

STIGMELLA AURELLA (F.) AND *STIGMELLA
SPLENDIDISSIMELLA* (H.S.) (LEP., NEPTICULIDAE) –
A METHOD OF DISTINGUISHING MINES ON *RUBUS*

BY GRIETA KOSTER, GEORGINA BRYAN & DAVID POVEL

The mines of most species of Nepticulidae can be distinguished without difficulty. *Stigmella aurella* (Fabricius) and *S. splendidissimella* (Herrich-Schäffer) are oligophagous species mining rosaceous herbs, both commonly occurring on bramble (*Rubus*) species. Emmet (1976), in his key to the mines of the Nepticulidae, gives the impression that distribution of frass is a reliable character for separating mines of these two species: *S. aurella* with the frass dispersed, occupying two-thirds of the width of the track and *S. splendidissimella* with the frass linear, or if dispersed, then occupying only one-third the width of the track. The mines are, however, very similar and, as Klimesch (1981) remarks, somewhat variable. We noticed that in thicker leaves the mine is shorter, the frass compacter and more dispersed, compared with mines in thinner leaves.

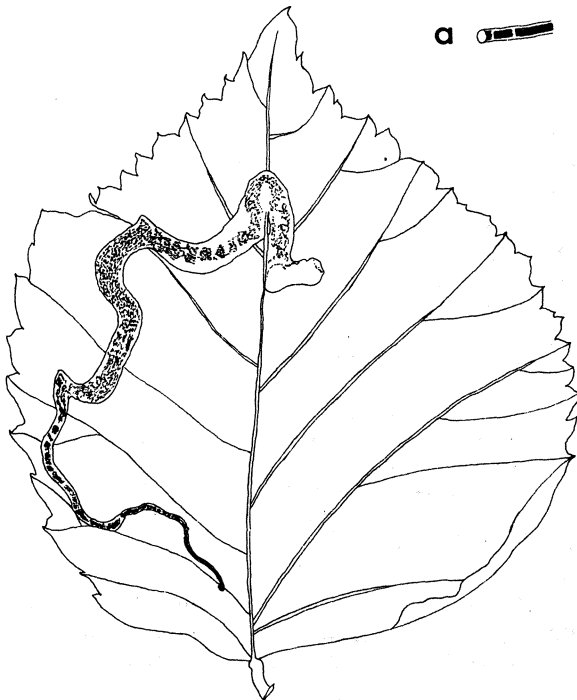


Fig. 1. – Mine of *S. aurella* on leaf of *Rubus fruticosus* agg., a. Beginning of mine.

During the course of an extensive study of *S. aurella* and *S. splendidissimella* on *Rubus* in The Netherlands, it became apparent that more characters were needed to separate mines with certainty. To this end, a matrix was made for 45 mines of each species and for 29 characters. Mines were used from which the larvae had been removed and biochemically determined (using gel electrophoresis of allozymes: a method known to be completely reliable for separating the two species). Characters used included details of egg position, frass distribution and mine form. The data were analysed with the help of a computer programme (Hogeweg & Hesper, 1972). Clustering the mines on the basis of overall similarity resulted in heterogeneous groups and a further analysis was therefore made of the frequency of occurrence of different character states in *S. aurella* and *S. splendidissimella*. For several characters there proved to be a significant difference in these frequencies:

Character	<i>S. aurella</i> %age	<i>S. splendidissimella</i> %age	χ^2	P
(1) 2nd half of mine: frass occupying ½ width of track	20	87	40.18	0.001
(2) 1st cm of mine: frass occupying ½ width of track	49	84	12.80	0.001
(3) Mine crosses own track	18	53	12.41	0.001
(4) Mine begins with a bend	47	73	6.67	0.01
(5) Mine crosses leaf mid-rib	44	22	5.00	0.05

As can be seen from the table of significant characters presented above, the width of the frass track is important in the separation of mines of the two species. Used alone, however, it is not completely reliable. A combination of the characters must be used for determination of the mines with more certainty. These are listed below and typical *S. aurella* and *S. splendidissimella* mines are depicted in figs. 1 and 2 respectively.

Second half of mine with frass mostly occupying more than half the width of the track; mine generally not crossing own track, but commonly crossing leaf mid-rib *S. aurella*
 First centimetre and second half of mine with frass almost always occupying less than half the width of the track; mine generally beginning with a bend; track less commonly crossing leaf mid-rib, but frequently crossing own track *S. splendidissimella*

It is perhaps interesting to note that we found no significant difference in the site of oviposition. According to Emmet (1976), *S. aurella* lays its eggs on either side of the leaf while *S. splendidissimella* usually lays its eggs on the upper side. In our analysis the figures were:

	<i>S. aurella</i>	<i>S. splendidissimella</i>
Uppside	33	37
Underside	12	8

This research was carried out as part of a student project by Grieta Koster under the supervision of Georgina Bryan, with the help of D.G.D.E. Povel with the computer work. We thank Adri Rol for technical assistance and Jan Jong for statistical analysis.

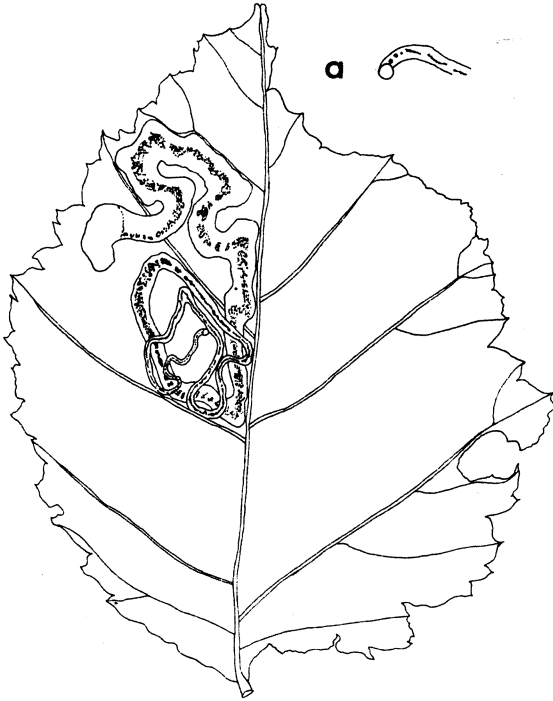


Fig. 2. – Mine of *S. splendidissimella* on leaf of *Rubus fruticosus* agg., a. Beginning of mine.

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