

Ectoedemia (Etainia) obtusa (Puplesis & Diškus, 1996) new for Europe: taxonomy, distribution and biology (Nepticulidae)

ERIK J. VAN NIEUKERKEN* & ALEŠ LAŠTŮVKA**

* Nationaal Natuurhistorisch Museum Naturalis, P. O. Box 9517, NL-2300 RA Leiden, The Netherlands; e-mail: nieukerken@nmm.nl

** Slavíčková 15, CZ-796 01 Prostějov, Czech Republic

Summary. *Ectoedemia (Etainia) obtusa* (Puplesis & Diškus), described from Turkmenistan, is for the first time recorded from Europe: Spain, France, Italy and Croatia. It has been reared from cocoons, partly found on trunks of *Fraxinus ornus* L., which is considered to be its probable host. The female is described here for the first time and the male redescribed and illustrated. A checklist and key of the seven Western Palaearctic species of the subgenus are provided.

Zusammenfassung. *Ectoedemia (Etainia) obtusa* (Puplesis & Diškus), beschrieben aus Turkmenistan, wird zum erstenmal aus Europa gemeldet, namentlich aus Spanien, Frankreich, Italien und Kroatien. Die Art wurde aus Puppen gezüchtet, die teilweise auf Stämmen von *Fraxinus ornus* L. gefunden wurden; diese Pflanze wird daher als die wahrscheinliche Futterpflanze angesehen. Das Weibchen wird zum erstenmal beschrieben, und das Männchen aufs neue beschrieben und abgebildet. Eine Checkliste und Bestimmungsschlüssel der sieben westpaläarktischen Arten der Untergattung *Etainia* werden angegeben und Anmerkungen zum taxonomischen Status von *Etainia* gemacht.

Résumé. *Ectoedemia (Etainia) obtusa* (Puplesis & Diškus), décrit de Turkmenistan, est rapportée de l'Europe pour la première fois: provenant d'Espagne, France, Italie et Croatie. Quelques exemplaires étaient élevés des cocons trouvés sur des troncs de *Fraxinus ornus* L.; cette plante est regardée comme plante-hôte possible. La femelle est décrit pour la première fois, et le mâle est décrit de nouveau et figuré en détail. Nous donnons aussi un liste des sept espèces Ouest-Paléarctiques et un table d'identification.

Key words. Lepidoptera, Nepticulidae, *Ectoedemia (Etainia) obtusa*, host plants, Europe.

Introduction

The nepticulid subgenus *Etainia* (in the genus *Ectoedemia*), often regarded as a separate genus (Scoble 1983; Puplesis 1994; Puplesis & Diškus 1996) is one of the best characterized monophyletic entities within the family, best characterized by the unique dorsal apodeme on the valve in the male genitalia. It is also rather peculiar in its biology, since the species are not leaf-miners, but – as far as known in the Holarctic fauna – feed in shoots, petioles or fruits, most on *Acer* (Aceraceae) and one species on *Arctostaphylos* (Ericaceae).

The four known European species were fully treated by Van Nieuwerkerken & Johansson (1990) and Laštůvka & Laštůvka (1997), a fifth was described by Puplesis (1994). Puplesis & Diškus (1996) described two further Western Palaearctic species from Turkmenistan and provided a world checklist of the 16 known species.

The senior author received in the early nineties some specimens from southern France and Italy which clearly did not belong to the four known European species. Initially it was considered an undescribed species, and listed as such in the French and Italian checklists (Karsholt *et al.* 1995; Leraut 1997). Later it could be identified as the recently described *Etainia obtusa* Puplesis & Diškus, 1996. Since then the junior author also reared this species from cocoons, collected on trunks of *Fraxinus ornus* L. Krenek (2000) beautifully illustrated one of his female specimens.

The species will be redescribed here, including the description of the unknown female and biology. In addition we provide a revised key to Western-Palaeartic species.

Methods

Genitalia preparations were embedded in euparal, following the methods in Van Nieukerken et al. (1990) or studied in glycerine. Photographs of genitalia were taken by the senior author with a Zeiss AxioCam digital camera attached to a Zeiss Axioskop H, using Carl Zeiss AxioVision 3.0.6 software. Drawings were prepared by the junior author. Morphological terms follow Van Nieukerken *et al.* (1990). The map was prepared with DMAP 7.0 (Morton 2000), UTM co-ordinates were taken from French topographical maps or calculated from the geographical co-ordinates.

Subgenus *Etainia* Beirne

A description of the subgenus and comments on its subgeneric position were provided earlier (Van Nieukerken 1986; Van Nieukerken & Johansson 1990). Puplesis & Diškus (1996) also listed the apomorphies and concluded that *Etainia* deserved full generic status on the basis of many apomorphies. Although we fully agree with the monophyly of *Etainia* and its long list of defining apomorphies, we consider that the rank of the taxon is only determined by its relative position in the cladogram. Van Nieukerken (1986) showed that *Etainia* most likely is the sister group of the clade *Zimmermannia* Hering + *Ectoedemia* Busck s. str. The other subgenera *Fomoria* Beirne and *Laqueus* Scoble branch off earlier in his cladogram. Hoare (1998) re-analysed Van Nieukerken's cladogram with PAUP, and was able to confirm most clades. The monophyly of *Etainia*, *Zimmermannia* and *Ectoedemia* s. str. was even better supported, but no strong choice could be made between the two alternative topologies within this branch: (*Ectoedemia* (*Etainia* + *Zimmermannia*)) or (*Etainia* (*Zimmermannia* + *Ectoedemia*)); there was no support for the third alternative (*Zimmermannia* (*Etainia* + *Ectoedemia*)). With the present knowledge we prefer to keep *Etainia* as subgenus, since raising its rank immediately causes the need of raising most other subgenera as well. This will cause several tenths of name changes and new combinations, which will upset stability of nomenclature. Further work to refine the cladogram is much needed.

Puplesis & Diškus (1996) consider the posterior process of the male genitalia to be an uncus. Since we do not see a hinging point with the genital capsule or gnathos, which normally separate the uncus, we regard this structure tentatively as a pseuduncus, as was suggested before (Van Nieukerken 1986). The lack of the real uncus is one of the apomorphies supporting the clade *Etainia* + *Zimmermannia* + *Ectoedemia* (see above).

Diagnosis

Etainia-species are easily recognized from other European Nepticulidae by the presence of two non-metallic white fasciae or a antemedial fascia and an additional post-

medial costal and dorsal spot. Only *Acalyptris platani* (Müller-Rutz) has similar spots, but is overall much paler, and the male has conspicuous widened hindwings with raised white androconiae (Van Nieuwerkerken & Johansson 1990). The valval apodeme in the male genitalia is unique and also the female genitalia are rather characteristic (see figures in Van Nieuwerkerken & Johansson 1990; Laštůvka & Laštůvka 1997).

Checklist of Western Palaearctic species

Ectoedemia Busck, 1907

Subgenus *Etainia* Beirne, 1945

Obrussa Braun, 1915 (preoccupied)

1. *E. (Et.) sericopeza* (Zeller, 1839) (Poland)
2. *E. (Et.) louisella* (Sircom, 1849) (Britain)
sphendamni (Hering, 1937) (Denmark)
3. *E. (Et.) obtusa* (Puplesis & Diškus, 1996) (Turkmenistan)
4. *E. (Et.) biarmata* (Puplesis, 1994) comb. n. (Georgia)
5. *E. (Et.) decentella* (Herrich-Schäffer, 1855) (Germany)
monspessulanella (Jäckh, 1951) (Germany)
6. *E. (Et.) leptognathos* (Puplesis & Diškus, 1996) comb. n. (Turkmenistan)
7. *E. (Et.) albibimaculella* (Larsen, 1927) (Denmark)

Key to males on external characters

Note. *E. biarmata* from Abchazia in Georgia is not included, it is known from a single poorly preserved male. It is externally very similar to *E. obtusa*, but has an additional valval process in the male genitalia (see Puplesis 1994). For other illustrations see the above mentioned books.

1. Forewing underside and hindwing upperside with conspicuous patch of black androconial scales at base. Basal spot present 3.
– Black androconial scales absent. Basal spot present or absent 2.
2. Forewing without basal spot, dark grey; thorax uniform dark-grey *E. albibimaculella*.
– Forewing with basal white spot; thorax posteriorly white (Fig. 1) *E. obtusa*.
3. Thorax white. Frontal tuft black or yellow to brown 4.
– Thorax black or fuscous. Frontal tuft yellow to ferruginous *E. sericopeza* or *E. louisella*.
4. Frontal tuft black *E. decentella*.
– Frontal tuft yellow to brown. Forewing usually with white pattern more dominant
..... *E. leptognathos*.

Key to males on genitalia characters

Illustrations in Van Nieuwerkerken & Johansson (1990), Puplesis (1994) and Laštůvka & Laštůvka (1997). The genitalia of *E. obtusa*, *E. leptognathos* and *E. decentella* are also illustrated here.

1. Tegumen produced into pseuduncus, pointed or truncate 2.
– Tegumen rounded and wide, not or hardly produced into pseuduncus (Figs. 4, 5) 5.

- 2. Gnathos with broadly rounded central element. Valval tip broad and rounded 3.
- Gnathos with narrow pointed central element. Valval tip broad and rounded or pointed 4.
- 3. Genital capsule about 550–650µm long. Tegumen very long and pointed. Transtilla with sublateral arms almost as long as transverse bar *E. sericopeza*.
- Genital capsule about 410µm long. Tegumen shorter, slightly truncate. Transtilla with sublateral arms approximately half length of transverse bar *E. louisella*.
- 4. Valval tip triangular, pointed. Pseuduncus with relatively long point... *E. albibimaculella*.
- Valval tip broad and rounded. Pseuduncus relatively short and obtuse (Figs. 2, 3, 8) *E. obtusa*.
- 5. Gnathos very broad, tegumen broadly rounded (Fig. 5) *E. decentella*.
- Gnathos rather narrow, tegumen slightly produced (Fig. 4) *E. leptognathos*.

Key to females

- 1. Thorax completely white 2.
- Thorax brown or grey, at most with some white posteriorly and on tegulae 3.
- 2. Frontal tuft black; signa very long, longest more than 500 µm *E. decentella*.
- Frontal tuft yellow to brown. Forewing usually with white pattern more dominant; signa considerably shorter, longest less than 500 µm *E. leptognathos*.
- 3. Forewing without white spot at basis; thorax uniform dark-grey *E. albibimaculella*.
- Forewing with white spot at basis; thorax with white scales on posterior tip; species only identifiable on genitalia 4.
- 4. Tergite VIII with strong medial invagination of posterior margin; two difficult species, for differences see Van Nieukerken & Johansson (1990) *E. sericopeza* or *E. louisella*.
- Tergite VIII with almost straight margin (Figs. 6, 7, 9) *E. obtusa*.

Ectoedemia (Etainia) obtusa (Puplesis & Diškus) (Figs. 1–3, 6–10)

Etainia obtusa Puplesis & Diškus, 1996: 46. Holotype ♂, Turkmenistan, W. Kopet Dag, 40 km E. Garrygala [= Kara Kala], 800 m, [UTM 40S DH75] 26.v.1993, R. Puplesis & A. Diškus (VUPI) [examined].

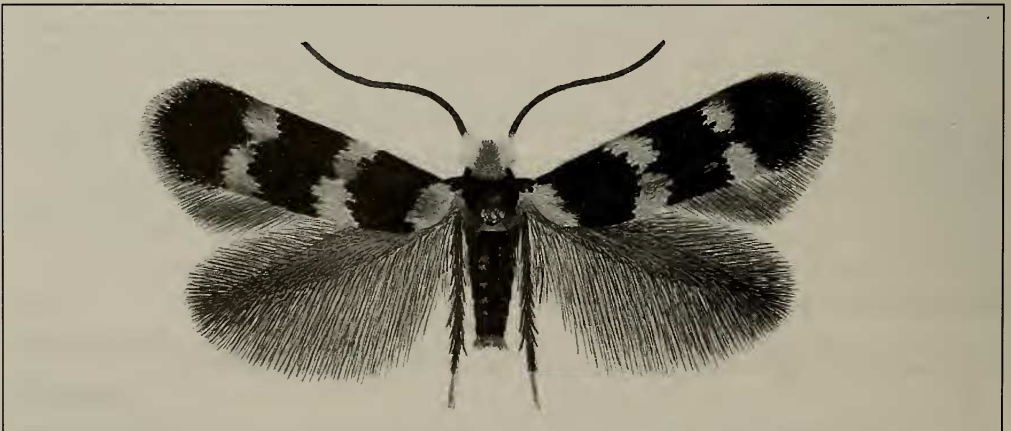
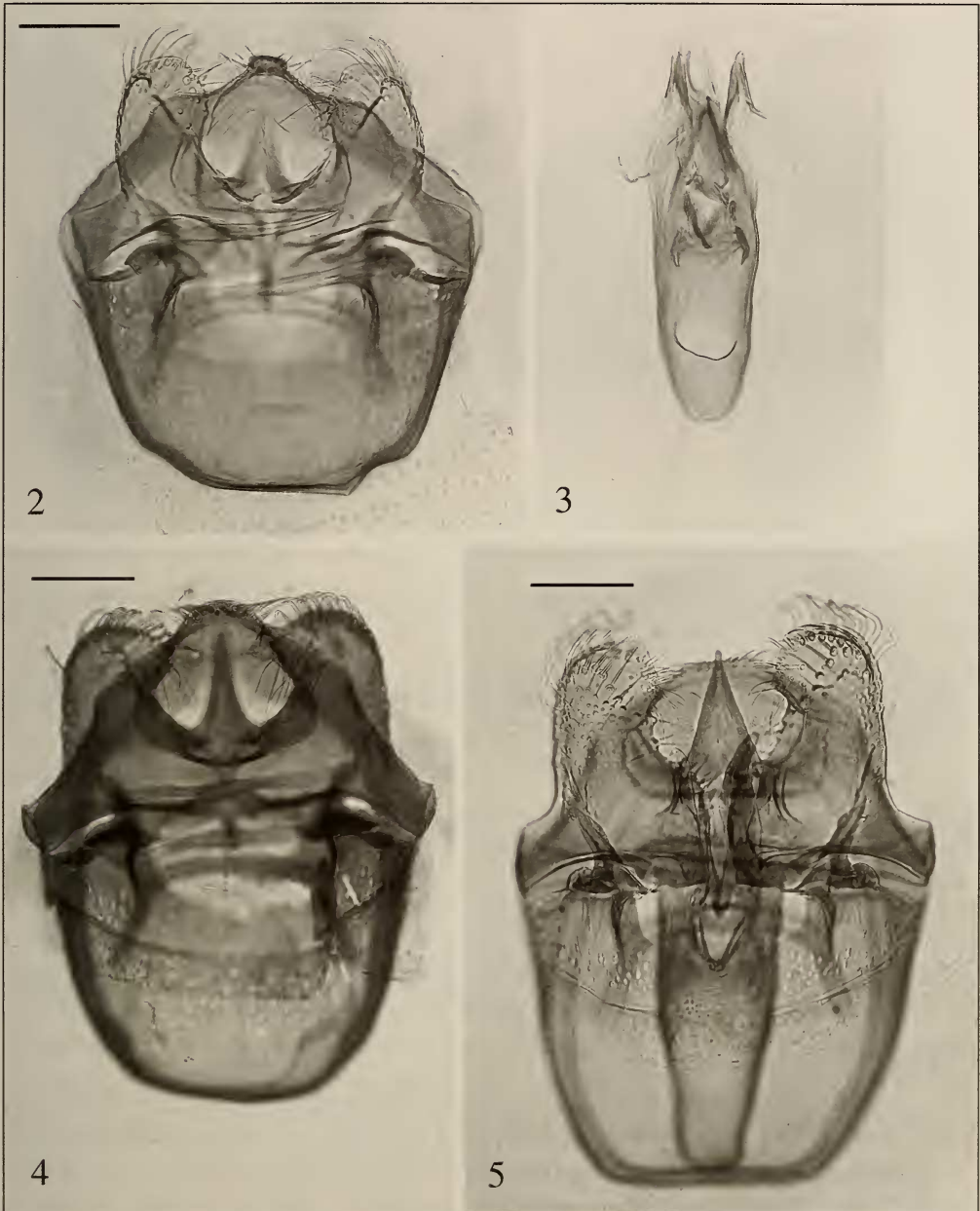


Fig. 1. *Ectoedemia (Etainia) obtusa*. Male, Croatia, Istra. del. A. Laštůvka.



Figs. 2–5. Male genitalia of *Ectoedemia* (*Etainia*), ventral aspect. **2, 3** – *E. obtusa*, slide EvN 3181 (France, Les Mées). **4** – *E. leptognathos*, slide EvN 2920 (paratype, Turkmenistan). **5** – *E. decentella*, slide VU 1297 (Netherlands, Overveen). Scales: 100 μ m.

Ectoedemia obtusa (Puplesis & Diškus); Krenk 2000: 36 [colour photograph]

Ectoedemia (*Etainia*) sp.; Karsholt *et al.* 1995: 7, no 018.004.0; Leraut 1997: 82, no. 129 [listed]

Material. Croatia: 22♂, 10♀, Istra, Labin [UTM 33T VK39], 4.iv.1999, cocoon on *Fraxinus ornus*, emerged in iv, A. Laštůvka (coll. Laštůvka, 1♂ RMNH), 1♂, Krk, Risika, 19.–25.v.2001, M. Petrů (coll.



Figs. 6–7. Female genitalia of *Ectoedemia (Etainia) obtusa*, slide EvN 2830 (France, Les Mées): 6 – Abdominal terminal segments, dorsally, 7 – Bursa copulatrix with the largest signum in focus. Scales: 50 μ m (6), 200 μ m (7).

Petrů). – France: 2♂, 1♀, Alpes Hte Provence, Les Mées [UTM 31T GJ3879], 14.v.1989, G. R. Langohr (RMNH); 1♂, Var, La Sainte Baume, Plan d’Aups [UTM 31T GJ2001], 5.vi.1991, R. Buvat; 2♂, Var, La Sainte Baume, Plan d’Aups, La Brasque [31T GJ1900], 21.vi.1991, R. Buvat (RMNH). – Italy: 1♂, Cuneo, Pezzolo v. Uzzone [UTM 32T MQ3531], 19.v.1970, reared from cocoon [host unknown], U. Parenti (coll. Parenti). – Spain: 1♀, Aragon, prov. Teruel, Albarracin, [UTM 30T XK36], 23.vi.1992, A. Laštůvka (coll. Laštůvka). – Turkmenistan: holotype.

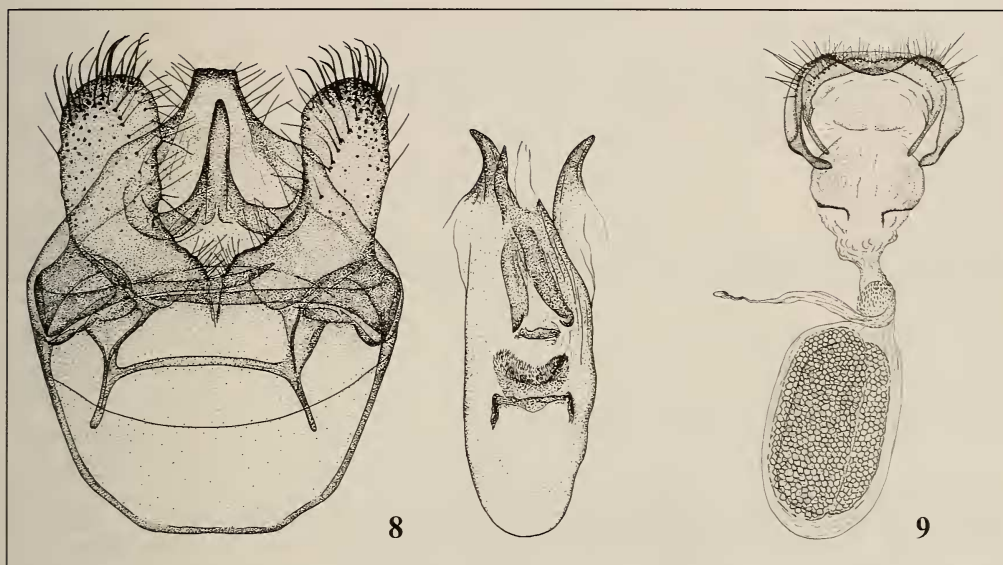
Other material (not examined, data provided by R. Buvat). France: 1♂, Bouches-du-Rhône, Auriol, Bois de la Lare, [UTM 31T GJ1704], 3.vi.1991, R. Buvat; 2♂, Var, La Sainte Baume, Plan d’Aups, [UTM 31T GJ2001], 16.vi.1995, R. Buvat (coll. Buvat).

Diagnosis

Males differ from *E. sericopeza*, *louisella* and *decentella* by the absence of black androconial scales on forewing underside and hindwing. *E. albibimaculella* is also missing these scales, but is overall paler brown, and lacks a basal spot on the forewing. *E. biarmata* is also externally very similar to *obtusa*. Females are very similar to *sericopeza* and *louisella*, only separable by differences in the terminal tergites.

Description

Male (Fig. 1). Forewing length 2.5–2.9 mm. Head with frontal tuft pale yellow to orange; collar similar. Antenna with ca. 51 segments (broken in most specimens); scape creamy white, flagellum dark brown. Thorax fuscous, posterior tip white, tegulae sometimes with few white scales; forewing fuscous-black, with small basal white spot, a slightly constricted white fascia at 1/3 and a costal and dorsal spot at 2/3, sometimes



Figs. 8–9. Genitalia of *Ectoedemia (Etainia) obtusa*, genitalia preparations AL (Croatia): **8** – male, **9** – female. del. A. Laštůvka.

forming a second fascia; terminal cilia silvery white beyond more or less distinct cilia-line. Underside brown, without black androconial scales, but with a small band of yellow androconial scales in furrow under frenulum (often difficult to see). Hindwing grey, no trace of androconial scales.

F e m a l e. Forewing length 2.6–3.1 mm, antenna with 51 segments. Otherwise as male.

M a l e g e n i t a l i a (Figs. 2, 3, 8). Capsule length 405–455 μm ($n=4$), ca. 0.81–0.95 as wide as long; vinculum truncate anteriorly, fused with tegumen; tegumen forming pseuduncus with truncate tip with about 6–7 setae ventrally in one row. Gnathos with narrow, pointed central element. Valva length 175–223 μm , with broadly rounded tip; valval apodeme sinuous, pointed, about 230–260 μm long; transtilla with long transverse bar and short, but distinct ventrolateral arms. Aedeagus 325–370 μm long, with pair of ventral carinae, a pointed tip; vesica with 2 strong cornuti near phallotrema and an H-shaped circular sclerotization anteriorly near cathrema.

F e m a l e g e n i t a l i a (Figs. 6, 7, 9). T VII posteriorly with lateral rows of 11–14 setae on sclerotized plates, slightly excavated medially along anterior margin of T VIII; T VIII with almost straight anterior margin, ca 6–8 setae on either side; anal papillae with 23–27 setae. Bursa total length 880 μm ($n=1$). Vestibulum with paired lobes, only slightly sclerotized. Ductus bursae with a group of spines, but occasionally poorly developed; corpus bursae without spines, with two obovate large reticulate signa, resp. measuring 302 \times 115 and 278 \times 138 μm .

B i o l o g y. In 1999 cocoons were found by the junior author in Croatia on trunks of *Fraxinus ornus* L., in a small forest of about 60 \times 100 m, with a dominance of *Fraxinus ornus*. In total about 80 cocoons were collected from trunks in the whole area. The



Fig. 10. Distribution of *Ectoedemia (Etainia) obtusa*.

nearest trees of *Acer monspessulanum* were growing at a distance of ca 40–50 m; on the isolated *Acer* and *Fraxinus* trees in the surroundings no cocoons were found. No signs of feeding were observed on the trees. In 2002 these trees unfortunately had been felled and in nearby localities trees of *Fraxinus* and *Acer* were mixed; here few cocoons were found on both tree species. Parenti also reared the specimen from Italy (Cuneo), but unfortunately his rearing notes have since been lost (U. Parenti *in litt.*). Puplesis & Diškus (1996) assumed *Acer turcomanicum* to be the host, basing on the host preference of several related species. On the same assumption, the senior author searched in vain for larvae in one of the French localities only amongst the various *Acer*-species, unaware of the possibility of *Fraxinus* as host. Evaluating all the available evidence, we consider *Fraxinus ornus* as the most likely host in Croatia, although the possibility that all larvae were transported prior to cocoon spinning from nearby *Acer* cannot be excluded totally. *Fraxinus ornus* is widespread in the Eastern Mediterranean region and southern Central Europe, but not native in France or Spain, although it has been planted there (Amaral Franco & Rocha Alfonso 1972). In France and Spain occur the more widespread *F. angustifolia* Vahl and *F. excelsior* L. We tentatively assume that *E. obtusa* feeds on several species of *Fraxinus*. Cocoons whitish to light purple, changing into greyish-brown after few days. Adults have been collected in May and June, cocoons were found in April.

Distribution (Fig. 10). Southern Europe: Spain, France, Italy, Croatia and in Turkmenistan. To be expected elsewhere on the Balkan and in Turkey and Iran.

Hostplant relationships. *Fraxinus* (family Oleaceae) – if indeed the host – is an interesting and unexpected addition to the hostplants of Nepticulidae. Previously only one species was recorded from this family: *Ectoedemia (Fomoria) oleivora* Vári, feeding in *Olea chrysophylla* Lamk. (Vári 1955; Scoble 1983); it is not closely related. Most species of *Etainia*, where the biology is known, feed on *Acer* species (Aceraceae or Sapindaceae in the system of Bremer et al. 1998). Only *E. albimaculella* is known to feed on Ericaceae (*Arctostaphylos*). Oleaceae are not closely related to Aceraceae or Ericaceae, and most likely the feeding on *Fraxinus* constitutes a secondary hostshift. Since *Acer* is recorded as host in Europe, the Eastern Palaearctic

and the Nearctic region, it is very likely that it constitutes the plesiomorphic host of *Etainia*.

Remarks. The new combination *Ectoedemia obtusa* was inadvertently published by Krenk (2000).

Acknowledgements

We thank the late R. Buvat (Marseille), Gerard Langohr (Simpelveld, The Netherlands), M. Petrů (Praha) and Rimantas Puplėsis for lending us their material and a gift of several specimens of *E. obtusa* and *E. leptognathos* respectively.

References

- Amaral Franco, J. do & M. L. da Rocha Alfonso 1972. Fraxinus.– *In*: T. G. Tutin, V. H. Heywood, N. A. Burges et al. (eds.), Flora Europaea. – University Press, Cambridge. Pp. 53–54.
- Bremer, K., B. Bremer & M. Thulin 1998. Classification of flowering plants. Department of Systematic Botany, Uppsala University. – <http://www.systbot.uu.se/classification/summary98.html>. [Accessed 03-02-2002.]
- Hoare, R. J. B. 1998. Systematics of Australian Nepticulid moths (Lepidoptera: Nepticulidae). – Unpublished thesis, Canberra, Australian National University. 248 pp.
- Karsholt, O., E. J. van Nieukerken, S. E. Whitebread & S. Zangheri 1995. Lepidoptera Zeugloptera, Dacnonypha, Exoporia, Monotrysia (=Micropterigoidea, Eriocranioidea, Hepialoidea, Nepticuloidea, Incurvarioidea, Tischerioidea). – *Checkl.Spec.Faun.Ital.* 80: 1–12.
- Krenk, V. 2000. Small moths of Europe. – *Ceský Tesin.* 174 pp.
- Laštůvka, A. & Z. Laštůvka 1997. Nepticulidae Mitteleuropas. Ein illustrierter Begleiter (Lepidoptera). – *Konvoj*, Brno. 229 pp.
- Leraut, P. 1997. Liste systématique et synonymique des Lépidoptères de France, Belgique et Corse (deuxième édition). – *Supplément à Alexanor*, Paris. 526 pp.
- Morton, A. 2000. DMAP for Windows. Version 7.0^c (32-bit). – Berkshire, UK.
- Nieukerken, E. J. van 1986. Systematics and phylogeny of Holarctic genera of Nepticulidae (Lepidoptera, Heteroneura: Monotrysia). – *Zool.Verh.* 236: 1–93.
- Nieukerken, E. J. van, E.S. Nielsen, R. Johansson & B. Gustafsson 1990. Introduction to the Nepticulidae. – *In*: R. Johansson, E. S. Nielsen, E. J. van Nieukerken & B. Gustafsson (eds.), *The Nepticulidae and Opostegidae (Lepidoptera) of NW Europe*. *Fauna Entomologica Scandinavica* 23. Brill, Leiden. Pp. 11–109.
- Nieukerken, E. J. van & R. Johansson 1990. Tribus Trifurculini.– *In*: R. Johansson, E. S. Nielsen, E.J. van Nieukerken & B. Gustafsson (eds.), *The Nepticulidae and Opostegidae (Lepidoptera) of NW Europe*. *Fauna Entomologica Scandinavica* 23. Brill, Leiden. Pp. 239–321.
- Puplėsis, R. 1994. *The Nepticulidae of eastern Europe and Asia. Western, central and eastern parts.* – Backhuys Publishers, Leiden. 290 pp.
- Puplėsis, R. & A. Diškus 1996. First record of the genus *Etainia* Beirne from Central Asia with descriptions of two new species and some provisional notes on the world fauna (Lepidoptera: Nepticulidae). – *Phegea* 24(1): 41–48.
- Scoble, M. J. 1983. A revised cladistic classification of the Nepticulidae (Lepidoptera) with descriptions of new taxa mainly from South Africa. – *Transv.Mus.Monogr.* 2: 1–105.
- Vári, L. 1955. South African Lepidoptera I. Descriptions of new leafmining Tineina. – *Ann.Transv.Mus.* 22(3): 331–351.