

Bonn. zool. Beitr.	Bd. 45	H. 1	S. 67—78	Bonn, März 1994
--------------------	--------	------	----------	-----------------

Notes on the morphology of some little known species of the genus *Idaea* Treitschke, 1825 in the Middle East (Lepidoptera: Geometridae, Sterrhinae)

Axel Hausmann

Abstract. Type material of *Idaea antennata* (Wehrli, 1931), *Idaea consociata* (Staudinger, 1900), *Idaea capnaria* (Püngeler, 1909), and *Idaea detritaria* (Staudinger, 1897) has been examined by the author. Data on external morphology and genitalia are given here. The species are placed into the system of the genus *Idaea* Treitschke as proposed by Sterneck (1940). Lectotypes are designated for *I. consociata* and *I. detritaria*. *I. antennata* is a junior synonym of *Idaea tineata* (Thierry-Mieg, 1911). *Idaea praetineata* n. sp., a closely related species to *I. tineata*, is described from Jordan.

Key words. Geometridae, Sterrhinae, *Idaea*, Middle East, *I. praetineata* n. sp., genitalia, systematics.

Introduction

Many Palaearctic Geometridae species, belonging to the genus *Idaea*, are known presently only from the type specimens. Their systematic position is doubtful in many cases. So, except for the types of the four taxa revised in this paper (*antennata/consociata/capnaria/detritaria*), data on further specimens can be found in literature only for *Idaea capnaria* and *Idaea detritaria* in one study.

Sterneck (1940), still the most important publication on the morphology of the Palaearctic *Idaea* species, mentions only one taxon (*Idaea detritaria*), but he treated it rather superficially (only the right valva is shown in a figure).

Abbreviations used in this paper:

ZFMK = Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn

MNHU = Museum für Naturkunde der Humboldt-Universität zu Berlin

SMNK = Staatliches Museum für Naturkunde, Karlsruhe

ZSM = Zoologische Staatssammlung München.

Systematic part

Idaea tineata (Thierry-Mieg, 1911)

Acidalia tineata Thierry-Mieg, 1911: 468 (Loc. typ.: Akbès, Amanus)

Idaea antennata (Wehrli, 1931), n. syn., Fig. 1

Ptychopoda antennata Wehrli, 1931: 41 (Loc. typ.: Akbès, Amanus)

Ptychopoda antennata Wehrli, 1934: 1, t. 1, Fig. 12

Sterrrha antennata: Prout, 1934: 389

Sterrrha antennata: Prout in Seitz, 1935: 63, Fig. 6e

All the citations of *I. antennata* concern the holotype.

Material examined: ♂, (Holotype *I. antennata*), Syria, Akbès, prp. Hausm. 7464 (coll. ZFMK). Further 9 ♀, Turkey, 50 km W Konya 1300 m, 23. VII. 1990 and 1 ♀, Turkey, Isparta, 5 km W Kecioborlu 1200 m, 22. VII. 1990 (all leg. Falkner and coll. ZSM) and the photograph of the genitalia of an Anatolian male (coll. J. Lenz, Meckesheim).

Measurements: Length of the right forewing of the holotype of *I. antennata* 8,4 mm. ♀ from Anatolia: m = 8,1 mm (7,2–8,8 mm).

External morphology (Holotype *I. antennata*): Antenna thick (about 0,15 mm), covered with short cilia (their length about 1/3 of the antenna's diameter), the flat segments separated from one another by narrow necks. Hindtibia of the male slender, without spurs, but with a large pencil reaching half the length of the tarsi. Proportion tarsus/tibia = 0,55 mm/1,25 mm (Wehrli 1934, and Prout in Seitz 1935: "1/3 or 1/4"). Palps very short and slender (length about 0,18 mm = 30 % of the eye's diameter). Tongue rather short (about 1,0 mm).

♂ Genitalia (Holotype *I. antennata*, Fig. 10): Anellus with two big and stout hooks. Uncus broad, terminally cut, scaphium sharply tipped; valva slender, curved, terminal costa with flat teeth. Length of aedoeagus 1,1 mm; without cornutus, terminal lying conglomerate of vesica rather dense, perhaps caused by preparation artifacts. In the central part a sclerotised tube.

♀ Genitalia ("*I. tineata*" from Anatolia, Fig. 12): Only little difference to the female genitalia of *I. praetineata* n. sp. In both species *I. tineata* and *I. praetineata* the pair of small lateral processa beneath the papillae anales is remarkable, also the pair of large chitinised lobes in the ductus bursae and the broad and folded outlet from the bursa copulatrix into the ductus seminalis near the beginning of the ductus bursae. Apophyses posteriores short and slender (0,45–0,50 mm), apophyses anteriores also short and slender (0,15–0,20 mm). Bursa copulatrix with an area of chitinised folds, which characterize this species by its numerous teeth (Fig. 12a).

Remarks: The genitalia of the holotype of *I. antennata* correspond rather well to the photograph of the genitalia of an Anatolian male belonging to a large sample of *I. tineata* examined by the author. Considering also the fact that the type localities of both *I. antennata* (type series contains only one ♂) and *I. tineata* (type series 5 ♀) are of the same location, *I. antennata* sinks to synonymy of *I. tineata*. As the closely related species described below (*I. praetineata*) shows a considerable sexual dichroism, such a phenomenon may also be expected in *I. tineata*. This dichroism led to the erroneous opinion of Wehrli (1931), who postulated two distinct species. The species has no closer relationship to *Idaea elongaria* (Rambur, 1833) (cf. Prout in Seitz 1935) and should be inserted preliminarily into the 12th group of the genus *Idaea*, like it was done by Sterneck (1940). The short cilia of the antenna, the short tongue and the very small palps, however, are structural details unusual in the 12th group. *Idaea tineata* and the species described below show some relations to *Idaea lobaria* (Chrétien, 1909) (4th group sensu Sterneck 1940). Indications to such a relationship with respect to the male genitalia are the lacking of cornuti in the aedoeagus, the broad, nearly forked uncus and the broad valva without terminal tip or tooth. In female genitalia the pair processa beneath the papillae anales are prominent in *I. lobaria* and *Idaea fractilineata* (Zeller, 1847; 23th group). *I. lobaria* is characterized also by a small pair of lobes in the ductus bursae. The rudimentary tongue and the small palps in *I. lobaria* are further indications to such a relationship. Perhaps *Idaea tineata* and *Idaea praetineata* n. sp. must be transferred to the 4th group. The anellus is somewhat similar to the anellus of *Idaea circuitaria* (Hübner [1819]; 9th group). In the form of uncus and valva the species resembles also *Idaea infirmaria* (Rambur, 1833; 28th group), but with regard to aedoeagus and anellus it is quite different.

Probably all the Anatolian populations belong to *Idaea tineata*. However, it could be more convenient to distinguish them from the nominate subspecies as a distinct one. More material is required to clarify the relations. The author was able to examine only females from Konya and Isparta district.

Idaea praetineata n. sp., Figs 2, 3

Idaea tineata: Hausmann, 1991 (nec Thierry-Mieg, 1911): 124, Fig. 99

Holotype: ♂, N Jordan, Wadi Sir b. Amman, 600 m, 30. IV. 1956, prp. Hausm. 3872, leg. J. Klapperich, coll. ZSM.

Paratypes: ♂, id., 3. VII. 1956, leg. Klapperich, coll. ZSM; ♀, N Jordan, Fuhes, 1000 m, 2. VI. 1957, leg. J. Klapperich, coll. ZSM; ♀, id., 9. VI. 1956, leg. J. Klapperich, coll. SMNK; ♀, N Jordan, Amman, 800 m, 24. VI. 1956, leg. J. Klapperich, coll. SMNK; ♂ ♀, N Jordan,

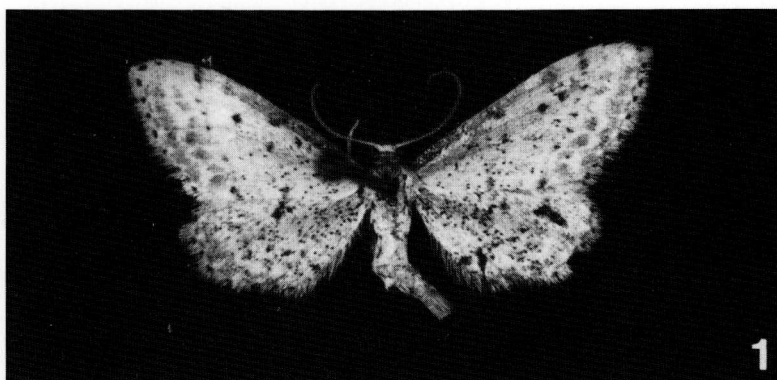


Fig. 1: *Idaea tineata* Thierry-Mieg, ♂, Holotype of *Idaea antennata* Whli., length of the right forewing 8,4 mm.

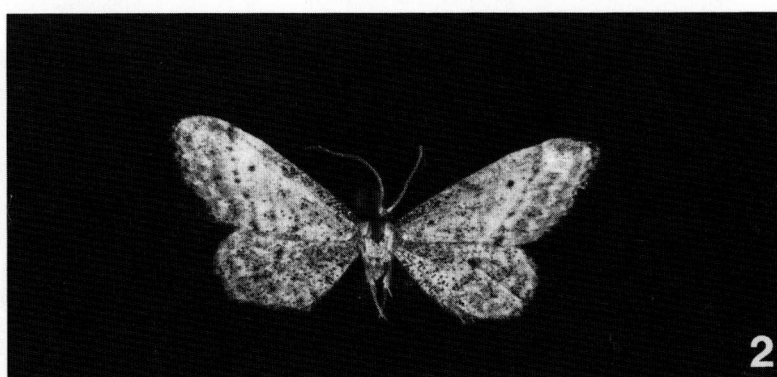


Fig. 2: *Idaea praetineata* n. sp., ♂, Holotype, length of the right forewing 7,9 mm.

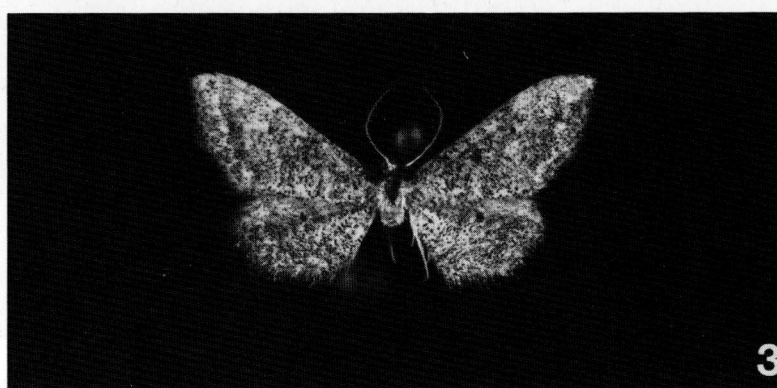


Fig. 3: *Idaea praetineata* n. sp., ♀, Paratype, length of the right forewing 7,6 mm.

Jarash, 16. VII. 1964, leg. J. Klapperich, coll. SMNK; ♀, N Jordan, Jarash, 13. VI. 1963, leg. J. Klapperich, coll. SMNK.

Distribution: Jordan.

Measurements: ♂ m = 7,1 mm (6,7—7,9 mm); ♀ m = 7,3 mm (6,1—8,2 mm).



Fig. 4: *Idaea consociata* Stgr., ♀, Lectotype, length of the right forewing 11,7 mm.



Fig. 5: *Idaea consociata* Stgr., ♀, Paratype, length of the forewing 9,3 mm.

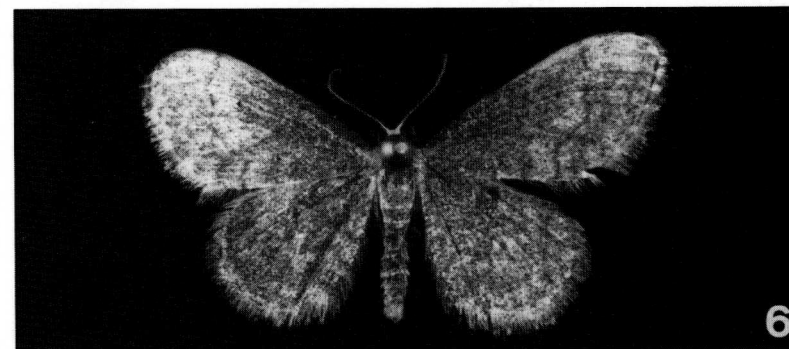


Fig. 6: *Idaea capnaria* Pglr., ♂, Holotype, length of the right forewing 9,9 mm.

Description: Smaller than *I. tineata*. Wing colour (♂) grey, somewhat darker than in the holotype of *I. antennata*. Wing pattern of the males like in the holotype of *I. antennata*: Antemedian and postmedian fascia dark grey, small, submarginal shade dark grey, vague, separated from the terminal shade. Females much darker, the dark brown postmedian shade broader, connected to the postmedian fascia. Frons brown like in *I. tineata*, vertex white. Ex-

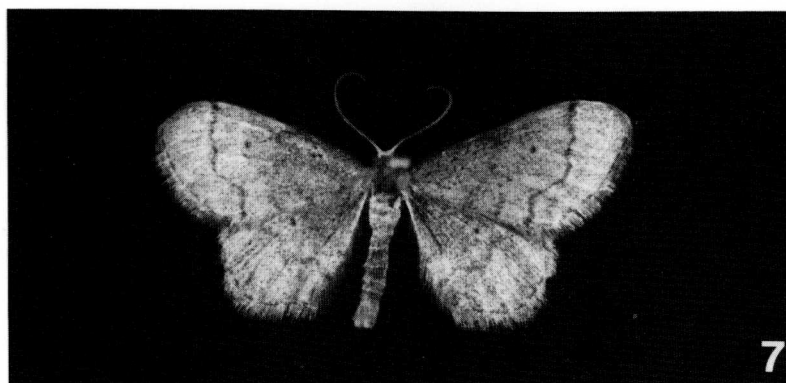


Fig. 7: *Idaea capnaria* Pglr., ♂, Paratype, length of the right forewing 8,5 mm.

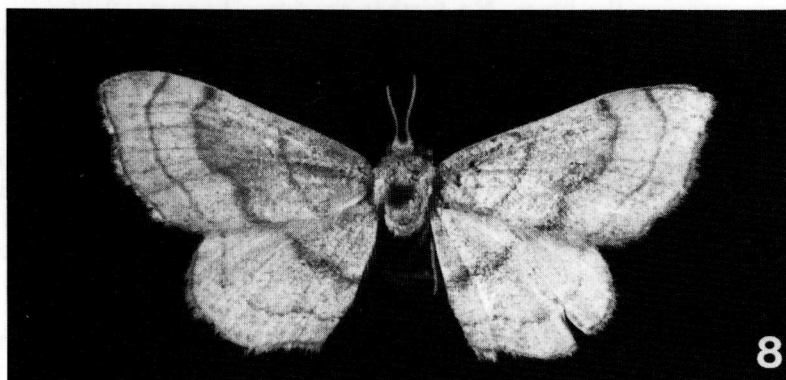


Fig. 8: *Idaea detritaria* Stgr., ♂, Lectotype, length of the right forewing 9,2 mm.

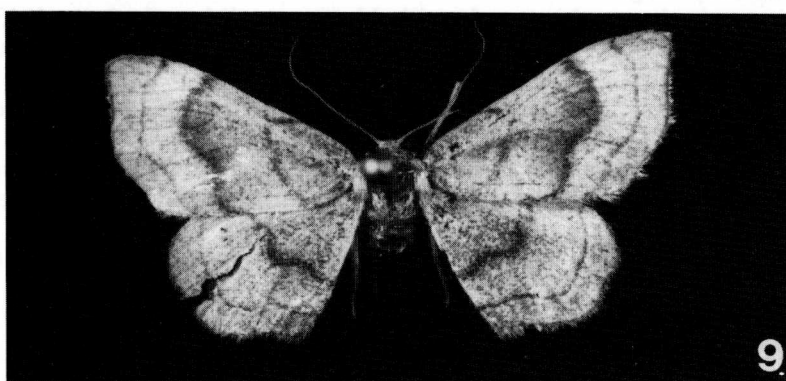


Fig. 9: *Idaea detritaria* Stgr., ♀, Paratype, length of the right forewing 9,0 mm.

ternally the close relationship to *I. tineata* is also indicated by the short cilia of the male antenna (about 1/3 of the antenna diameter), the short tongue (about 1,0 mm) and the very small palps (length about 0,15 mm). Male antenna not so thick as in *I. tineata* (only 0,12 mm), female antenna slender (0,06—0,075 mm) sparsely serrated with short cilia (about 0,02 mm). Genitalia of the ♂ (Fig. 11): Rather similar to the genitalia of *Idaea tineata* (i. e. the

holotype of *I. antennata*). Hooks of the anellus much smaller, more slender and less sclerotised. In the aedoeagus the vesica less dense, tube in the central part little chitinised, almost invisible. Aedoeagus distally not sclerotised as in the *I. antennata*-male.

♀ Genitalia (Fig. 13): Only little difference to the female genitalia of "*I. tineata*" from Anatolia. Papillae anales, apophyses, ductus bursae and bursa copulatrix correspond to the above given description for the females from Anatolia. Bursa copulatrix with an area of chitinised folds, which are smooth in this species (Fig. 13a).

Remarks: Very closely related to *I. tineata*. With regard to the systematic position of this species see remarks on *I. tineata*.

Idaea consociata (Staudinger, 1900), Figs 4, 5

Acidalia consociata Staudinger, 1900: 390, t. 6, Fig. 10 (Loc. typ.: Mardin, SE Turkey)

Ptychopoda consociata: Prout in Seitz, 1913: 108

Sterrhia consociata: Prout, 1934: 351

All the citations concern the types. No further specimen known.

Material examined: Two female types (labelled as "Origin."; coll. MNHU). The lectotype has to be designated: ♀, Mardin "97. Man.", prp. Hausm. 7465, coll. MNHU (this specimen is figured in the original description).

Measurements: Length of the right forewing 11,7 (Lectotype) and 9,3 mm.

External morphology: Antenna slender, diameter about 0,07–0,08 mm (not "thick", cf. original description). Cilia almost lacking, the few present very short. Female hindtibia long, slender, with 2 spurs; proportion tarsus/tibia 2,3 mm/2,9 mm (Lectotype) or 1,8 mm/2,3 mm (Paratype). Palps normal, their length nearly approaching the diameter of the eye (0,35–0,5 mm). Tongue lacking.

♂ Genitalia: Unknown.

♀ Genitalia (Fig. 16): Apophyses posteriores (0,85 mm) and anteriores (0,30 mm) short and weak. Ostium bursae trumpet-shaped. Ductus bursae long, with smooth transition into the bursa copulatrix. Pear-shaped bursa comparatively long, armed with a lot of short spines and wrinkled longitudinally. Ductus seminalis in the outlet of the bursa broad, then becoming more slender and very long.

Remarks: The species has nothing to do with *Idaea consolidata* (Lederer, 1853) cf. original description and Prout in Seitz 1913) and should be inserted into the 29nd group after the species *Idaea improbata* (Staudinger, 1897) (cf. Hausmann 1991, p. 127). Female genitalia and wing colour reveal close relationship to that species but also to *Idaea brevitarsata* Hausmann, 1991 and *Idaea hispanaria* (Püngeler, 1913). In the female genitalia and in the external characters of the ♀ there is no difference between *Idaea consociata* and *Idaea improbata/brevitarsata*, so it is possible, that *Idaea consociata* is a synonym of *Idaea improbata*, or that *Idaea brevitarsata* is conspecific to *Idaea consociata*.

Presently there are known only females of *Idaea consociata* (the three types), though in the manuscript on the Staudinger types of the MNHU, written in 1947, 2 ♂ 1 ♀ are stated as type series (an error). The discovery of males in the type locality should clarify the status of *Idaea consociata* in regard to *Idaea improbata* and *Idaea brevitarsata*.

Idaea capnaria (Püngeler, 1909), Figs 6, 7

Acidalia cineraria Bang-Haas, 1907: 79, t. 3, Fig. 17 (nom. praeocc., nec. Leech, 1897)

Acidalia capnaria Püngeler, 1909: 292, t. 4, Fig. 9 (Loc. typ.: Beirut, Lebanon)

Ptychopoda capnaria: Prout in Seitz, 1913: 122, t. 3h

Sterrhia capnaria: Prout, 1934: 378

Sterrhia capnaria: Ellison & Wiltshire, 1939, 45 ("Shweir, scarce")

All the citations except Wiltshire (1939) concern the types.

Material examined: ♂, "Type", Beirut, prp. Hausm. 7467 (= Holotype!). One further male examined (from the Püngeler collection) showed no difference to the second specimen

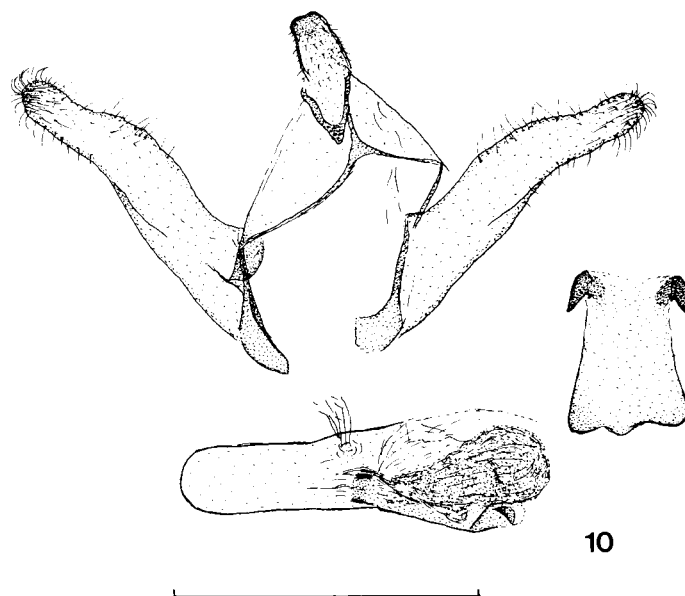


Fig. 10: Male genitalia of *Idaea tineata* Thierry-Mieg, Holotype of *Idaea antennata* Whli., anellus beside; scale bar = 1 mm.

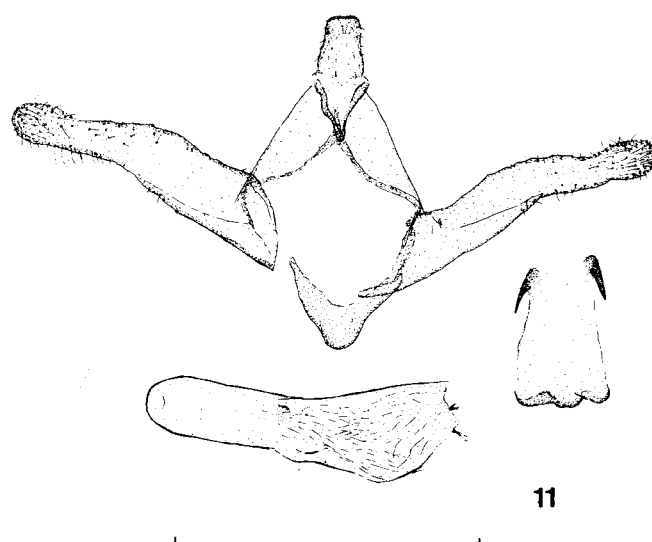


Fig. 11: Male genitalia of *Idaea praetineata* n. sp., Holotype, anellus beside; scale bar = 1 mm.

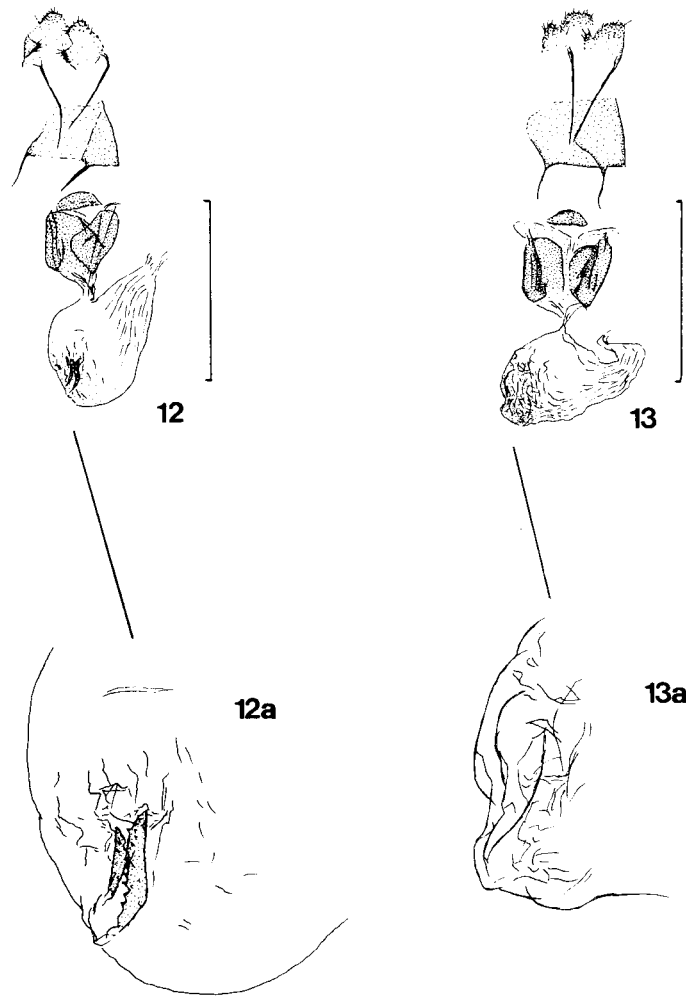


Fig. 12: Female genitalia of "*Idaea tineata* Thierry-Mieg" from Anatolia, scale bar = 1 mm (12a: detail of the bursa copulatrix).

Fig. 13: Female genitalia of *Idaea praetineata* n. sp., Paratype; scale bar = 1 mm (13a: detail of the bursa copulatrix).

mentioned in the original description (labelled as "paratype" by the author). Both specimens in coll. MNHU.

Measurements: Length of the right forewing 9,9 mm (Holotype) and 8,5 mm (Paratype). External morphology: Male antenna serrate, cilia of about the same length as the antenna diameter (about 0,09 mm). Male hindtibia very slender, with a pencil that is comparatively small. Proportion tarsus/tibia 1,2/2,0 mm (Holotype) or 0,9/1,8 mm (Paratype). According to the German edition of Prout in Seitz (1913) "the hindtarsi are much longer than 1/2 of the 'type'" (error, should read 'tibia'). Palp approaching about 3/4 of the eye diameter (0,4—0,5 mm). Tongue well developed (about 2,5 mm).

♂ Genitalia (Fig. 14): Somewhat similar to both *Idaea humiliata* (Hufnagel, 1767), and *Idaea politata* (Hübner, 1793). Anellus without lateral teeth. Uncus short (0,12 mm) and broad. Scaphium comparatively slender (0,08 mm). Valva linguiform, very similar to both *Idaea humiliata* and *Idaea politata*; terminally with two lateral teeth and some small teeth be-

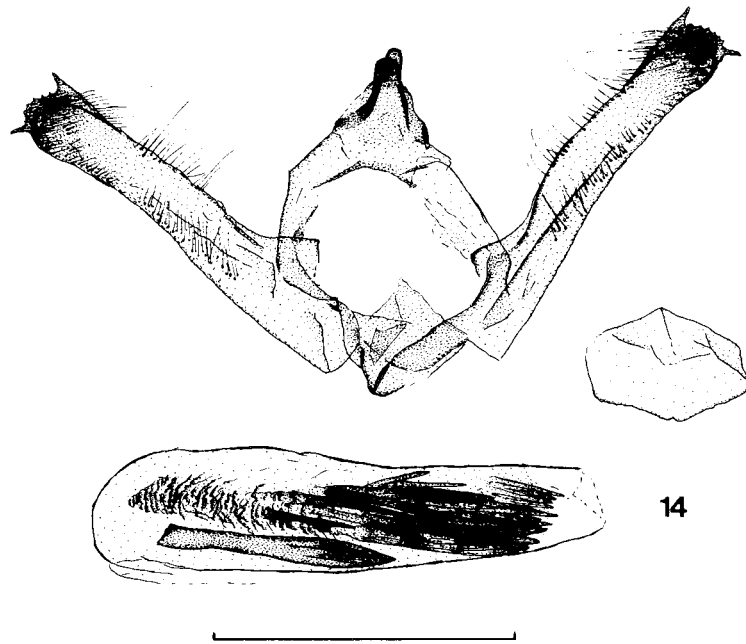


Fig. 14: Male genitalia of *Idaea capnaria* Pglr., Holotype, anellus beside; scale bar = 1 mm.

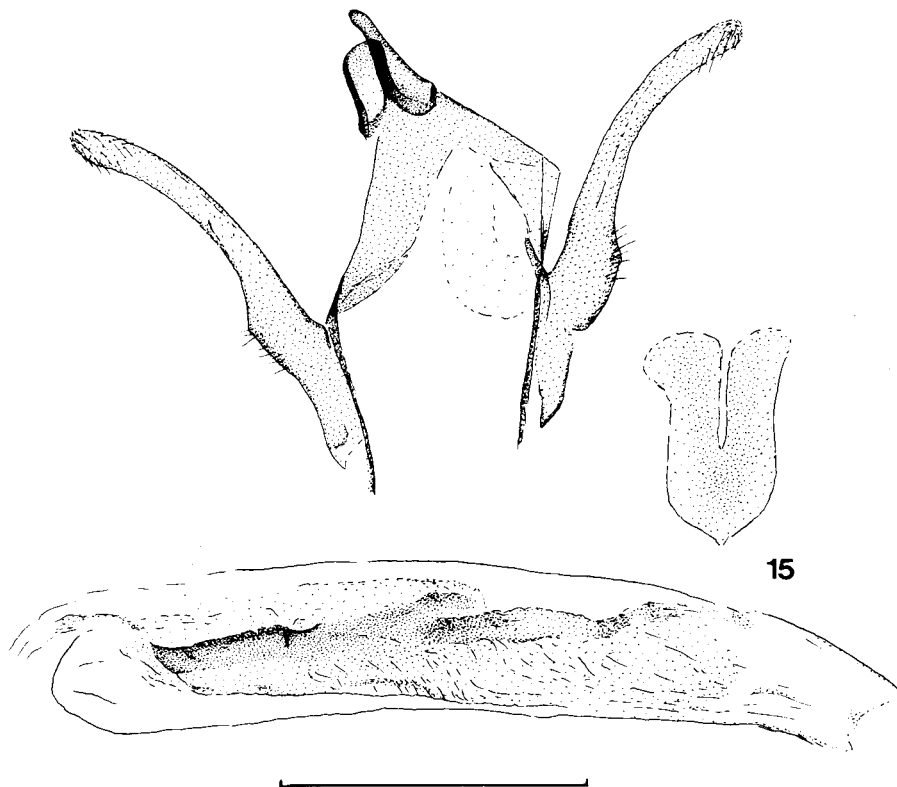
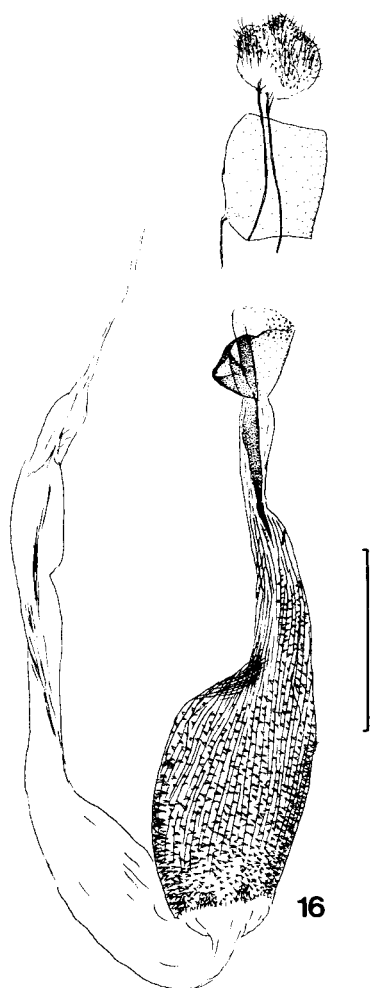


Fig. 15: Male genitalia of *Idaea detritaria* Stgr., Lectotype, scale bar = 1 mm.



16



17

Fig. 16: Female genitalia of *Idaea consociata* Stgr., Lectotype, scale bar = 1 mm.

Fig. 17: Female genitalia of *Idaea detritaria* Stgr., Paratype, scale bar = 1 mm.

tween them. Length of aedoeagus 1,7–1,8 mm, width 0,42–0,45 mm (“short penis” sensu Sterneck, 1940), terminally becoming more slender. About 20 (!) stout cornuti with the basal vesical folds, which are typical for the second series of species in the 14th group of the genus *Idaea*. Laterally one long (0,8 mm) and stout cornutus without a folded basis.

♀ Genitalia: Unknown.

Remarks: The species is not closely related to *Idaea ostrinaria* (Hübner, [1813]) (cf. original description and Prout in Seitz, 1913), but has to be inserted into the 14th group between the species *Idaea humiliata* and *Idaea politata*.

Idaea detritaria (Staudinger, 1897), Figs 8, 9

Acidalia detritaria: Staudinger in Kalchberg, 1897: 180, t. 4, Fig. 14 (Loc. typ.: Haifa, Israel)

Acidalia detritaria: Staudinger & Rebel, 1901: 269

Ptychopoda detritaria: Prout in Seitz, 1913: 118

Sterrrha detritaria: Amsel, 1933: 108

Sterrrha detritaria: Prout, 1934: 369, 446

Ptychopoda detritaria: Amsel, 1935: 242 (“1 ♂, Tel Aviv, dune”)

Acidalia detritaria: Bodenheimer, 1937: 87

Sterrrha detritaria: Sterneck, 1940: 101, 142, Fig. 169

Idaea detritaria: Hausmann, 1991: 128

All the citations except Amsel (1935) and Sterneck (1940) refer to the type specimens. *Idaea detritaria* seem to live in very isolated populations. Neither in the entomological collections of Israel nor in the results of about 1600 light trap captures from Israel examined by the author the species was present.

Material examined: ♂, "Origin.", Haifa, prp. Hausm. 5576; ♀ "Origin.", Haifa, prp. Hausm. 5577. In the MNHU there are only these two specimens. The whereabouts of the other 4 from the original series is unknown. Perhaps they have been lost. The Lectotype had to be designated: ♂, Haifa, prp. Hausm. 5576, coll. MNHU.

Measurements: Length of the right forewing 9,2 mm (Lectotype) and 9,0 mm (Paratype). External morphology: Male antenna serrated, with many cilia of the length of the antenna's diameter. Female antenna sparsely serrated. Length of cilia less than half of the antenna's diameter. Male hindtibia rather slender, no pencil could be found, which is perhaps an artifact, because Sterneck (1940) found one; proportion tarsus/tibia 0,7/2,0 mm. A mistake in the original description has to be corrected: "♀ ungespornt" (without spurs) should read "♂ ungespornt". Female hindtibia with two spurs, proportion tarsus/tibia 2,0/2,0 mm. Frons reddish-ochraceous, vertex whitish-ochraceous sprinkled with some reddish scales. Palps slender, somewhat shorter than the eye diameter. Tongue reduced.

♂ Genitalia (Fig. 15): Anellus simple, with smooth margins. Uncus long with slender basis (length 0,27 mm), Scaphium normal, comparatively broad (0,15 mm). Valva very slender and long (1,43 mm), characteristically curved. Aedoeagus long (2,75 mm), without cornuti, in the basical vesica a chitinous plate.

♀ Genitalia (Fig. 17): Ostium bursae broad, ductus bursae with a very narrow part, then becoming broader with a smooth transition into the bursa copulatrix. Bursa copulatrix bent back by 180°. In the bursa one (internal) stout ribbon and one (periphäre) more feeble and folded ribbon. These chitinous ribbons wear a lot of spines. In the periphery between the ductus bursae and the bursa copulatrix there is a third ribbon, that is somewhat more slender. Remarks: As postulated in Sterneck (1940), *Idaea detritaria* has to be placed into the 18th group. The species is closely related to both *Idaea jacobii* Hausmann, 1991 and *Idaea wiltshirei* (Brandt, 1938).

Idaea detritaria is not conspecific with *Idaea wiltshirei*, as discussed in Sterneck (1940). Length of aedoeagus in *Idaea wiltshirei* about 1,9 mm, uncus with a small hook (like in *Idaea jacobii*), valva of *Idaea wiltshirei* much shorter (1,15 mm) and broader (similar to *Idaea consociata*) than in *Idaea detritaria*. Also wing pattern and colour quite different.

Acknowledgements

Many thanks to Dr. W. Mey, Berlin, and to Dr. D. Stuenkel, Bonn, for loan of the type material. Mr. G. Ebert, Karlsruhe, H. Falkner, Karlsruhe, and J. Lenz, Meckesheim, helped by donations or loans of further relevant material to the ZSM.

Zusammenfassung

Die wenig bekannten vorderasiatischen Arten *Idaea antennata* (Wehrli, 1931), *Idaea consociata* (Staudinger, 1900), *Idaea capnaria* (Püngeler, 1909) und *Idaea detritaria* (Staudinger, 1897) wurden vom Autor anhand von Typenmaterial eingehend untersucht. Die vier Arten werden nach ihrer äußeren Morphologie sowie ihrer Genitalmorphologie charakterisiert und in das von Sterneck (1940) erarbeitete System der Gattung *Idaea* Treitschke eingeordnet. Für *I. consociata* und *I. detritaria* erfolgt die Festlegung eines Lectotypus. *I. antennata* ist ein jüngeres Synonym von *Idaea tineata* (Thierry-Mieg, 1911). *Idaea praetineata* n. sp., ein naher Verwandter der *I. tineata*, wird aus Jordanien neu beschrieben.

References

- Amsel, H. G. (1933): Die Lepidopteren Palästinas. — Zoogeographica 2 (1), 1—146.
 Amsel, H. G. (1935): Weitere Mitteilungen über palästinensische Lepidopteren. — Veröff. Dtsch. Kol. Übersee-Mus. 1 (2), 223—277.

- Bang-Haas, A. (1907): Neue oder wenig bekannte palaearktische Makrolepidopteren. — Dt. ent. Zeitschrift Iris 20: 69–88.
- Bodenheimer, F. S. (1937): Prodomus Faunae Palestinae. — Mem. Inst. d’Egypte 33: 1–287.
- Ellison, R. E. & E. P. Wiltshire (1939): The Lepidoptera of the Lebanon with notes on their season and distribution. — Trans. Royal Ent. Soc. London 88 (1), 1–56.
- Hausmann, A. (1991): Beitrag zur Geometridenfauna Palästinas: Die Spanner der Klapperich-Ausbeute aus Jordanien (Lepidoptera, Geometridae). — Mitt. Münchn. Ent. Ges. 81: 111–163.
- Prout, L. B. (1913): Die spannerartigen Nachtfalter. — In: Seitz, A. [1912–1916]: Die Gross-Schmetterlinge der Erde, Bd. 4. — Verlag A. Kernen, Stuttgart.
- Prout, L. B. (1934): Lepidopterorum Catalogus, Pars 61: Geometridae, Subfamilia Sterrhinae I. — Verlag W. Junk, Berlin, 1–486.
- Prout, L. B. (1935): Brepinae, Oenochrominae, Hemitheinae, Sterrhinae, Larentiinae. — In: Seitz, A. [1934–1939]: Die Gross-Schmetterlinge der Erde, Suppl. 4. Verlag A. Kernen, Stuttgart.
- Püngeler, R. (1909): Neue palaearctische Macrolepidopteren. — Dt. ent. Z. Iris 21: 286–303.
- Staudinger, O. (1897): *Acidalia Detritaria* Stgr. n. sp., in Kalchberg, F. v. A.: Über die Lepidopterenfauna von Haifa in Syrien. — Dt. ent. Z. Iris 10: 180–181.
- Staudinger, O. (1900): Neue Lepidopteren des paläarktischen Faunengebietes. — Dt. ent. Z. Iris 12: 352–403.
- Staudinger, O. & H. Rebel (1901): Katalog der Lepidopteren des palaearktischen Faunengebietes 1. — Verlag Friedländer & Sohn, Berlin.
- Sterneck, J. (1940): Versuch einer Darstellung der systematischen Beziehungen bei den palaearktischen Sterrhinae (*Acidaliinae*). — Zeitschr. Wiener Ent. Ver. 25: 6–17; 25–36; 56–59; 77–79; 98–107; 126–128; 136–142; 152–159; 161–176.
- Thierry-Mieg, P. (1911): Descriptions de Lépidoptères nouveaux. — Ann. Soc. Ent. Belg. 54: 465–469.
- Wehrli, E. (1931): Einige neue paläarktische Geometriden aus Syrien, Algerien und Sicilien (Lepid. Het.). — Mitt. Münchn. Ent. Ges. 21: 41–51.
- Wehrli, E. (1934): Lepidopteren-Fauna von Marasch in türkisch Nordsyrien. — Mitt. Münchn. Ent. Ges. 24: 1–55.

Dr. Axel Hausmann, Zoologische Staatssammlung, Münchhausenstr. 21, D-81247 München.