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THE IDENTITY OF *STIGMELLA ZELLERIELLA* (SNELLEN, 1875), A SENIOR SYNONYM OF *S. REPENTIELLA* (WOLFF, 1955) (LEPIDOPTERA, NEPTICULIDAE)

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With 2 text-figures and 2 plates

ABSTRACT

The identity of *Stigmella zelleriella* (Snellen, 1875) n. comb. is fixed by designation of a lectotype. *Nepticula repentiella* Wolff, 1955, and *Nepticula lappovimella* Svensson, 1976, are placed in synonomy with *S. zelleriella*, which is redescribed and discriminated from resembling species. It appears to have a northern distribution, occurring in sand-dunes on the *Salix repens* L.-complex and on moors in Scandinavia on *Salix lapponum* L. The related *S. benanderella* (Wolff, 1955), which occurs on the same foodplants, is also diagnosed.

Snellen (1875) described *Nepticula zelleriella* from specimens collected as adults near 's-Gravenhage (The Hague, Netherlands). Despite Snellen's comparatively good description and figure, most authors misinterpreted *N. zelleriella*. Hering (1937) identified as such a species which he reared from *Carpinus*, although he had earlier reported (1932) *Salix repens* to be the foodplant, possibly referring to Snellen. As nobody had studied Snellen's material, Hering's (1937) view was several times repeated and *zelleriella* was subsequently incorrectly synonymised by some authors with *N. carpinella* Heinemann or *N. floslactella* (Haworth).

When first reading the description of *N. zelleriella* the resemblance of the figure to *N. repentiella* Wolff, 1955, struck me at once. This led me to examine the original specimens which are housed in the Snellen collection at the Rijksmuseum van Natuurlijke Historie at Leiden, and also the types of *N. repentiella*, and material of *N. lappovimella* Svensson, 1976. Additional material was studied to get a picture of the geographical variation and distribution, and the related *N. benanderella* Wolff has also been studied.

The distribution map is mainly based on material examined and reliable literature records, given under the heading distribution.

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Johansson (Växjö), R. de Jong (Leiden), and E. S. Nielsen (Copenhagen). I am greatly indebted to C. Wilkinson for his critical remarks on the draft and corrections of the english text.

Depositories of material have been abbreviated as follows: RMNH, Rijksmuseum van Natuurlijke Historie, Leiden; VUA, Department of Animal Systematics and Zoogeography, Vrije Universiteit, Amsterdam; ZMA, Instituut voor Taxonomische Zoölogie (Zoölogisch Museum), Amsterdam; ZMC, Zoologisk Museum, University of Copenhagen; ZSMK, Zoologische Staatssammlung München, collection Klimesch (material exchanged with Klimesch).

Stigmella zelleriella (Snellen, 1875) n. comb.
(figs. 1, 2; pl. 1, pl. 2 figs. 4-6)

Nepticula zelleriella Snellen, 1875: 116, pl. 7. — Lectotype ♀ (here designated), [Netherlands], [Den] Haag, 19.vi.1874, *Salix repens*, Snellen, Genitalia slide VU 0816 (RMNH) (examined).
Nepticula zelleriella; Snellen, 1882: 1007; Hering, 1932: 11; Lempke, 1976: 13.
Nepticula repentiella Wolff, 1955a: 82, figs. 1-7, 13-16. — Holotype ♂, Denmark, Asserbo, larva 4.x.1953, *Salix repens*, Wolff, Genitalia slide NLW 1803 (ZMC) (examined). N. syn.
Nepticula repentiella; Wolff, 1955b: 49, fig. 2; Borkowski, 1975: 11.
Stigmella repentiella; Hering, 1957: 929; Emmet, 1977: 178.
Nepticula lappovimella Svensson, 1976: 204, figs. 14, 15, pl. 1: 7, 8. — Holotype ♂, Sweden, Hrj., Tännäs, 20-21.vi.1968, Svensson, Genitalia slide IS 5741 (Coll. Svensson) (not examined). N. syn.

External features (pl. 1 fig. 1). — Forewing length 2.2-2.7 mm; wingspan 5.2-5.8 mm (♂ and ♀). Head with frontal tuft varying from almost yellowish white, via orange to fuscous. Collar white, eyecaps white. Antennae with 28-34 segments in male, 22-25 in female. Thorax concolorous with base of forewing. Forewing with ill-defined colour-pattern, often seeming almost unicolorous. Basal two-thirds shining grey to almost white in some females, generally followed by an ill-defined whitish fascia, which may be concolorous with basal part, especially in females; apical third darker, dark-grey to almost brown, sometimes with slight purplish lustre. Cilia lighter grey, slightly demarcated by a line of dark scales. Male with inconspicuous grey anal tufts. Female with prominent long pointed ovipositor and pair of grey anal tufts, as long as ovipositor.

Variation. — In a given locality there is some sexual dimorphism, the females generally being lighter and having a more pronounced colour-pattern. Throughout the area the geographical variation supersedes the sexual variability, northern specimens generally being darker than southern specimens. The species also exhibits a variation in external characters within single localities.

Male genitalia (pl. 2 figs. 4, 5). — Very similar to *S. salicis* (Stainton), see Wolff (1955a and b). Characteristic are the valvae, which are apically broadly rounded and have a short medial point only, while in other species of the *salicis* group the valvae are apically narrower and with two points or digitate processes. Uncus bilobed, each lobe slightly emarginate.

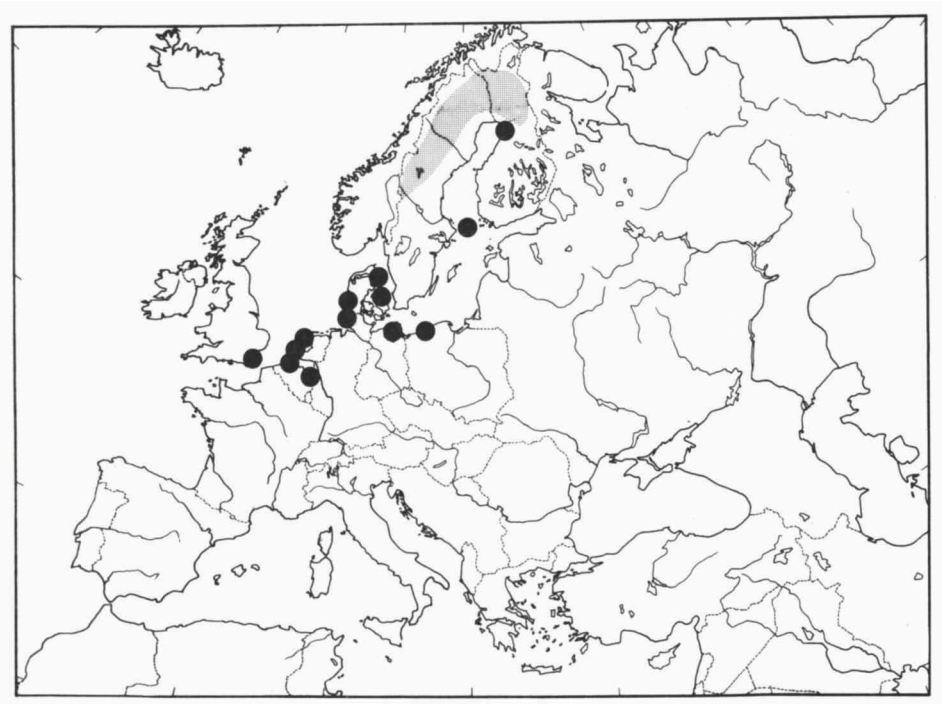

Fig. 1. Distribution of *Stigmella zelleriella* (Snellen). Dots represent records of "typical" form on *Salix repens* L. aggr., hatched area represents distribution of form found on *Salix lapponum* L.

Female genitalia (pl. 1 figs. 2, 3; pl. 2 fig. 6). — Long, narrow, pointed ovipositor formed by tergites 8 and 9 and sternites 7 and 8. Anterior apophyses widened at one-third from anterior end. Bursa copulatrix with strongly folded ductus bursae; corpus bursae with conspicuous band of scallop-like pectinations, similar to other members of the *salicis* group.

Diagnosis. — Fresh specimens are easily recognizable on external characters; *S. benanderella* (Wolff, 1955) is rather similar, but generally more uniformly grey, and females have a short ovipositor and inconspicuous anal tufts. Since this species also feeds on *Salix repens*, reared specimens have also to be checked carefully. Other species of the *salicis* group have a more pronounced colour-pattern and a distinct fascia, and the females never have such a long ovipositor and distinct anal tufts as in *zelleriella*. The ovipositor is also a good character in worn females, which only can be confused with *S. floslactella* (Haworth), *S. carpinella* (Heinemann) and *S. tityrella* (Stainton). In these species the bursa is different, lacks the typical band of pectinations and has less thickened apophyses.

Remarks. — There are three female syntypes of *zelleriella* at Leiden. Two are worn examples of *Stigmella confusella* (Wood), but the third is in very good condition and this specimen has been selected as lectotype. There are several reasons

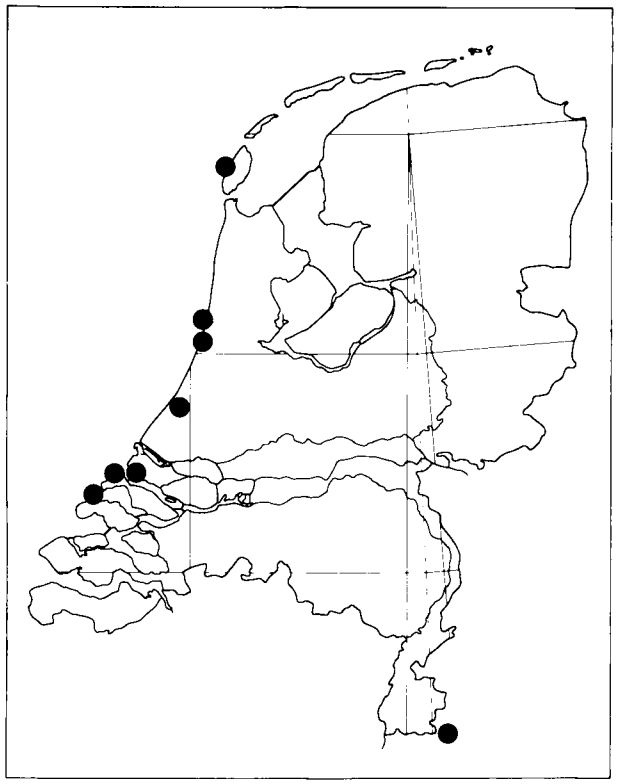

Fig. 2. Distribution of *Stigmella zelleriella* (Snellen) in the Netherlands, plotted on 10 km squares of UTM-grid.

for this: firstly Snellen himself considered the other two specimens insufficient to describe a new species on and waited until he received the third specimen, which he called a "very perfect specimen", from De Graaf. Secondly, this specimen was figured in the original description; the figure clearly shows the prominent ovipositor and anal tufts. Since the description and specimen agree completely, this designation fixes the identity of *zelleriella* clearly. The lectotype is depicted in pl. 1 figs. 1-3.

The identity of *repentiella* Wolff is beyond doubt through his very good description and figures (1955a), although he himself overlooked a few *benanderella* males in the long type-series of *repentiella*. *N. lappovimella* Svensson has recently been described after specimens caught flying over *Salix lapponum* L., on which mines have also been noted. This species is completely identical with *zelleriella* in the genitalia, but seems to be slightly different in external features. However, from the study of material from a large geographical range, it appears that there is considerable variation without a distinct gap between the two forms. The varia-

tion in this species, being more dark in the north, is parallelled by many insects, also in Nepticulidae.

Arguments based on habitat, life-cycle and distribution are not sufficient in this case to give the form a separate status and, therefore, it is synonymised here.

Distribution (figs. 1, 2). — The species is known with certainty from Kent in England (Emmet, 1977), the coastal area in the Netherlands and one inland locality (fig. 2), West Germany (Isle of Sylt) (Wolff, 1955b), possibly in East Germany (reported as mines of *salicis* on *Salix repens*) (Buhr, 1936), Poland (Mielenko near Koszalin) (Borkowski, 1975), Denmark (Fanø, west of Jylland, Asserbo and Anholt) (Wolff, 1955a and Karsholt & Nielsen, 1978), Finland (Åland, near Oulu, coast), and throughout Finnish and Swedish Lapland, south to Idre in Dalarna (form *lappovimella*: Kyrki, 1978; Svensson, 1976 and 1979). *S. zelleriella* certainly is to be expected in northern France, Belgium, Norway and the Baltic states.

Biology. — Foodplants are *Salix repens* L., *S. arenaria* L. and *S. lapponum* L.; *S. lapponum* in Lapland only, where the species may feed on more *Salix* species. The mines are often very difficult to find, but when vacated the mined region soon stains black and is easier to pick out. In less hairy plants, however, the mines are more conspicuous. The mine generally is linear, but can become a false blotch. Reliable differences with the mines of *S. benanderella* have not been found.

In western Europe there are at least two generations. Larvae have been taken in the first half of July and October, adults were bred or found in July and August and in May and June. In Lapland there is one generation only, with adults flying in June and July and mines to be expected in August.

On *Salix arenaria* and *S. repens, S. zelleriella* is mainly found in coastal dunes, but does probably also occur in inland moors, since at least one specimen is known from an inland locality. In Lapland the species occurs with *S. lapponum* in typical moor habitats, but does not occur high up in the mountains (pers. comm. R. Johansson).

Material examined[1]). — Denmark (holo- and paratypes *N. repentiella* Wolff): Asserbo, 2 ♂, 2 ♀, 4.x.1953 (larva), *Salix repens*, leg. N. L. Wolff; 3 ♂, 2 ♀, caught 17.v.1952, 22.v.1952 and 18.v.1953, leg. N. L. Wolff (ZMC). Netherlands: 1 ♀, Vaals, 29.v.1927, leg. Lycklama à Nijeholt; 1 ♂, Rockanje, 29.viii.1931, leg. Lycklama à Nijeholt (ZMA); 1 ♂, 's-Gravenhage, 6.v.1934, leg. A. Diakonoff; 2 ♂, Aerdenhout, 11.vi.1931, leg. G. A. Bentinck; 1 ♂, Zandvoort, 11.vi.1932, leg. G. A. Bentinck (RMNH); 2 ♀, Ouddorp, 20.v.1981, leg. K. J. Huisman (coll. Huisman); Wassenaar, Meijendel (dunes), 1 ♀, UTM: ET9176, larva 7.vii., e.l. 25.vii.1979; 1 ♂, UTM: ET9077, larva 3.vii., e.l. 28.vii.1980, leg. E. J. van Nieukerken; 2 ♂, 2 ♀, Texel: De Koog, UTM: FU1985, larva 10.vii., e.l. 27.vii-3.viii.1979, leg.G. Bryan & E. J. van Nieukerken; 1 ♂, 2 ♀, Haamstede: Duinhoeve (dune-slack), UTM: ET5030, larva 8.vii., e.l. 26.vii-1.viii.1980, leg. E. J. van Nieukerken (VUA, ZMA, ZSMK (1 ♀)). Sweden (specimens identified as *lappovimella*): 2 ♂, 3 ♀, Hrj. Tännäs. 20-21.vi.1968, leg. I. Svensson (paratypes of *lappovimella* Svensson); 1 ♂, 2 ♀, Nb., Övertorneå, 30.vi.1976, leg. R. Johansson; 1 ♀, Torne-Lappmark, Kiruna, 28.vi.1964, leg. R. Johansson (coll. R. Johansson).

[1]) Note added in the proof. — *S. zelleriella* has now also been recorded from Belgium (coastal dunes) (Henderickx, 1983) and Norway (Oppdal) (O. Karsholt, in litt.).

Stigmella benanderella (Wolff, 1955)
(pl. 2 fig. 7)

Nepticula benanderella Wolff, 1955b: 53, figs. 1-3. — Holotype ♂, Sweden, Blekinge: Listerlandet, larva 11.vii.1941, *Salix repens*, e.l. 30.vii.1941, Benander (Entomological Museum, University, Lund) (not examined).
Nepticula benanderella; Szőcs, 1968: 226.
Stigmella benanderella; Hering, 1957: 930.

Diagnostic notes. — Because this species feeds on the same foodplant and is very similar to *S. zelleriella* it is treated here as well. The adult is generally uniform grey, or with a still more ill-defined pattern than *zelleriella*. The male is characterised by the rather short valve ending in two strong points or digitate processes (see fig. in Wolff, 1955b). The female is easily separated from *zelleriella* by the short ovipositor (pl. 2 fig. 7) and inconspicuous anal tufts. This species also seems to exhibit some geographical variation, and also has a darker form in Lapland (pers. communication R. Johansson).

Distribution. — A little known species, which seems to exhibit a more eastern distribution. Known from Denmark (Asserbo) (among type-series of *N. repentiella*), Sweden (districts of Bohuslän, Halland, Västergötland, Skåne, Blekinge and Öland) (Wolff, 1955b; Svensson, 1974, 1978), Finland (provinces of Uusimaa and Pohjois-Pohjanmaa) (Kyrki, 1978) and Hungary (Szigetszentmiklós) (Szőcs, 1968). Only in Finland and Denmark both species have been found sympatrically.

Biology. — Foodplants are *Salix repens* L., *S. rosmarinifolia* L. and possibly another *Salix* species in Lapland. The mines are very similar to those of *S. zelleriella*.

Material examined. — Denmark: 3 ♂ (misidentified paratypes of *N. repentiella* Wolff), Asserbo, on *Salix repens*, 19.v.1951, 22.v.1952, 20.v.1953; leg. N. L. Wolff. Hungary: 1 ♂, 1 ♀, Szigetszentmiklós, ex *Salix rosmarinifolia*, e.l. 21.iii.1963 and 2.iv.1964, leg. J. Szöcs (ZMC).

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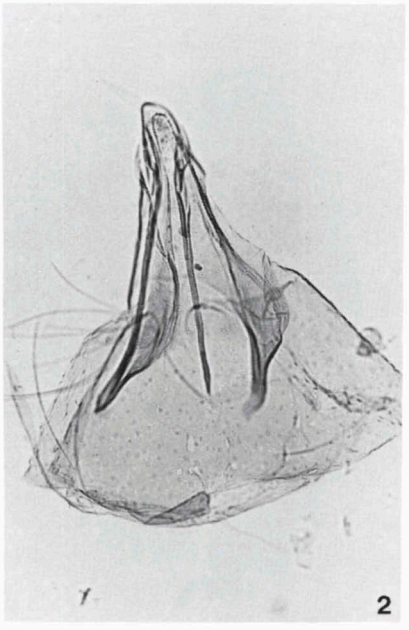
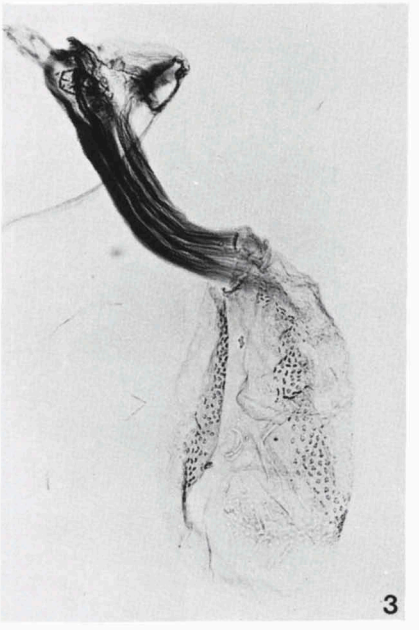
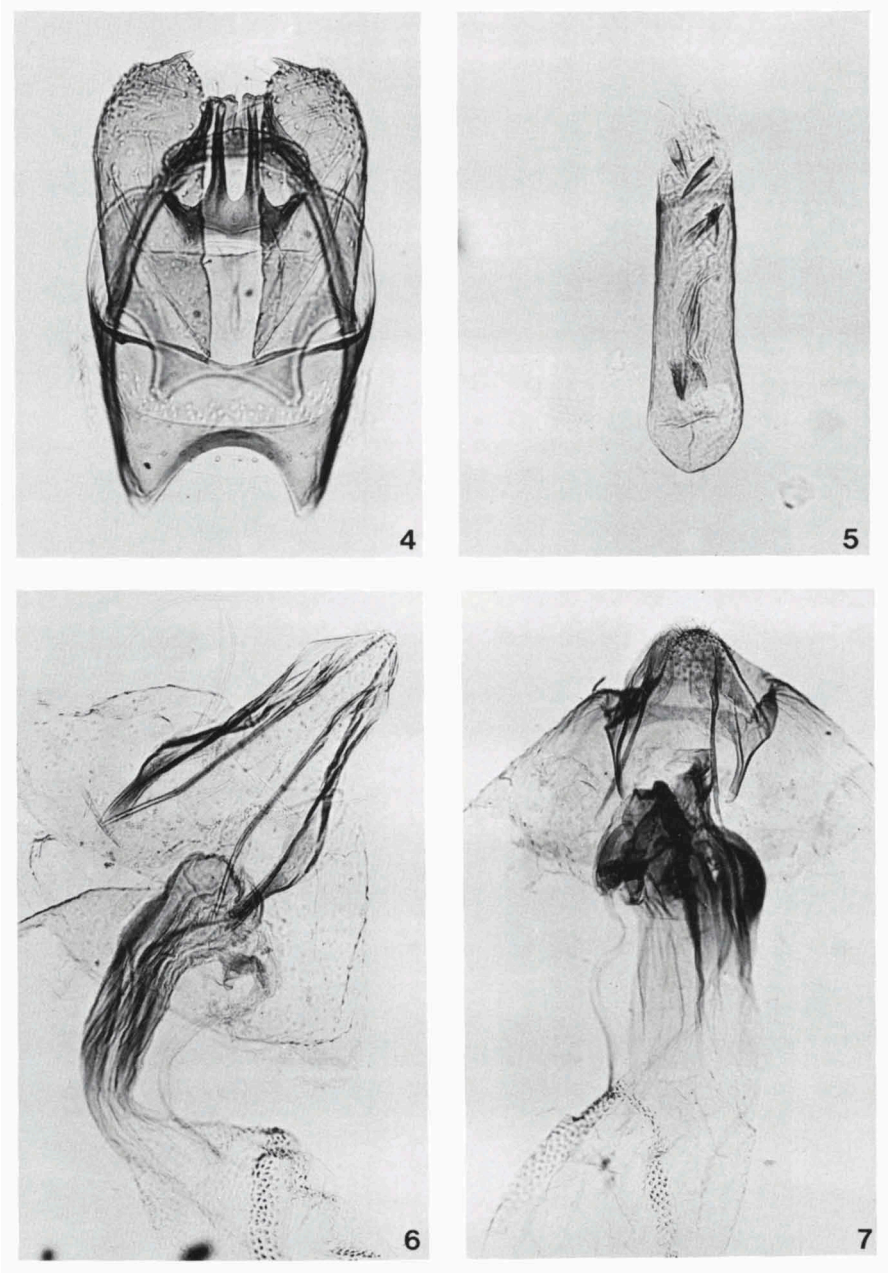




Figs. 1-3. Lectotype (♀) of *Nepticula zelleriella* (Snellen), Netherlands, 's-Gravenhage. 1, external features, before dissecting abdomen; 2, terminal abdominal segments; 3, bursa copulatrix, slide VU 816 (RMNH).



Figs. 4-6. *Stigmella zelleriella* (Snellen). 4, male genitalia; 5, aedeagus, slide VU 818, Denmark, Asserbo (ZMC); 6, female genitalia, slide VU 817. Fig. 7. *Stigmella benanderella* (Wolff), female genitalia, slide VU 821.