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STIGMELLA STETTINENSIS (HEINEMANN), AN OVERLOOKED SPECIES OF THE *STIGMELLA OXYACANTHELLA*-GROUP (LEPIDOPTERA, NEPTICULIDAE) IN EUROPE

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Abstract

LAŠTŮVKA, A., LAŠTŮVKA, Z.: *Stigmella stettinensis (Heinemann), an overlooked species of the Stigmella oxyacanthella-group (Lepidoptera, Nepticulidae) in Europe*. Acta univ. agric. et silvic. Mendel. Brun., 2004, LII, No. 4, pp. 17-24

Stigmella stettinensis (Heinemann, 1871) is separated from a widely distributed *Stigmella minusculella* (Herrich-Schäffer, 1855) – a miner of pear-tree. The two species differ in colouration, in number of antennal segments and in some genitalia structures. The caterpillar of *Stigmella stettinensis* mines also leaves of *Pyrus* spp. Important characters are figured, problems of nomenclature are discussed, neotypes of the both taxa are fixed.

Stigmella, *Pyrus*, Europe

During the study of the European taxa of the *Stigmella oxyacanthella*-group, we observed distinctive differences in the structure of the male genitalia between the individuals of what we believed to be *Stigmella minusculella* (Herrich-Schäffer, 1855). Such differences were mentioned yet by Schoorl et al. (1985) and Johansson et al. (1989) who considered especially the size and the form of the interior valva lobe to be variation. A comparative study of extensive material of moths from different parts of Europe revealed that two distinct specific entities are involved showing not only genitalia differences but also distinct habitual characters. The name *Stigmella stettinensis* is applied for the rediscovered species which was formerly published in the synonymy of *Stigmella minusculella*. The neotypes are fixed for the two species to avoid their possible confusion.

Stigmella stettinensis (Heinemann, 1871)

Nepticula stettinensis Heinemann, 1871: 210

Material. Neotype ♂, Poland, Toruń – Wrzosy, 11.VII.1984, ex larva, J. Buszko lgt., coll. UMK Toruń.

Other comparative material studied: 128 ♂♂, 136 ♀♀ from the following localities: Poland, Toruń – Wrzosy, 11.VII.1984, 1 ♂, ex larva, J. Buszko lgt., coll. UMK Toruń; Czech Republic, Moravia, Bedihošť near Prostějov (6568), 20.VIII.1999, larvae, III.2000, 2 ♂♂, 3 ♀♀ ex l.; 28.V.2000, larvae, VI.2000, 3 ♂♂, 6 ♀♀ ex l.; 8.VI.2000, larvae, VI.2000,11 ♂♂, 12 ♀♀, ex l.; 15.VII.2000, larvae, VII.2000, 11 ♂♂, 8 ♀♀ ex l.; 10.VIII.2000, larvae, III.2001, 4 ♂♂, 3 ♀♀ ex l.; Výšovice (6568), 20.VII.2000, larvae, VIII.2000, 18 ♂♂, 13 ♀♀ ex l., III.2001, 11 ♂♂, 17 ♀♀ ex l.; 29.VII.2000, larvae, VIII.2000, 5 ♂♂, 7 ♀♀ ex l., III.2001, 9 ♂♂, 20 ♀♀ ex l.; 2.VIII.2000, larvae, VIII.2000,

3 ♂♂, 4 ♀♀ ex l., II.2001, 21 ♂♂, 14 ♀♀ ex l.; Hluchov (6467), 5.VIII.2000, larvae, III.2001, 2 ♂♂, 6 ♀♀ ex l.; Konice (6467), 28.VII.2000, larvae, III.2001, 6 ♂♂, 4 ♀♀ ex l.; Střílky (6869), 30.VII.2000, larvae, II.2001, 1 ♂, 2 ♀♀ ex l.; Litenčice (6869), 30.VII.2000, larvae, VIII.2000, 3 ♂♂, 5 ♀♀ ex l., III.2001, 11 ♂♂, 9 ♀♀ ex l., all on *Pyrus communis*; Němčičky (7066), 13.VIII.2000, larvae on *Pyrus pyraster*, III.2001, 4 ♂♂, 3 ♀♀ ex l.; Slovakia occ., Sekule (7368), 22.VI.1990, larvae on *Pyrus pyraster*, VII.1990, 2 ♂♂ ex l.; Slovakia or., Slovenský kras Karst, Zádiel (7390), 16.IX.1988, larva on *Pyrus communis*, II.1989, 1 ♂ ex l., all lgt. et coll. A. Laštůvka.

Diagnosis

Male. Wingspan 4.0-5.0 mm; head with frontal tuft black, collar and scape yellowish white, lustrous; antenna with 19-23 segments; forewing brownish black, smooth, golden lustrous, sometimes with bronze tinge; hindwing grey, with small brown black scales in basal two thirds; terminal cilia brownish black; abdomen black. Male genitalia (Fig. 1). Uncus widely bilobed; gnathos with long horizontal element and comparatively short distal horns; valva with long distal process and with prominent interior lobe (Fig. 2); horizontal bar of transtilla curved (Fig. 3); aedeagus 0.9-1.3 length of genital capsule.

Female. Wingspan 4.2-5.1 mm; antenna with 17-19 segments; wing and body colouration similar to male, but hindwing without darker scales. Female genitalia (Fig. 4). Corpus bursae elongate, without signum; bursa accessoria slightly elongate and arcuate; 8th tergite broad.

Biology

The caterpillar is a miner of different species of Pyrus (*Pyrus communis* L., *P. pyraster* (L.) Burgsdorf) growing in orchards, in tree allees, on traffic margins, in bushy habitats, in forest margins and forest undergrowth. The oviposition follows mostly on leaf underside. The caterpillar is green, its mine is initially a narrow tunnel later dilated (Fig. 5). The droppings form a narrow, later dilated central line. The shape and size of the mine depend on the leaf thickness. The mine is poorly different from the mines of *Stigmella minusculella* and *S. desperatella* (Frey, 1856), but the second species prefers apple-tree leaves for mining. The next of the species mining *Pyrus*, viz. *Stigmella pyri* (Glitz, 1865) shows a similar mine which is, however, more curved with a broader dropping line forming minor transverse stripes. The oligophagous *Stigmella oxyacanthella* (Stainton, 1854) has usually a long mine with a striking line of droppings. *Stigmella stettinensis* develops three generations in Central Europe annually, the mines engaged by the caterpillars are found since the end od May and during June, then in July and finally in August and September. In southern Europe the number of generations increases. *Stigmella stettinensis* occurs syntopically with *S. minusculella*, but it was more numerous in habitats studied. 260 individuals of *S. stettinensis*, but only 13 of *S. minusculella* hatched from some 2 thousand mines collected during the years 1998-2000 in central Moravia.

Distribution

The studied material came from Poland (locus typicus), Czech Republic and Slovakia. *Stigmella stettinensis* occurs obviously also in other European countries. In some cases, the presence of the species is documented by exact faunistic records accompanied by the genitalia figures, e.g. Puplesis (1994) figured male genitalia of a specimen from Lithuania.

Stigmella minusculella (Herrich-Schäffer, 1855)

Nepticula minusculella Herrich-Schäffer, 1855: 348
Nepticula chalybeia Braun, 1914: 20
Nepticula embonella Klimesch, 1978: 259

Material. Neotype ♂, Poland, Breslau (Wroclaw), V.[18]57, *Pyrus communis*, coll. Wocke in ZIAS St. Petersburg.

Other comparative material studied: 17 ♂♂, 13 ♀♀, from the following localities: 1 ♀, Poland, Breslau (Wroclaw), III.[18]58, *Pyrus communis*, coll. Wocke in ZIAS St. Petersburg; Czech Republic, Moravia, Bedihošť (6568), 23.IX.1998, larvae, II.1999, 3 ♂♂, 4 ♀♀ ex l.; 18.VII.2000, larvae, VIII.2000, 1 ♀ ex l.; Výšovice (6568), 16.VII.2000, larvae, VIII.2000, 1 ♂, 4 ♀♀ ex l., all on *Pyrus communis*; Italy, Sicily, Sortino, 16.VI.1995, 1 ♂; Solarino, 20.VI.2000, 5 ♂♂; Francavilla di Sicilia, 23.VI.2000, 2 ♂♂; Greece, Preveza, Thesprotikó, 7.VI.1999, 2 ♂♂; Pieria, Leptokaría, 22.VI.1997, 1 ♂; Voiotia, Chairona, 13.VI.1998, 2 ♂♂; Argolida, Kandia, 14.VI.1998, 1 ♀; Messinia, Kardamili, 21.VI.1998, larvae on *Pyrus amygdaliformis*, VII.1998, 2 ♀♀ ex l., all lgt. et coll. A. Laštůvka.

Diagnosis

Male. Wingspan 3.5-5.0 mm; head with frontal tuft orange ochreous, light brown or dark brown, collar and scape yellowish white; antenna with 20-22 segments; forewing brownish grey, scaled, nearly dull; hindwing grey, without dark scales basally; terminal cilia and abdomen brownish grey. Male genitalia (Fig. 6). Uncus bilobed; gnathos with short horizontal element and comparatively long distal horns; valva with long distal process and without prominent interior lobe (Fig. 2); horizontal bar of transtilla straight (Fig. 3); aedeagus 0.9-1.1 length of genital capsule.

Female. Wingspan 3.8-5.2 mm; antenna with 20-21 segments; wing and body colouration similar to male. Female genitalia (Fig. 7). Corpus bursae elongate, without signum; bursa accessoria short and broad, slightly arcuate; 8th tergite broad.

Biology

The caterpillars mine the leaves of different species of *Pyrus* (*P. communis*, *P. pyraster*, *P. amygdaliformis* Vill., *P. eleagrifolia* Pallas) both in cultures and in nature habitats. The oviposition follows usually on the leaf underside. The green caterpillar forms initially a narrow, later curved and dilating mine with a narrow dropping line. The differentiation of this mine from the mines of the other species of *Stigmella* mining *Pyrus* spp. is difficult (cf. *Stigmella stettinensis*). This species shows probably three generations in Central Europe annually.

Distribution

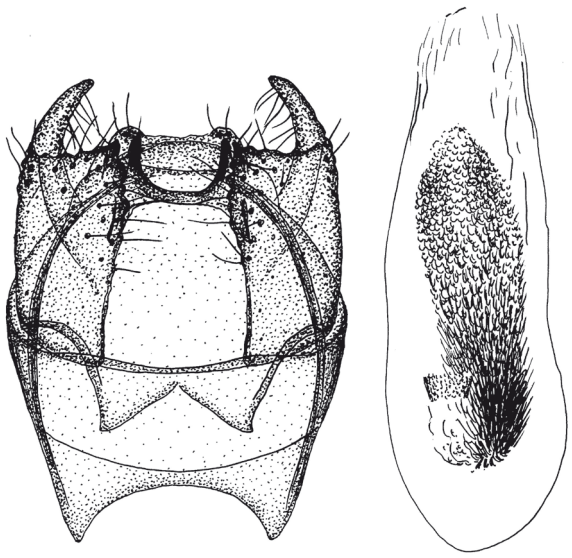
The verified records of this species exist from Poland (locus typicus), Czech Republic, Slovakia, Sicily and Greece. Van Nieukerken (pers. comm.) studied the material of this species from the Netherlands and France. It was also introduced into North America and described there as *Nepticula chalybeia* (cf. Braun, 1914, Wilkinson & Scoble, 1979, Newton & Wilkinson, 1982, Schoorl et al., 1985).

Differential diagnosis

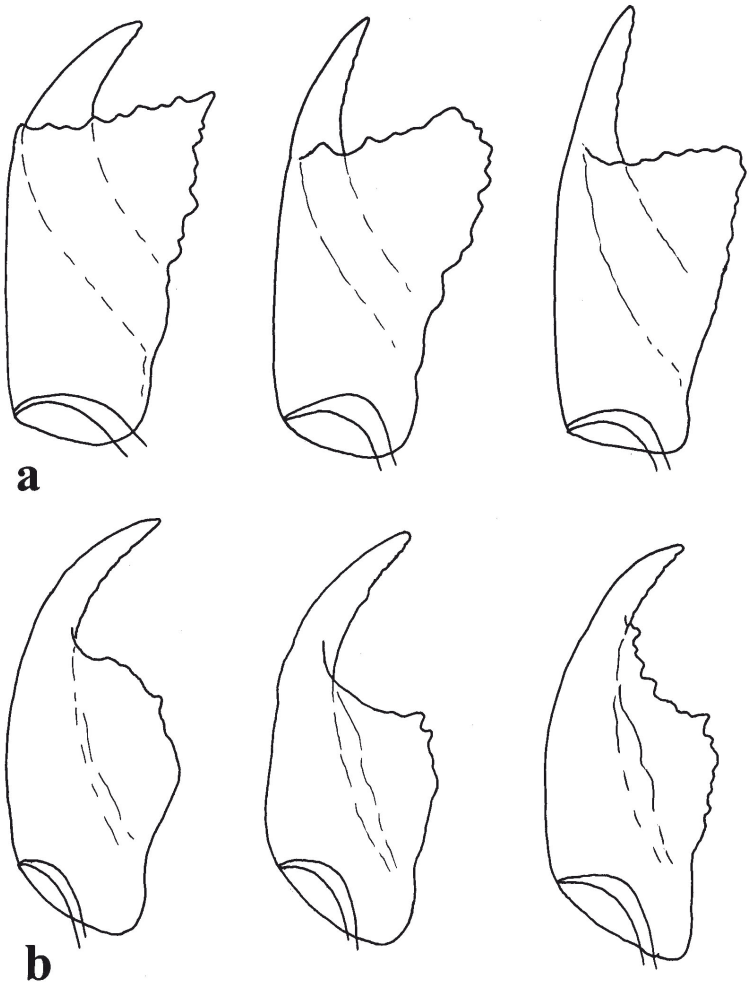
The decisive differences between *Stigmella stettinensis* and *S. minusculella* exist in the wing colouration, in number of antennal segments and in some male genitalia characters. In *S. stettinensis* the forewing is distinctly goldish lustrous, the female has only 17-19 antennal segments, and the male valva shows distinct interior lobe and excised horizontal bar of transtilla. *Stigmella minusculella* has forewing moderately lustrous up tu dull, scales more „rough“; the female has 20-21 antennal segments, the male valva withous distinct interior lobe and the horizontal bar of transtilla is straight. The next three European species of *Stigmella* mining *Pyrus* spp., *Stigmella pyri*, *S. oxyacanthella* and *S. desperatella* are well differentiated. *Stigmella pyri* has a bright head, dark collar, not monotonous forewing (partly with bronze or violett lustre or hue) and the male has dark androconial scales on hindwing. *Stigmella desperatella*, rarely mining *Pyrus*, also shows bright head and dark collar, but its forewing shows more expressed lustre. In *S. oxyacanthella* the head and the collar are bright, and dark, roughly scaled, less lustrous forewing.

Comments on nomenclature

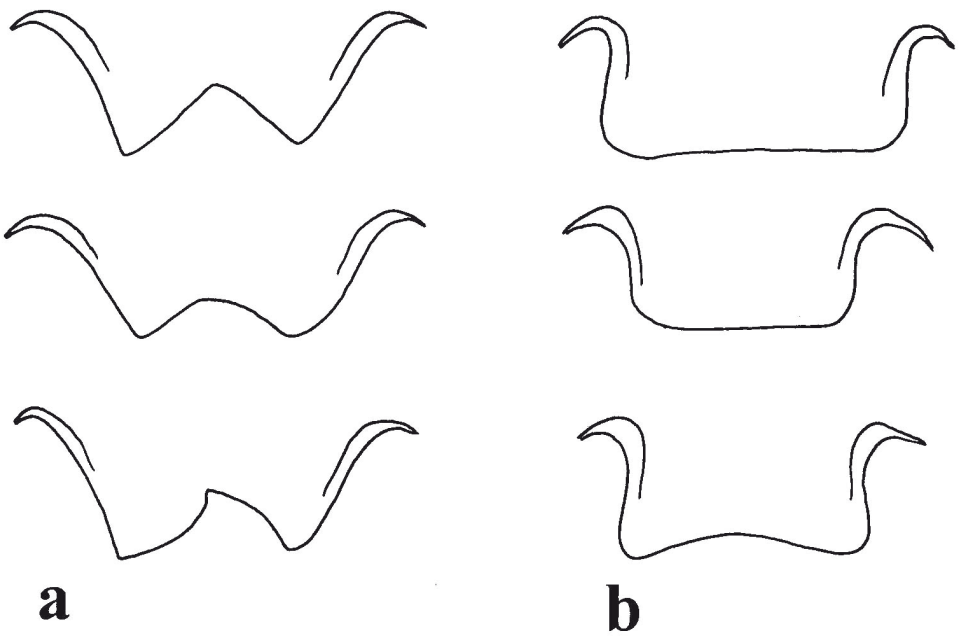
Herrich-Schäffer (1855) described *Stigmella minusculella* according to 5 individuals from Wocke and collected in Breslau (= Wroclaw, Poland). Unfortunately, the type specimens are not found in Wocke´s collection in the Zoological Institute of the Academy of Sciences in St. Petersburg (Sinev, pers. comm.) and are probably lost. Several individuals collected during the subsequent years and not included in the type series are preserved there. Their study revealed that this taxon shows dull wings and no distinctive interior lobe of valva. Altough both *Stigmella minusculella* and *S. stettinensis* may occur syntopically, it is high probable that the above later collected individuals preserved in the Wocke collection are conspecific with the lost types. This is also indicated by the original description by Herrich-Schäffer (1855) obviously related to the dull species with rough forewing scales („die Schuppen der Vorderflügel viel gröber, daher weniger glänzend, gegen die Spitze kaum kupferig“). In view of possible future confusions, the fixation of the neotype appears to be desirable, and this was selected from the above specimens in Wocke collection. The existing type specimens of the next two taxa considered to be synonymous with *Stigmella minusculella*, viz. *Nepticula chalybeia* Braun, 1914, described from North America (introduced from Europe) and *Nepticula embonella* Klimesch, 1978 from Greece, evidence clearly that these two taxa show also the „dull“ moths without the distinctive interior lobe on valva and are consequently conspecific with *Stigmella minusculella*. The next synonym of *S. minusculella* is the name *Nepticula stettinensis* Heinemann, 1871. The type specimen (a female) of this taxon is also probably lost (cf. Schoorl et al., 1985). This is no reason to ignore this name, but Heinemann (1871) indicates the apple-tree as its host. Heinemann´s description suits thoroughly with the form showing black head and lustrous forewing, related consequently to the second species, and there exists no species mining on apple-tree which would correspond to Heinemann´s description. One may presume that the host plant was either misidentified or later mixed – a confusion which is also known in similar cases of old literature. Wocke adjusted later (Heinemann & Wocke, 1876) the next individual (a male) reared from *Pyrus* with this taxon. There is, therefore, no reason not to use the name *Nepticula stettinensis* for the taxon with black head and lustrous forewing. To preserve the nomenclatorial stability the neotypus was selected from the material close to the original locus typicus.



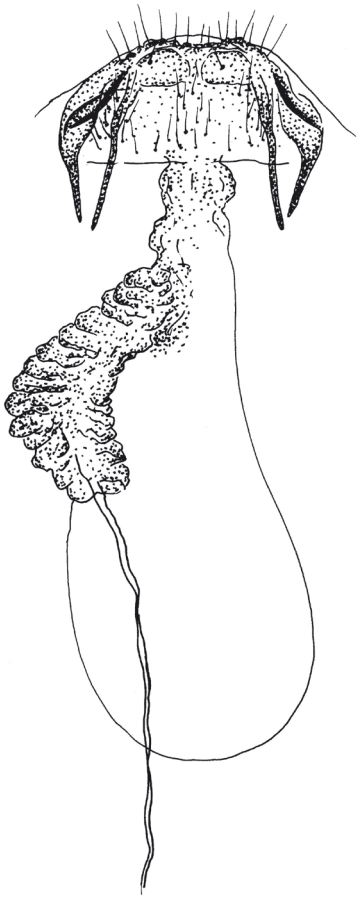
1: *Male genitalia of Stigmella stettinensis*



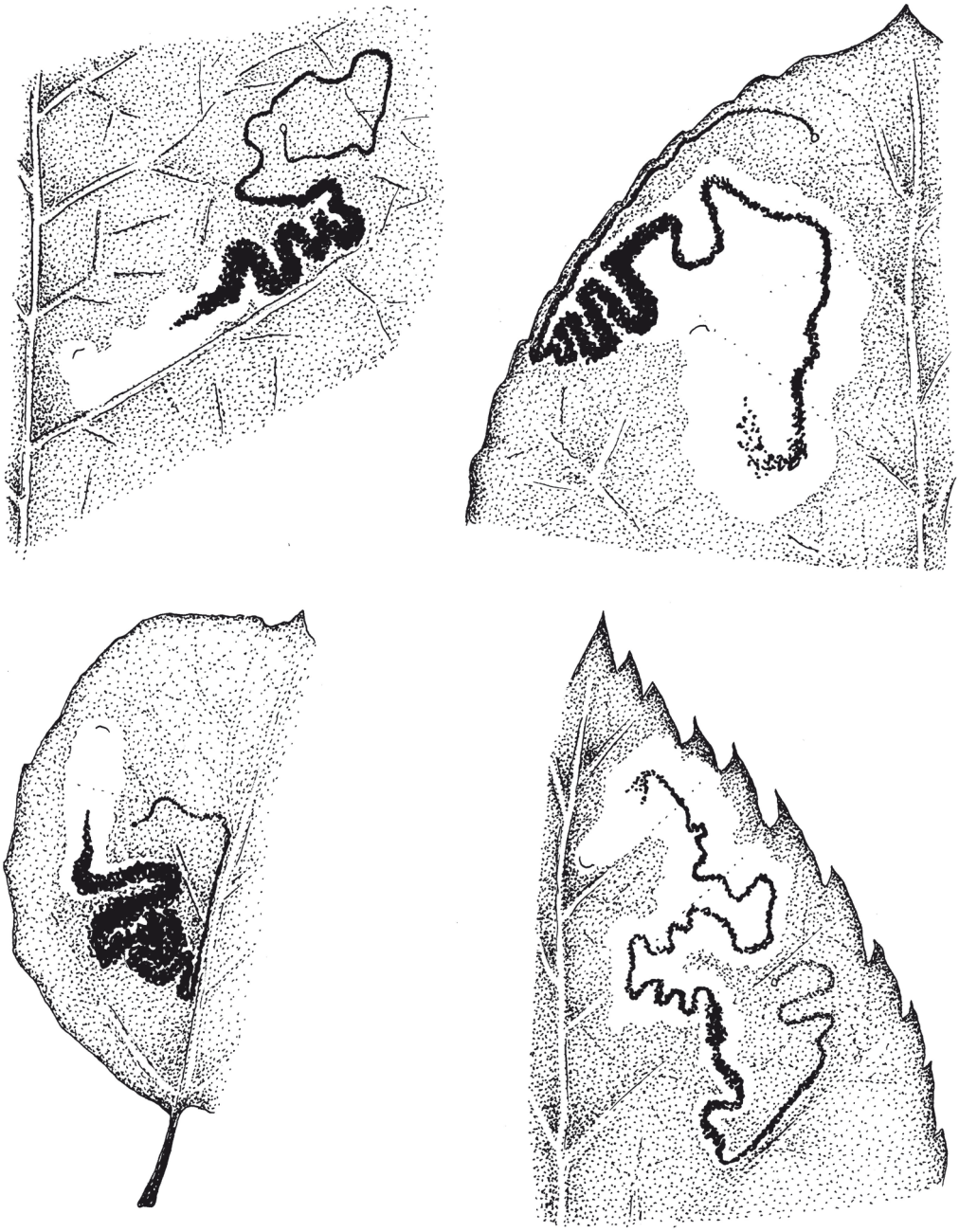
2: *Variability of valva, a – Stigmella stettinensis, b – S. minusculella*



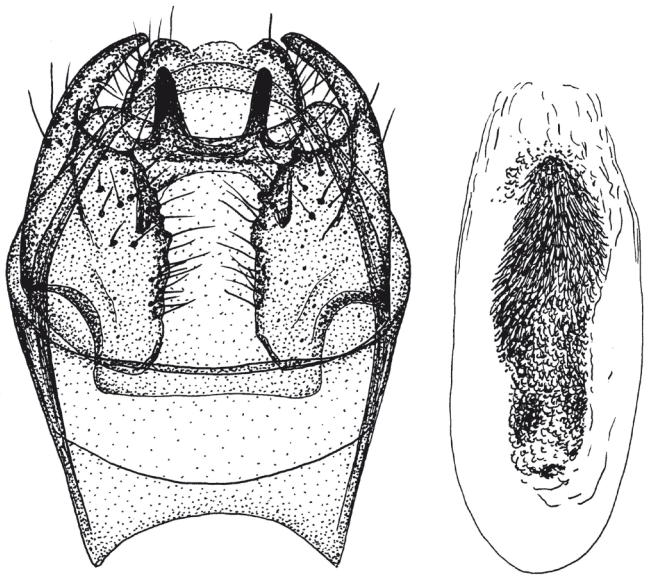
3: *Horizontal bar of transtilla in male genitalia, a – Stigmella stettinensis, b – S. minusculella*



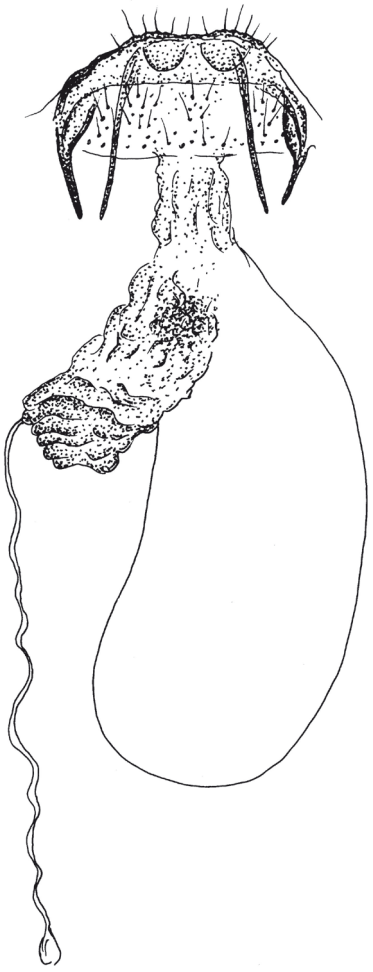
4: *Female genitalia of Stigmella stettinensis*



5: *Mines of Stigmella stettinensis on Pyrus communis*



6: *Male genitalia of Stigmella minusculella*



7: *Female genitalia of Stigmella minusculella*

SOUHRN

Stigmella stettinensis (Heinemann), přehlížený druh skupiny *Stigmella oxyacanthella* (Lepidoptera, Nepticulidae) v Evropě

V práci je redeskribován a taxonomicky vymezen druh drobníčka *Stigmella stettinensis* (Heineman, 1871), jehož housenky minují listy hrušní (*Pyrus* spp.). Tento druh nebyl dosud odlišován od široce rozšířeného a známého druhu *Stigmella minusculella* (Herrich-Schäffer, 1855). Oba druhy se liší zbarvením, počtem článků tykadel a některými strukturami samčích kopulačních orgánů. *Stigmella stettinensis* se vyskytuje ve střední Evropě ve třech generacích a jeho housenka se vyvíjí jak na kulturních výsadbách hrušní (*Pyrus communis*), tak na hrušních rostoucích na křovinatých biotopech, okrajích lesů i v lesním podrostu (*Pyrus pyraster*). Je diskutována nomenklatura a stanoveny neotypy obou druhů.

Stigmella, *Pyrus*, Evropa

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REFERENCES

BRAUN, A. F.: Notes on North American species of Nepticula with descriptions of new species (Lepidoptera). *Can. Entomol*., 1914, 46: 17-24

HEINEMANN, H. von: Nachtrag zu den Bemerkungen über die Arten der Gattung Nepticula. *Berliner Entomol. Ztschr*., 1871, 15: 209-223

HEINEMANN, H. von and WOCKE, M. F.: *Die Schmetterlinge Deutschlands und der Schweiz. 2. Abt. Kleinschmetterlinge. Band II. Die Motten und Federmotten*. C. A. Schwetschke & Sohn, Braunschweig, 1876, 825 + 102 pp.

HERRICH-SCHÄFFER, G. A. W.: *Systematische Bearbeitung der Schmetterlinge von Europa, zugleich als Text, Revision und Supplement zu Jacob Hübner´s Sammlung europäischer Schmetterlinge. 5. Die Schaben und Federmotten*. G. J. Manz, Regensburg, 1847–1855, 394 pp., 132 pls.

JOHANSSON, R., NIELSEN, E. S., NIEUKERKEN, E. J. van and GUSTAFSSON, B.: The Nepticulidae and Opostegidae (Lepidoptera) of North West Europe. *Fauna Entomol. Scand*., 1989, 23: 1-739

KLIMESCH, J.: Beitrag zur Kenntnis der Nepticulidenfauna von Anatolien und der Insel Rhodos (Lepidoptera, Nepticulidae). *Tijdschr. Entomol*., 1978, 121: 239-278

LAŠTŮVKA, A. and LAŠTŮVKA, Z.: *Nepticulidae Mitteleuropas. Ein illustrierter Begleiter (Lepidoptera)*. Konvoj, Brno, 1997, 230 pp.

NEWTON, P. J. and WILKINSON, C.: A taxonomic revision of the North American species of Stigmella (Lepidoptera: Nepticulidae). *Syst. Entomol*., 1982, 7: 367-463

PUPLESIS, R.: *The Nepticulidae of eastern Europe and Asia: western, central and eastern parts*. Backhuys Publishers, Leiden, 1994, 291 pp.

SCHOORL, J. W., van NIEUKERKEN, E. J. and WILKINSON, C.: The Stigmella oxyacanthella species-group in Europe (Nepticulidae: Lepidoptera). *Syst. Entomol*., 1985, 10: 65-103

WILKINSON, C. and SCOBLE, M. J.: The Nepticulidae (Lepidoptera) of Canada. *Mem. Entomol. Soc. Can*., 1979, 107: 1-129

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