, pointed, slightly curved. Basal lobe of harpe strongly convex, with numerous small spines. Aedoeagus slender and long (mean 1.7 mm). Cornutus weakly sclerotised, situated subterminally. Aedoeagus bearing a longitudinal row of about four sharp, stoutly sclerotized teeth in terminal part. In the male from Sicily there are six teeth,

perhaps an individual aberration. In the Tunisian males these teeth are isolated from each other.

FEMALE GENITALIA (Fig. 14): Females examined from Algeria have a comparatively long and narrow ductus bursae, its left lateral margin concave. Bursa copulatrix broad and large, but narrower than in the Spanish subspecies. Caudal edge of lamella postvaginalis convex.

HABITAT: Not above 900 m, mostly from 0-300 m. In Southern Italy abundant in a xerothermic locality (Mte. Camplo) with remnants of Mediterranean macchia.

FLIGHT PERIOD: Beginning of February to mid-April. The Tripolitanian specimen mentioned in KRUGER (*l.c.*) taken in January.

***Myinodes interpunctaria atlantica* subsp. n.** (Figs 2, 3)

Myinodes interpunctaria: Exposito, 1978: 38.

Myiniodes interpunctaria: Rungs, 1981: 223.

HOLOTYPE: ♂, S. Spain, Prov. S. Nevada, Alcolea, 5.IV.1991, leg. Kuchler jr., coll. ZSM, Prep.No. G 6825.

PARATYPES: 1 ♀, S. Spain, Prov. S. Nevada, Alcolea, 1.IV.1991, leg. Kuchler jr., coll. ZSM; 1 ♂, id., 5.IV.1991, leg. Kuchler jr., coll. K. Kuchler; 1 ♂, S. Spain, Fuerte Higuera, Alicante, 2.IV.1993, leg. Kuchler jr., coll. K. Kuchler; 3 ♂♂, S. Spain, Prov. Gador, Beria, 4.IV.1991, leg. Kuchler jr., coll. K. Kuchler; 1 ♂, S. Spain, Prov. Cadiz, Villaluenga, 870m, 13.IV.1986, leg. et coll. A. Exposito; 1 ♂, S. Spain, Prov. Malaga, Ronda, Cmo. Carbonera, 15.-28.III.1972, leg. et coll. A. Exposito; 1 ♂, C. Spain, Toledo, 24.V.1972, leg. J. Calle, coll. A. Exposito; 3 ♂♂, SW. Morocco, Marrakesch, O. Tensift, 12.III.1974, leg. Friedel, coll. M. Sommerer; 1 ♂, id., coll. ZSM; 1 ♀, W. Morocco, Zehroun, Mrassine, 1.-15.III.1921, leg. H. Powell, coll. ZFMK. 7 ♂♂, 3 ♀♀ dissected.

DISTRIBUTION (Fig. 1): C. and S. Spain, W. and N. Morocco.

EXTERNAL MORPHOLOGY: Palpi: Length in both sexes somewhat variable 1.00-1.25 mm, shorter than in nominate subspecies, dark brown, only upperside white. Frons with two projections. Length of cilia of male antenna about 0.11 mm, not exceeding thickness of shaft (0.11 mm).

WINGS: Indistinguishable from *M. i. interpunctaria*. Forewing length, male: 13.6-16.8 mm; female: 13.2-13.8 mm.

MALE GENITALIA (Fig. 11a-d): Uncus, juxta and costal part of the valva similar to *M. i. interpunctaria*. Harpe prominent, pointed, somewhat more curved than in nominate subspecies. Basal lobe of harpe slightly convex, not so heavily rounded. Aedoeagus slender and long



Figs 8, 9. Head of *Myinodes* spp. 8 — *M. interpunctaria* H.-S. ; 9 — *M. constantina* sp. n.

(mean 1.7 mm). Cornutus as in typical *M. i. interpunctaria*. Aedoeagus terminally heavily sclerotized, more than in nominate subspecies, bearing row of 3 or 4 sharp, lateral teeth.

FEMALE GENITALIA (Fig. 15) : Ductus bursae shorter and broader than in specimens from Algeria. Caudal edge of lamella postvaginalis slightly concave. Bursa copulatrix very similar, somewhat broader.

FLIGHT PERIOD : S. Spain mid-March to mid-April ; Morocco first half of March. The very late record from Toledo could indicate a later flight period in C. Spain, but this needs confirmation.

Myinodes constantina sp. n. (Figs 4,5)

HOLOTYPE : ♂, Algeria, Lambèse, II-III.1913, leg. Sari Lakhdar ben Laouès, coll. ZFMK, Prep. No. Hausm. 7910.

PARATYPES : 4 ♂♂, Algeria, Lambèse, II-III.1913, leg. Sari Lakhdar ben Laouès, coll. ZFMK ; 1 ♂, id., coll. ZSM ; 1 ♀, Algeria, Guelt-es-Stel near Boghari, III-IV.1914, leg. Domenech Joseph, coll. ZSM ; 1 ♀, id., coll. ZFMK ; 1, Tunisia, Kroumirie, Soudia, 24.V.1941, leg. Chnéour, coll. ZSM. 3 ♂♂, 2 ♀♀ dissected.

DISTRIBUTION (Fig. 1) : N. Algeria : Saharan Atlas and Constantine district. In Guelt-es-Stel sympatric with *M. interpunctaria*. NW. Tunisia.

EXTERNAL MORPHOLOGY : Palpi : Length in both sexes 1.40-1.60 mm, longer than in the other species, dark brown, upperside and basal scales near tongue white. Frons (Fig. 9) with only one central projection. Length of cilia of male antenna about 0.18 mm, exceeding thickness of shaft (0.12 mm).

WINGS : Forewing length, male : 14.7-15.7 mm ; female : 12.9-13.5 mm. Postmedial line not dentate, at inner margin strongly inclined toward wing base. White intervenal line in forewing apex very short, length about 1/3 of subterminal area. Postmedial line and intervenal lines

indistinctly bordered. Antemedial line completely lacking. Small terminal spots black, punctiform. Intervenial lines near margin not forked, and not encircling terminal spots. Hindwings brighter than in the other species.

MALE GENITALIA (Fig. 12a-d) : Uncus long, with very small subapical processus. Caudal median notch of juxta very deep, caudal lobi pointed, basis convex. Costal part of valva sinus shaped. Harpe prominent, less pointed than in *M. interpunctaria*, strongly curved, without spines. Basal lobe of harpe lacking. Aedoeagus slender and very long (mean 1.9 mm). Cornutus situated subterminally, broader and more sclerotized than in *M. interpunctaria*. Aedoeagus terminally bearing a long digitiform and heavily sclerotized processus without teeth.

FEMALE GENITALIA (Fig. 16) : Ductus bursae long, straight. Bursa copulatrix small, irregularly shaped and not longitudinally ribbed as in the other species.

FLIGHT PERIOD : No precise data available (February to May?).

Myinodes shohami sp. n. (Figs 6, 7)

Pseudotagma interpunctaria : Staudinger, 1892 : 168.

Pseudotagma interpunctaria : v. Kalchberg, 1897 : 182.

Eusarca interpunctaria : Amsel, 1933 : 109.

Myinodes interpunctaria : Wehrli, 1934 : 2.

Eusarca interpunctaria : Bodenheimer, 1937 : 88.

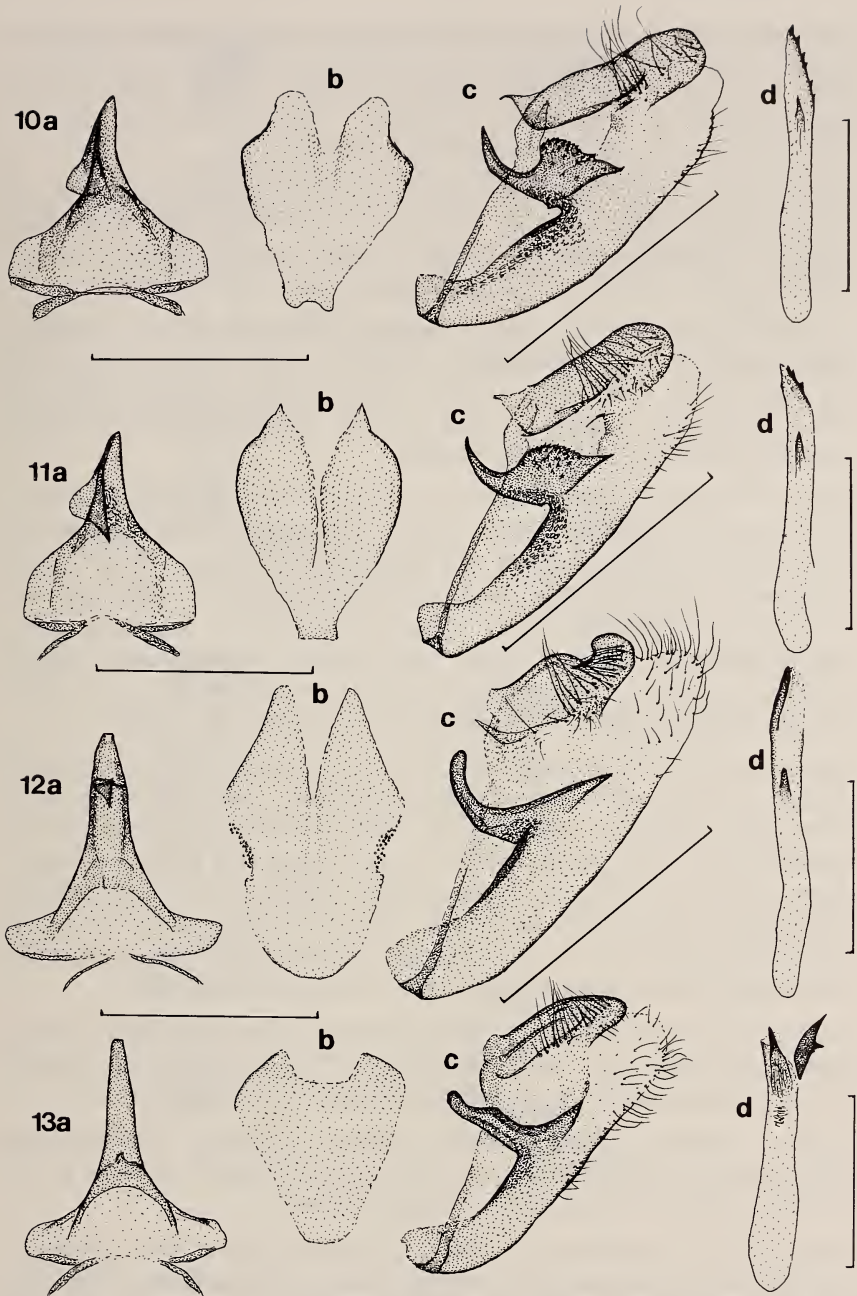
Myinodes interpunctaria : Ellison & Wiltshire, 1939 : 43

Myinodes interpunctaria : Wiltshire, 1957 : 101.

Myinodes interpunctaria : Hausmann, 1991 : 115, pl. 10, fig. 63.

HOLOTYPE : ♂, NE. Jordan, Qasr el Hallabad, 17.II.1958, leg. Klapperich, coll. ZSM

PARATYPES : 1 ♂♀; C. Israel, En Gedi (Dead Sea), January, leg. G. Müller, coll. ZSM ; 1 ♂, id., III.1989 ; 1 ♀, id., 8.III.1989 ; 1 ♂, id., coll. TAU ; 1 ♂, C. Israel, Enot Zuqim (Dead Sea), leg. G. Müller, coll. ZSM ; 3 ♂♂ 1 ♀, N. Israel, N. Ammud, 8.III.-19.III.1991, leg. R. Ortal, coll. ZSM ; 5 ♂♂, id., coll. TAU ; 1 ♂, N. Israel, Hula Reserve, 19.III.1991, leg. R. Ortal, coll. ZSM ; 2 ♂♂, id., 5.-8.III.1992 ; 1 ♂, N. Jordan, Amman, 8.II.1958 ; leg. Klapperich, coll. NLK ; 1 ♀, id., 28.VIII.1967 (date probably mislabelled) ; 1 ♂ 1 ♀, N. Jordan, Rumman, 28.II.1968, leg. Klapperich, coll. NLK ; 1 ♀, id., 28.II.1965, leg. Klapperich, coll. ZSM ; 3 ♂♂, N. Israel, Sede Nehamyia, leg. Shoham, coll. BUS ; 1 ♂, id., coll. S. Yathom ; 1 ♂, N. Israel, Neot Mordehai, leg. Shoham, coll. BUS ; 1 ♂, N. Israel, Gazith, coll. TAU ; 1 ♂, C. Israel, "Palaestina", Tel Aviv, leg. Bodenheimer, coll. NHMW ; 1 ♀, N. Israel, "Syria", Haifa, coll. NHMW. 8 ♂♂, 3 ♀♀ dissected.



Figs 10-13. ♂ genitalia of *Myinodes* spp. 10 — *M. interpunctaria interpunctaria* H.-S. (topotypical: Sicily); 11 — *M. interpunctaria atlantica* ssp. n. (Holotypus); 12 — *M. constantina* sp. n. (Paratypus); 13 — *M. shohami* sp. n. (Paratypus, Jordan); a = Uncus; b = Juxta (scale bar = 0,5 mm). c = valva; d = Aedeagus (scale bar = 1 mm).

FURTHER MATERIAL EXAMINED : About 20 more or less damaged specimens from N. and C. Israel, coll. ZSM ; 1 ♂, "Syria", coll. NHMW ; 1 ♂, id., coll. ZSH ; 1 ♂, "Syria", coll. ZFMK ; 4 ♂♂, S. Turkey, Taurus, Marasch, 600-900m, III.1930, leg. Einh. Slr., coll. ZFMK ; 1 ♂, id., coll. ZSH ; 1 ♂, S. Turkey, Amanus, "Syria", Akbès, 1895, coll. ZFMK.

DISTRIBUTION : C. and N. Israel (AMSEL, 1933), N. Jordan (HAUSMANN, 1991), Lebanon (ELLISON & WILTSHIRE, 1939 : Beirut), S. Turkey (Marasch, Akbès, Mardin ; cf. WEHRLI, 1934) and N. Iraq (WILTSHIRE, 1957). As yet no species of this genus have been found in Egypt.

EXTERNAL MORPHOLOGY : Palpi : Length in both sexes 1.15-1.30 mm, much shorter than in *Myinodes constantina*, dark brown, upperside and basal scales near tongue white. Frons (cf. Fig. 9) with only one central projection. Length of cilia of male antenna about 0.16 mm, exceeding thickness of shaft (0.12 mm).

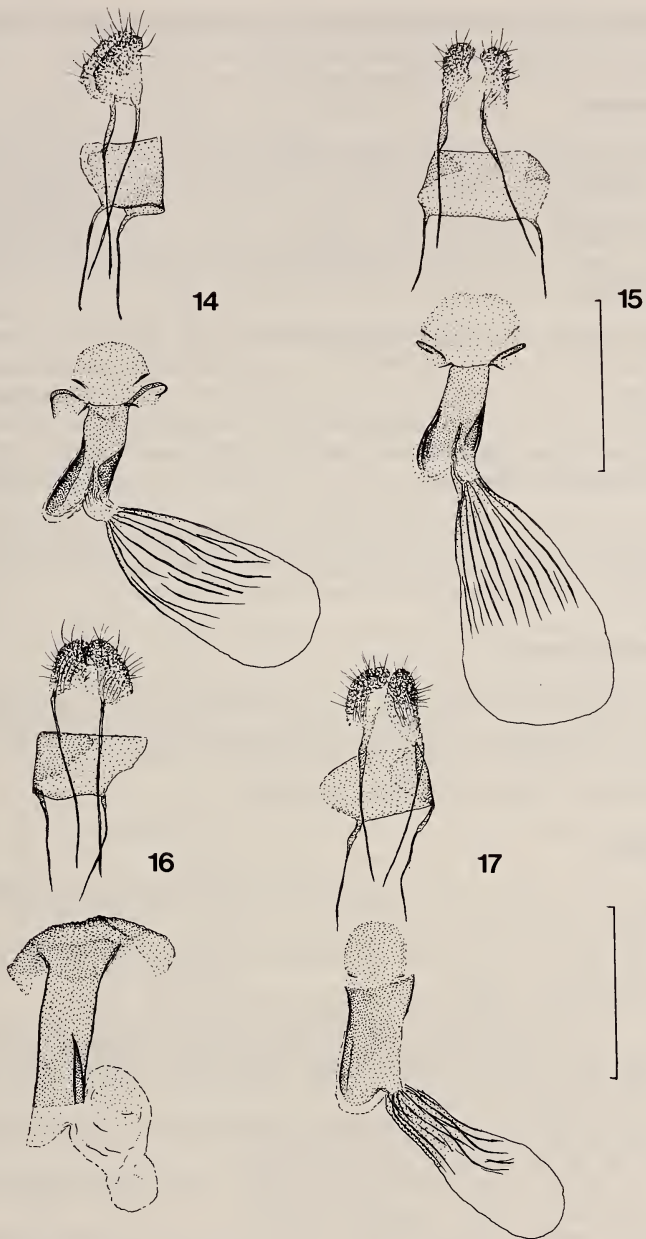
WINGS : Forewing length, male : 12.5-14.6 mm ; female : 10.6-11.4 mm. Postmedial line strongly dentate, more outwardly curved than in the other species, at inner margin not inclined toward base. White inter-venal line in forewing apex longer than in *Myinodes constantina*, but not crossing postmedial fascia. Postmedial line and inter-venal lines sharply bordered. Terminal spots black, punctiform and small, thinly encircled by white forked inter-venal line. Forewings of specimens from S. Turkey slightly darker than in those from Jordan and Israel.

MALE GENITALIA (Fig. 13a-d) : Uncus very long, subapical processus lacking. Caudal excavation of juxta U-shaped, much less deep than in the other species, basis of juxta convex. Costal part of the valva narrower than in the other species, more convex and distally pointed. Harpe prominent, S-shaped, without spines. Basal lobe of harpe lacking. Aedoeagus comparatively broad and short (mean 1.55 mm). Cornutus terminally located, very stout. Aedoeagus apex laterally bearing heavily sclerotized, distally pointed plate with one or two lateral teeth.

FEMALE GENITALIA (Fig. 17) : Ductus bursae broad and short. Bursa copulatrix smaller and narrower than in *M. interpunctaria*. Caudal half of bursa copulatrix more sclerotized than in the other species.

HABITAT : From - 400 m (Israel) to 900 m (Taurus). In Israel and Jordan mainly in the swamps and wet areas near Hula Lake, the Dead Sea and some rivers (e.g. Zerqa, Nahal Amud).

FLIGHT PERIOD : Israel and S. Turkey : Mid-February to end of March, one specimen in January (C. Israel). Jordan : Throughout February. One Jordan female labelled "28.VIII." probably a mistake. In Iraq flying in April (WILTSHIRE, 1957).



Figs 14-17. ♀ genitalia of *Myinodes* spp. 14 — *M. interpunctaria interpunctaria* H.-S. (NE. Algeria); 15 — *M. interpunctaria atlantica* ssp. n. (Paratypus, S. Spain); 16 — *M. constantina* sp. n. (Paratypus); 17 — *M. shohami* sp. n. (Paratypus, N. Israel); scale bar = 1 mm.

REMARKS : Named after the late Mr. Z. Shoham, Israel, for his great merits in the lepidopterological exploration of N. Israel.

Key to species

1 Frons with two projections. Basal scales of palpi dark brown. Black terminal spots trianguliform. Intervenal line in forewing apex crossing postmedial line *interpunctaria* H.-S.

— Frons with only one central projection. Basal scales of palpi white. Black terminal spots punctiform. Intervenal line in forewing apex not crossing postmedial line 2

2 Palpi long (ca. 1.5 mm). Postmedial line not dentate, at inner margin strongly inclined toward wing base. The white intervenal line in forewing apex very short *constantina* sp. n.

— Palpi short (ca. 1.2 mm). Postmedial line strongly dentate, at inner margin not inclined toward wing base. The white intervenal line in forewing apex approaching postmedial line *shohami* sp. n.

PARENZAN (1976 : fig. 9) mentions the genus *Myinodes* from N. and W. Turkey and Rumania, but gives no details. Confirmation of the occurrence of this genus from these areas is required.

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