

Elachista imatrella Schantz, 1971 (Elachistidae): Female external morphology and redescription of the male

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Abstract. The female external morphology of *Elachista imatrella* Schantz, 1971 is described based on a single female specimen lacking the abdomen. The male *E. imatrella* is redescribed on the basis of new material and compared with a close relative, *E. cinereopunctella* (Haworth, 1828). The species can be distinguished most reliably by the length and shape of the aedeagus. The wing pattern of *E. imatrella* is more distinct than presumed earlier. The habitat of *E. imatrella* is described and its possible life history discussed.

Key words. Elachistidae, *Elachista imatrella*, *Elachista cinereopunctella*, taxonomy, morphology, redescription.

Introduction

Elachista imatrella Schantz, 1971 was described on the basis of three male specimens collected in the vicinity of Imatra, south-eastern Finland (Schantz 1971). Later, five additional, old, and unlabelled specimens were recorded from Norway (Traugott-Olsen & Schmidt Nielsen 1977). These were the only known records of this species until it was rediscovered in Finland in 1993 (Kaila & Kerppola 1995). Those findings were made in Rovaniemi, northern Finland, where two male specimens were found by L. Sippola. Soon after that (when mapping the lepidopterous fauna of the planned Vuotos water reservoir area in Pelkosenniemi in 1994), MM captured one male specimen of this rarity by kicking it off a spruce tree in a fen area (Itämies & Mutanen 1995, 1996). This locality was later visited by other lepidopterists and three more specimens were collected in 1996 (R. Siloaho and Henry Holmberg, pers. comm.). When the Norwegian specimens were later re-examined, they were considered to belong to *E. cinereopunctella* (Haworth, 1828) (L. Aarvik, pers. comm.). Therefore, *E. imatrella* is known only from Finland, and a total of nine specimens are nowadays available. The female genitalia still remain unknown as the only known female specimen, collected from Pelkosenniemi, Lapland (H. Holmberg leg.) unfortunately lacks the abdomen.

E. imatrella is closely related to *E. cinereopunctella* (see Traugott-Olsen & Schmidt Nielsen 1977). The following male characteristics are mentioned as diagnostic (Traugott-Olsen & Schmidt Nielsen 1977, Kaila & Kerppola 1995): 1. The wing pattern of *E. imatrella* is very indistinct, whereas that of *E. cinereopunctella* is conspicuous; 2. *E. imatrella* is smaller on average; 3. The aedeagus of the male genitalia of *E. imatrella* is very long and slender, whereas in *E. cinereopunctella* it is much shorter and also slightly thicker. The species further differ considerably in their ecology, *E. imatrella* being confined to bogs and *E. cinereopunctella* to sandy or calcareous areas with shady spots (Traugott-Olsen & Schmidt Nielsen 1977). The more recent findings of *E. imatrella* have proved that some of the previously described characteristics either show intraspecific variation or are due to the worn condition of the type material.

In this paper, we describe the external morphology of the female and redescribe the external and genital morphology of the male *E. imatrella*. We also comment on the reliability of the above-mentioned diagnostic characteristics between *E. imatrella* and *E. cinereopunctella* and provide diagnostic features for the males of the species.

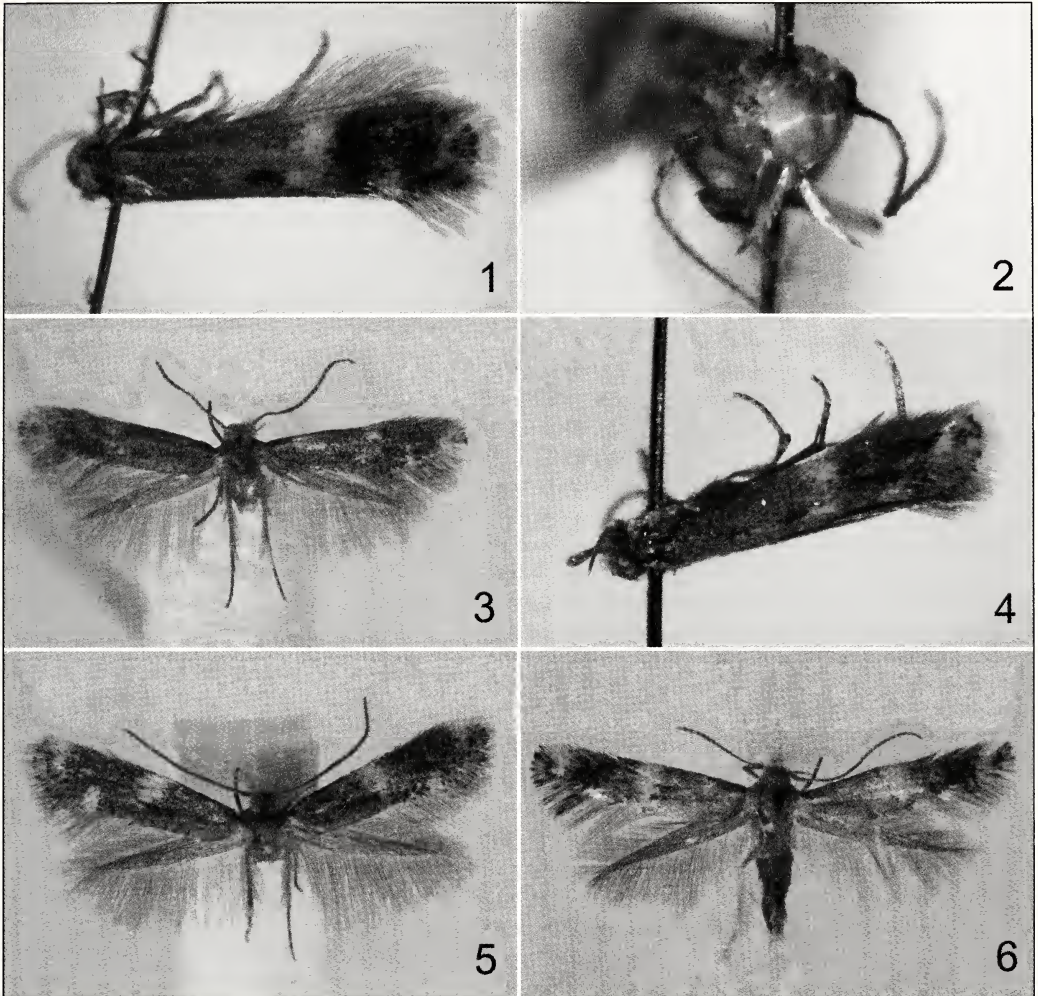
Elachista imatrella Schantz, 1971

Material. *E. imatrella*: 1♂ Finland, Sa Imatra, 23.vi.1938, von Schantz leg. (slide 531/1964, von Schantz); 1♂ KemLE: Pelkosenniemi 7456:538, 21.vi.1994, Mutanen leg. (slide 867 J. Itämies); 1♂ PPN: Rovaniemi, 25.vi.1993, Sippola leg. (slide 585 M. Mutanen); 1♂ KemLE: Pelkosenniemi, 26.vi.1996, Siloaho leg.; 1♀ KemL: Savukoski 745:53 (mislabelled, the correct municipality is Pelkosenniemi), 29.vi.1996, Holmberg leg., *E. cinereopunctella*: 2♂, 1♀ Estonia, Saaremaa, 20.vi.1994, Nupponen leg. (slides 573, 574 Mutanen); 2♂ Austria, 20.v.1992, Biesenbaum leg. (slides 1390, 3501 Kaila); 1♂ Poland, Tatra Mountains, Nosul, 1150 m, 3.vii.1987, Buszko leg. (slide 3502 Kaila); 1♂ Russia, Aunus, 19.vi.1991, Kullberg leg. (slide 3503 Kaila).

Female, external morphology (Figs. 1–2). Forewing length 3.4 mm. Labial palpus ascending; about as long as diameter of head; white above, except for tip of 3rd segment, narrowly grey, greyish below. Antennae grey, scales slightly raised on distal two thirds. Head creamy white. Neck tuft mottled grey (tips of scales greyish). Thorax and tegula mottled grey. Forewing ground colour mottled greyish/brownish from base to fascia, blackish beyond. Straight fascia situated beyond middle of costa, white and distinct, faintly broken in middle and hardly reaching dorsum. Fold area with black dot touching fascia. Ternal spot white and small. Faint white apical spot present. Ternal fringe scales grey, apical fringe scales white with clear fringe line. Legs greyish, hind leg pale inwardly. Tarsal articles grey, with broad white tip.

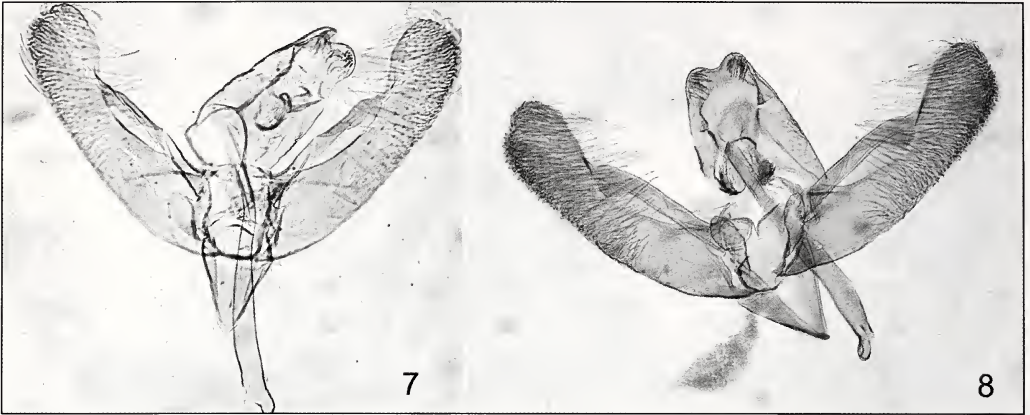
Male, redescription (Figs. 3–4, 7). Forewing length 3.2–3.7 mm. Labial palpus proximally greyish white, distally with dark brown-tipped scales. Head yellowish white with brownish scales between antennae. Neck tuft yellowish white, scales dark-tipped. Antennae dark brown, slightly serrated. Tegula and thorax brownish grey. Forewing ground colour greyish brown, with basally whitish scales giving mottled appearance; with three whitish markings varying in intensity; basal spot absent; fascia situated at 3/5 and not reaching dorsum; ternal spot small but distinct; apex with distinct, ochreous white streak-like spot; fringe line distinct, fringe yellowish white. Hindwing light greyish brown.

Male genitalia. Uncus lobes rounded with shallow u-shaped indentation between them. Gnathos bilobed, gnathos lobes elliptical. Distal margin of juxta lobes almost straight; digitate process broadly club-shaped, narrow at base; valva proximally broadest, narrowest before rounded and rather prominent cucullus; costal folds wide and prominent; valva length (0.521–0.581 mm). Saccus v-shaped, medial ridge not visible. Aedeagus length 0.559–0.599 mm and maximum width 0.029–0.039 mm, aedeagus comparatively long (1.00–1.01 times length of valva), slender and distally bent beyond slightly sclerotized ridges, vesica without cornuti.



Figs. 1–6. External appearance of *Elachista imatrella* and *E. cinereopunctella*. **1–2.** *E. imatrella* ♀ and head, Finland, KemL: Savukoski 745:53, 29.vi.1996, Holmberg leg. **3.** *E. imatrella* ♂, Finland, KemLE: Pelkosenniemi 7456:538, 21.vi.1994, Mutanen leg. **4.** *E. imatrella* ♂, Finland, KemLE: Pelkosenniemi, 26.vi.1996, Siloaho leg. **5.** *E. cinereopunctella* ♂, Estonia, Saaremaa, 20.vi.1994, Nupponen leg. **6.** *E. cinereopunctella* ♀, Estonia, Saaremaa, 20.vi.1994, Nupponen leg.

Diagnosis. The *E. imatrella* male is externally similar to that of *E. cinereopunctella* (see Figs. 5–6). The intensity of the wing pattern of *E. imatrella* seems to vary: wing markings may be clear or less pronounced, but hardly ever absent in fresh specimens (Figs. 3–4). The fascia is more outwardly situated in *E. imatrella* than in *E. cinereopunctella*, in which it is situated before the middle of the costa. *E. imatrella* is smaller on average than *E. cinereopunctella*, but there is some overlap because the forewing length of the studied *E. cinereopunctella* specimens varied from 3.6 to 4.0 mm. The species are most



Figs. 7–8. ♂ genitalia of *Elachista imatrella*. 7. Finland, KemLE: Pelkosenniemi 7456:538, 21.vi.1994, Mutanen leg. 8. *E. cinereopunctella*, Estonia, Saaremaa, 20.vi.1994, Nuppenon leg.

reliably distinguishable based on the male genitalia, particularly the aedeagus, which is both absolutely and relatively longer in *E. imatrella*. In *E. cinereopunctella* the length of the aedeagus varies from 0.477 to 0.530 mm ($n=6$), being statistically significantly shorter than in *E. imatrella* ($t=7.24$, $df=9$, $p<0.001$). The ratio between aedeagus and valva is 0.86–0.93 in *E. cinereopunctella*, but 1.00–1.01 in *E. imatrella*. However, this difference appears less prominent than presented by Traugott-Olsen & Schmidt Nielsen (1977), since the illustrated aedeagus of *E. imatrella* represents the extreme type. The maximum width of the *E. cinereopunctella* aedeagus (0.028–0.035 mm) is the same as in *E. imatrella*, but the shorter aedeagus also appears stouter (see Figs. 7–8). The distal end of the aedeagus of *E. cinereopunctella* is straight or only very slightly bent (Fig. 8). Due to the scarcity of *E. imatrella* specimens in collections, the reliability of the diagnostic characteristics is slightly doubtful. The length of the aedeagus varies to the extent of possible overlap at the junction of the distributions. The females of these species closely resemble each other externally, but the fascia of *E. cinereopunctella* is more proximally situated. Additional specimens of *E. imatrella* may reveal further external differences between females, and additional characteristics are potentially diagnostic in female genitalia.

Life history. Unknown. The species is confined to boggy habitats. The type series was collected flying over *Eriophorum vaginatum*, which was considered the plausible food plant by Schantz (1971). We consider this an improbable food plant for several reasons: Firstly, this plant is very scarce in the Pelkosenniemi habitat. Secondly, because *E. vaginatum* is often a dominant plant species in bogs in Finland, more findings of *E. imatrella* could be expected if *E. vaginatum* really were the host plant. Thirdly, there are almost always a number of sedge (*Carex*) species present together with *Eriophorum*, and since the close relative *E. cinereopunctella* is confined to certain sedges, we believe that some species of *Carex* are more probable food plants for *E. imatrella*. The locality in Pelkosenniemi is a woody bog, with spruce and pine trees mostly less than five meters tall. Dwarf birch (*Betula nana*) stands are dense in many places. The most abundant

sedges are *Carex globularis* and *C. vaginata*. The latter typically grows around and under spruce trees, from where some *E. imatrella* adults were also swept (R. Siloaho, pers. comm.). One male specimen was caught by kicking it on flight high up from a spruce tree. In August 2000, MM, together with Tomi Mutanen, visited the place and found several empty and some inhabited *Elachista* mines on *C. vaginata*, but this rearing did not yield adults. No mines were found on *C. globularis* or *E. vaginatum* despite intensive search. We therefore consider *C. vaginata* the more probable food plant for *E. imatrella*. We have also visited the Rovaniemi locality, which resembles that of Pelkosenniemi, but has more open areas with rich *Eriophorum* and *Carex* growths. The adult of *E. imatrella* seems to be on the wing very early in the summer, in June, and we therefore consider it probable that the larva reaches maturity in autumn. When the first specimen from Pelkosenniemi was collected, species overwintering at the pupal stage (e. g. *Phyllonorycter salicicolellus* (Sircom, 1848), *P. rolandi* (Svensson, 1966), and *Callisto coffeella* (Zetterstedt, 1839)) had just started their flight.

Discussion

The genital differences between many species groups of Elachistidae are extremely slight (see e. g. Kaila *et al.* 2001; Kaila & Junnilainen 2002; Kaila & Varalda 2004). In many cases, the differentiation of a species is based not only on differences in its external and genital morphology, but on a combination of morphological, biological, and distributional data. This is also the case in *E. imatrella*, since the morphological differences compared to *E. cinereopunctella* are slight. To our knowledge the two species live in different geographical areas and inhabit different habitats. There may be a reason for caution, however. Many lepidopteran species, such as *Clepsis pallidana* (Fabricius), *Thalera fimbrialis* (Scopoli), and *Lacanobia w-latinum* (Hufnagel), that are found in warm and dry localities in southern and central Europe, live mainly in bogs and other moist habitats in Scandinavia (Mikkola & Jalas 1977; Mikkola *et al.* 1985; Skou 1991; personal observations). Because we found intraspecific genital variation small in both species and the genital differences to be constant over the whole ranges and particularly between the closest population of *E. cinereopunctella* and *E. imatrella* in south-eastern Fennoscandia, we consider the possibility of geographic intraspecific variation in genitalia very improbable.

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