

Phyllonorycter medicaginella (Lepidoptera: Gracillariidae) new for The Netherlands

The gracillariid moth *Phyllonorycter medicaginella* is recorded for the first time for The Netherlands. Since September 2000 larvae and pupae of this species were found on black medick (*Medicago lupulina*) and white melilot (*Melilotus alba*) along the river Meuse, south of Maastricht near Sint Pieter (Limburg). Moreover, pupae were collected on white melilot at Scheldeoord (Zeeland) in October 2001. The nearest localities are in former East Germany, at a great distance from these new localities. Nevertheless *P. medicaginella* can be considered a resident in The Netherlands.

Key words: fauna nova species

Introduction

Visits to friends provide us with the opportunity to collect moths in their gardens by means of our light trap, thus combining business with pleasure. This enabled us to sample in a garden at the foot of a precipitous part of the eastern slope of the Sint Pietersberg near Sint Pieter, Limburg, south of Maastricht along the river Meuse. Quantitatively, the results here were rather disappointing. On the other hand they were of outstanding quality, as illustrated by the rediscovery in The Netherlands of *Ancylis comptana* (Tortricidae), a species recorded only with certainty for The Netherlands by Doets (1949, 1950) near Bemelen (Limburg) half a century ago. Furthermore, we found an adult of *Digitivalva pulicariae* (Plutellidae) in the trap, the first record in The Netherlands of an adult outside the marl cave area. There were also specimens of the rare *Cnephasia genitalana* (Tortricidae) and the even more rare *Coleophora ochripennella*. This encouraged us to pay close attention to the surroundings of our friends' house. One of the first excursions, on 22 September 2000, already resulted in a remarkable finding, namely tentiform mines on black medick (*Medicago lupulina*). Afterwards the mines were also collected from white melilot (*Melilotus alba*) at this locality. On both foodplants more than a hundred mines were found in 2000 and 2001, from which several dozens of moths were reared.

At first we thought that we were dealing with one of the two Leguminosae-feeding *Phyllonorycter*-species occurring in

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Northwest-Europe, namely *P. insignitella* or *P. nigrescentella*, both hitherto not reported for The Netherlands. When we inspected the male genitalia of the reared specimens it appeared to our great surprise that the valvae were completely different from those of these *Phyllonorycter*-species. It soon became clear that our finding referred to a third Leguminosae-feeding species of *Phyllonorycter*, namely *P. medicaginella* (Gerasimov, 1930), a species which up to now had not been recorded from West Europe.

During the preparation of this paper *P. medicaginella* (Gerasimov, 1930) surprised us again: on 10 October 2001 we discovered two pupae of the species on white melilot at Scheldeoord, Zeeland, at a distance of about 140 km from Maastricht.

The next sections deal with identification, bionomics and geographical distribution of this interesting species. In the Dutch checklist (Kuchlein & de Vos 1999) *P. medicaginella* should be given the number 0294a, and it should be placed between *P. quinqueguttella* and *P. lautella*. The species will be coded as PHYLMEDI according to the letter code system adopted in The Netherlands and Belgium.

Identification

Phyllonorycter medicaginella (figure 1) is a rather small *Phyllonorycter*-species with a wingspan of 5.3 – 6.7 mm. Males are on average slightly larger than females. The ground colour and forewing markings are very variable and differ markedly between the sexes (figure 2, 3). The ground-colour of the forewing is shining golden orange-brown, sometimes with a greyish tinge, in the male generally paler than in the female. Also the number of strigulae differ: the male has four costal strigulae, the female three, while both have three dorsal strigulae, all shining silvery white. The strigulae have a thick dark edge inwardly and very occasionally also outwardly, the edging in the male being less pronounced than in the female. The first pair of strigulae are usually joined, forming an obtuse-angled fascia. In the

Figure 1. Adult *Phyllonorycter medicaginella*, bred from mines, collected near St. Pieter, Limburg, 28 September 2001. Foto: F.A. Bink
 Volwassen *Phyllonorycter medicaginella*, gekweekt uit mijnen, verzameld bij St. Pieter, Limburg, 28 september 2001.



Dutch specimens the pattern of markings on the forewing is often more or less reduced.

Kuznetsov (1990), who treated *P. medicaginella* in 'Medvedev', was apparently unaware of its sexual dimorphism, for in his key based on male genitalia and external characters he uses the presence of two costal strigulae outside the first pair to distinguish it from a related *Phyllonorycter*-species with three costal strigulae. It is clear that using this character the males of *P. medicaginella* with three costals will be misidentified.

In the literature *P. medicaginella* is generally treated as a *Cinderella*. The original description of Gerasimov (1930) is very brief, without an illustration of the adult moth. Neither Deschka (1967) nor Buszko (1986) figured the moth. Furthermore, Hering (1957) only included the species in a note in his identification book for leaf miners.

Phyllonorycter medicaginella belongs to the group of *Phyllonorycter*-species with a pale basal streak in the forewing and with the first pair of strigulae either discrete (forming an obtuse angle if extrapolated) or meeting to form an obtuse-angled or curved fascia. The colour of the markings varies from silvery white to white or whitish. There are seven species of this group on the Dutch list. We shall now briefly discuss the characters differentiating them from *P. medicaginella*.

P. medicaginella has a straight pale basal streak on its forewing, which distinguishes it from *P. viminiella*, *P. viminetorum* and *P. salicicolella*, in which species the streak is slightly turned upwards apically. From *P. cavella* it differs by the white vertical tuft on the head, which is greyish in *P. cavella*. In *P. anderidae* the dorsum of the forewing has a white border below the basal streak (figure 4), which is absent in *P. medicaginella*. The apical cilia of the forewing show discriminating characters with *P. hilariella* and *P. ulmifoliella*. *Phyllonorycter hilarella* has no fringe line in the forewing which is present in *P. medicaginella*, and *P. ulmifoliella* has an apical hook (a greyish line from the apical spot into the paler coloured cilia), which is absent in *P. medicaginella*. Both *P. nigrescentella* and *P. insignitella*, the

two other Leguminosae-feeding *Phyllonorycter*-species found in Northwest-Europe, can be distinguished by the presence of a white dorsal border below the basal streak on the forewing, which is absent in *P. medicaginella*.

Examination of the male genitalia (figure 5) of our *Phyllonorycter*-species immediately made clear that they differ essentially from the Leguminosae-feeding species *P. nigrescentella* and *P. insignitella*. The symmetry of the valvae eliminates these species, which have asymmetrical valvae in common with most other Northwest-European species (see Pierce & Metcalfe 1935). Besides *P. nigrescentella* and *P. insignitella*, the following *Phyllonorycter*-species belong to the group with asymmetrical valvae: *P. viminiella*, *P. viminetorum*, *P. salicicolella* and *P. anderidae*. Only *P. cavella* and *P. ulmifoliella* have similar symmetrical valvae as *P. medicaginella*. *Phyllonorycter cavella* is easily distinguished by the curved and pointed valva, provided with a row of four or five short stout spines near the apex. In *P. medicaginella* the valva is straight and rounded apically without such spines near the apex. The male genitalia of *P. ulmifoliella* and *P. medicaginella* are more similar. They differ in the shape of the caudal margin of sternite VIII, which is almost square ended in *P. ulmifoliella* and is more rounded, forming nearly a half ellipse, in *P. medicaginella*. It is worth noting here that in the paper of Deschka (1967) the drawings of the male genitalia - among which those of *P. medicaginella* - are presented upside down.

The female genitalia of the British *Phyllonorycter*-species are much alike (Pierce & Metcalfe 1935) and, moreover, good illustrations are scarce. Therefore, it is practically impossible to compare the female genitalia of *P. medicaginella* (figure 6) with the *Phyllonorycter*-species discussed in this section. Comparing them with the two other Leguminosae-feeding *Phyllonorycter*-species it appears that in *P. medicaginella* the postapophyses are slightly longer than the antapophyses. This is also the case in *P. nigrescentella*, but in *P. insignitella* the postapophyses are considerably longer, approximately one and a half times the length of the antapophyses.

The larvae of *Phyllonorycter*-species feed by mining in leaves, usually of shrubs and deciduous trees. The young larva makes a rather inconspicuous epidermal mine in the leaf, living as a sap feeder. Later, after a change of the mouthparts, it eats the parenchyma producing a much more noticeable blotch mine. Contraction of silken threads, spun in a special way by the larva, give rise to a hollow chamber. This usually causes the external leaf epidermis to fold in longitudinal creases. This type of blotch mine is known as a tentiform mine, or ptychome (Hering 1951).

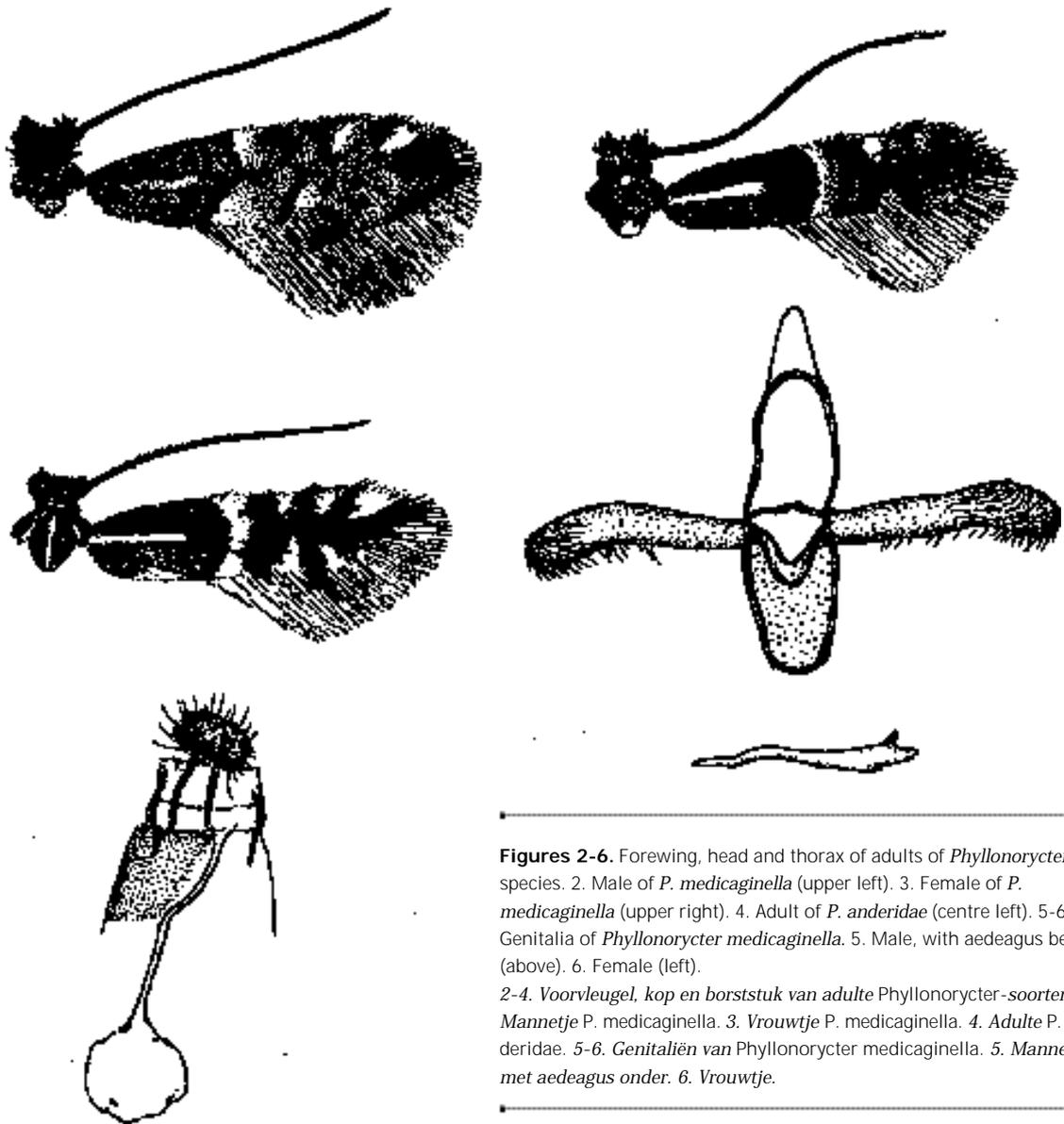
In *P. medicaginella* the mine is constructed on the underside of the leaf, and often finally occupies the entire leaflet. Its lower surface is contracted, resulting in several distinct longitudinal creases and causing the edges of the leaflet to curl downwards (figure 7). The contortion can be so strong that the curling edges of the leaflet overlap (fig. 8). Finally, hardly any green parenchyma remains, mainly along the veins, resulting in the upper surface becoming pale-coloured. Hence, the mines of the older larvae are rather easy to find. The frass is heaped at one end of the mine. The

full-grown larva pupates in a loosely woven cocoon inside the mine.

In The Netherlands larvae and pupae of *P. medicaginella* have only been found on medick (*Medicago* spec.) and melilot (*Melilotus* spec.). In the literature the following foodplants are mentioned specifically: sickle medick (*Medicago falcata*), black medick, lucerne (*M. sativa*), bur medick (*M. minima*), white melilot, common melilot (*M. officinalis*) and *M. dentata* (Toll 1949, Deschka 1967, Buszko 1986, Buhl *et al.* 1993).

As stated earlier, the larvae of *P. nigrescentella* and *P. insignitella* also live on Leguminosae, but usually not on medick or melilot (Hering 1957; Lhomme 1963). This was another reason to decide that our finding referred to a third Leguminosae-feeding species. However, there is still much confusion concerning the Leguminosae-feeding *Phyllonorycter*-species (see Deschka 1967) and therefore particularly records in the literature from medick and melilot need confirmation.

We do not have a complete idea yet of the voltinism of *P. medicaginella* in Northwest-Europe. We found larvae and pupae from mid-August to mid-October. A part of the moths we bred from the mines collected between mid-August and 28 September emerged shortly afterwards until the second



Figures 2-6. Forewing, head and thorax of adults of *Phyllonorycter*-species. 2. Male of *P. medicaginella* (upper left). 3. Female of *P. medicaginella* (upper right). 4. Adult of *P. anderidae* (centre left). 5-6. Genitalia of *Phyllonorycter medicaginella*. 5. Male, with aedeagus below (above). 6. Female (left).
 2-4. Voorvleugel, kop en borststuk van adulte *Phyllonorycter*-soorten. 2. Mannetje *P. medicaginella*. 3. Vrouwetje *P. medicaginella*. 4. Adulte *P. anderidae*. 5-6. Genitaliën van *Phyllonorycter medicaginella*. 5. Mannetje, met aedeagus onder. 6. Vrouwetje.



Figures 7-8. Mines of *Phyllonorycter medicaginella* on white melilot (*Melilotus alba*). 7. Mine of the young larva. 8. Mine of the older larva.

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Mijnen van Phyllonorycter medicaginella op witte honingklaver. 7. Mijn van de jonge rups. 8. Mijn van de oudere rups.

half of October of the same year. In breeding experiments carried out by (Buszko 1986) in Poland moths emerged even until November. Hatching in late autumn also occurs in the *Phyllonorycter*-species with dark-sprinkled forewings (Kuchlein & Alders 2000), but these species hibernate in the adult stage. However, just like most of the Dutch *Phyllonorycter*-species, *P. medicaginella* passes the winter not as an adult but almost certainly in the pupal stage, as from mines collected on 9 October moths did not emerge from mines until April of the next year (as did part of the moths collected in September). These data give the impression that *P. medicaginella* has several generations per year, probably similar to *Cameraria ohridella* (Stigter *et al.* 2000), which also passes the winter as a pupa.

It is remarkable that we did not find adults of *P. medicaginella* in the field, nor did we find published data on captures of adult moths in the open. These facts give evidence of a hidden behaviour of the adults compared with other species of *Phyllonorycter*.

In the literature the habitat of *P. medicaginella* is characterized as xerotherm. The species can be found on sunny slopes, in waste-land and above all along roadsides (Deschka 1967, Buszko 1986, Buhl *et al.* 1993, Szyska 2001). We found this species along roadsides.

Distribution

Phyllonorycter medicaginella was originally described by Gerasimov (1930), who based his description on moths bred in 1927. The immature stages originated from the south of present Russia. Twelve years later Toll (1949) bred specimens from larvae he collected in Podolia, Ukraine, some thousand kilometres to the west. Subsequently the species was recorded in Kazakhstan and Central-Asia in the east (Kuznetsov, 1990) and in the eastern half of Central-Europe and the Balkans in the west. It has been found in Austria (Deschka 1967), Hungary and Poland (Buszko 1986), Denmark (Buhl *et al.* 1993), East Germany (Buhl *et al.* 1993, Steuer 1995, Gädike & Heinicke 1999), Lithuania and Bulgaria (Buszko 1996) and the Czech Republic (Lastuvka 1998). This distribution strongly suggests that *P. medicaginella* is currently extending its range, at least in a westerly direction. This coincides with the fact that specimens were absent

from collections until its discovery (Buszko 1986) and is also supported by the recent occurrence in the well-investigated Northwest-Europe, where it is now known from the two Dutch localities and, also recently, from a locality in Belgium south of Maastricht (to be published elsewhere).

According to present knowledge, *P. medicaginella* occurs in a rather narrow belt from Northwest-Europe to Central-Asia (figure 9). The species has not yet been found in areas close to The Netherlands, namely the British Isles, Niedersachsen, Westphalia and (until recently) Belgium. The nearest location to those south of Maastricht is Bad Blankenburg in Thüringen, eastern Germany (Steuer 1995), more than 400 km from Maastricht. It is likely that *P. medicaginella* already occurs in the intervening area.



Figure 9. Distribution of *Phyllonorycter medicaginella* in Europe.
Verspreiding van Phyllonorycter medicaginella in Europa.

Buszko (1986) stated that in Poland the species occurs along and not far from river valleys. This applies also to the Dutch localities near Maastricht, which are situated some tens of meters from the river Meuse; the locality at Scheldeoord lies at a similar distance to the dike of the estuary Westerschelde.

Undoubtedly *P. medicaginella* should be considered a new resident in Northwest-Europe. Furthermore, it seems likely that colonization will continue and larger areas will be occupied by this species.

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Samenvatting

Phyllonorycter medicaginella (Lepidoptera: Gracillariidae) nieuw voor Nederland

De gracillariide *Phyllonorycter medicaginella* wordt als nieuw voor de Nederlandse fauna gemeld. Bladmijnen met rupsen en poppen zijn vanaf september 2000 gevonden op hopklaver (*Medicago lupulina*) en witte honingklaver (*Melilotus alba*) langs de Maas bij Sint Pieter, ten zuiden van Maastricht. Bovendien werden op laatstgenoemde voedselplant in oktober 2001 mijnen met poppen verzameld te Scheldeoord, Zuid-Beveland. De nieuwe locaties liggen ver verwijderd van de dichtstbijzijnde vindplaatsen in voormalig Oost-Duitsland en Denemarken. Het ziet er naar uit dat *P. medicaginella* in ieder geval in Zuid-Limburg als inheems moet worden beschouwd. Er worden onderscheidende in- en uitwendige kenmerken gegeven en levenswijze en geografische verspreiding worden besproken.