Caloptilia hemidactylella: new to The Netherlands. Notes on distribution, morphology and biology (Lepidoptera: Gracillariidae)

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KEY WORDS
Distribution, faunistics, leaf miners, maple

Entomologische Berichten 71 (2): 31-38

The leaf miner *Caloptilia hemidactylella* was observed for the first time in The Netherlands in 2003. The species is widely known from surrounding countries, but is mostly uncommon or rare. The larva lives on maple. In 2007 and 2008 material from various localities has been collected. Our study revealed previously unknown characteristics of the adult and the early stages. This article also gives an extensive description of the biology of this species, including the mining stages, larval behaviour and habitat preference. The distributional area in The Netherlands of *C. hemidactylella* is described. Several hymenopterous parasites were reared from the collected larvae, resulting in the discovery of a new species of Braconidae for The Netherlands, *Apanteles laetus*.

Introduction

This article describes the results of a study on *Caloptilia hemidactylella* (Denis & Schiffermüller) during 2007 and 2008 after a first record of this species in The Netherlands in 2003. Literature study showed that very little is known about this species and that existing knowledge of the morphology and biology was partly incorrect. Here, we aim to fill some of these gaps.

Caloptilia hemidactylella belongs to the family Gracillariidae, with almost 1.900 species known worldwide (De Prins & De Prins 2009). There are currently 27 species of *Caloptilia* known from the continent (Buszko 2009). The adults of *Caloptilia* can be recognized by the large segments of their tarsi and their unusual resting position, high on the forelegs (figure 1). The adults have long antennae, which are usually as long as the forewing. The labial palps are long and upturned, reaching above the head. *Caloptilia* are mostly bivoltine, and overwinters as pupa or in the adult stage (Patočka & Zach 1995).

Six European *Caloptilia* species are known to have *Acer* as host. The host plants for these species have been summarized in Table 1. The central European species which are known to feed on *A. campestre* are: *C. onustella* (Hübner), syn. *C. semifascia* (Haworth), *C. hauderi* (Rebel) and *C. hemidactylella*. The first two species have not been reported in The Netherlands. *Caloptilia* feeding signs can easily be recognised as leaves folded in the form of a cone. The young larva constructs a mine in the leaf epidermis. The frass (faeces) is often concentrated in one place in the mine. Subsequently, it lives in a rolled up leaf, often in a cone like shape, which functions as a shelter in which the larva feeds. The cocoon often has an elliptic form, and is spun in a fold on the under- or upper side of the leaf. The structure of the cocoon resembles pergamon paper. As in other Gracillariidae, the pupa breaks through the cocoon before the moth emerges (Patočka & Zach 1995).

Methods

In July 2007, we collected a *Caloptilia* specimen on light in the dunes of Meijendel, Wassenaar (province of Zuid-Holland) which was identified as *Caloptilia hemidactylella* based on external characteristics. A few months later, it turned out that *C. hemidactylella* was collected in Twello (province of Gelderland) on 23 July 2003 by J.B. Wolschrijn, which became the official first record for The Netherlands. As from the beginning of September 2007, the authors searched actively for the feeding signs on *Acer* in order to collect larvae and rear the adults of *Caloptilia hemidactylella*. The searches were successful and fresh leaf rolls and larvae were found in high numbers on many different locations. The leaf rolls were found on *Acer campestre* and sporadically on *A. platanoides*. In total, nine adults were successfully reared, which all turned out to be *C. hemidactylella*. Some specimens have been identified by J.C. Koster based on the dissection of the male genitalia.

In 2007 and 2008 many specimens were collected (see box 1). Based on a study of the collected material, new details concerning the biology and characteristics of the mine, larva and pupa of *C. hemidactylella* were discovered.

Distribution

Caloptilia hemidactylella seems to be well-spread across The Netherlands (box 1) after an intensive, coordinated search by several people in The Netherlands the records show that it can

1. *Caloptilia hemidactylella*, Drachten 21 August 2007. Photo: T. Muus

be found in high numbers in suitable habitats anywhere. The leaf miner is widespread in most parts of Europe, but seldom common. In Belgium it is known from the provinces Limburg, Brabant and Namen (De Prins & Steeman 2005), but here we can add two additional provinces: Antwerpen (Berchem, 18.vi.2005; Ranst, 4.v.-22.vi.2006, 2 ex., L. Janssen, det. TM) and West-Vlaanderen (Ledegem, 28.iii.2006, D. Pollet). The last record for Belgium to date is most probably from Brabant, from Zichem, 11.iv.2009, leg. M. Herremans.

The species is apparently very rare on the British Isles (personal communication J. Langmaid). However, it was recently found at Siccaridge Wood on 7.v.2009 by G. Meredith. Probably the last records preceding this record are from Daneway in 1954 and 1955 (personal communication G. Meredith). Newton (1981) states that the species is only rarely known from southern England. Its presence for Ireland was later corrected due to a misidentification (Meyrick 1927; personal communication K. Bond). Furthermore, the species has also been found in Luxembourg, Germany, Austria, Switzerland, the Czech Republic, Poland, Slovakia, Romania, Estonia, Lithuania, Latvia, France, Portugal and Italy as well as the Ukraine and central and southern Russia (Buszko 2009). According to Buszko (2009) it is also known from Fennoscania. The species was recorded for the first time in Sweden in 1996 (Svensson 1997) and currently it seems to be a common but local species. The species was collected in Denmark for the first time in 2005 and again in 2007 on the west coast of Jutland (Buhl *et al.* 2008). These recent records might indicate that the distribution of this species is shifting northwards.

Table 1. *Caloptilia* species in Europe feeding on *Acer*.
Tabel 1. Europese *Caloptilia*-soorten met *Acer* als waardplant.

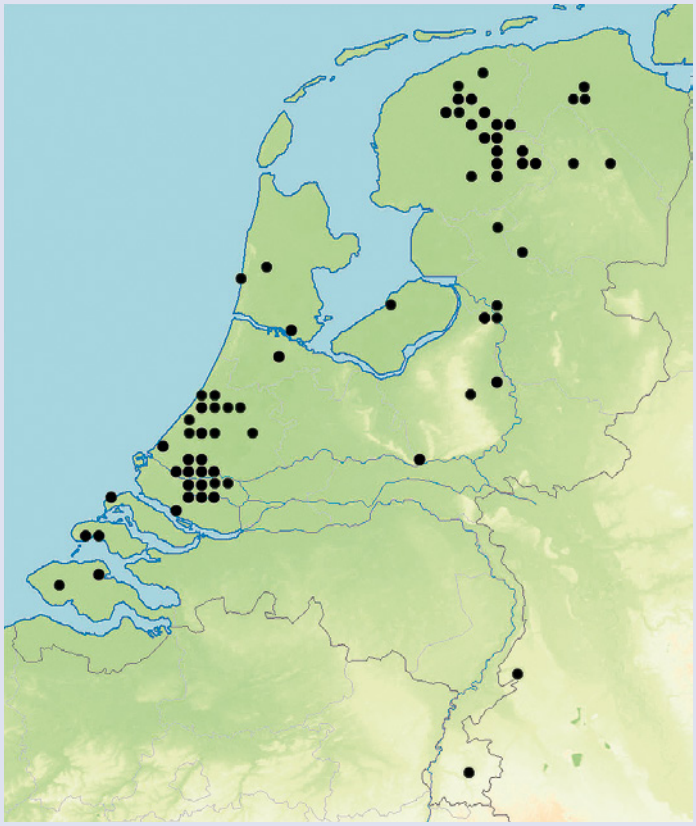
Species	Foodplant	Authors (main references)
C. onustella (Hübner) = *C. semifascia* (Haworth)	*A. campestre*	Klimesch 1956; Emmet *et al.* 1985
C. hauderi (Rebel)	*A. campestre*	Chrétien 1908; Klimesch 1956
C. rufipennella (Hübner)	*A. pseudoplatanus*	Patočka & Zach 1995
	A. platanoides	Hartig 1964
	Acer sp.	De Prins & De Prins 2009
C. hemidactylella (Denis & Schiffermüller)	*A. campestre*	Buszko & Baraniak 1989; Klimesch 1950; Patočka & Zach 1995
	A. pseudoplatanus	Frey 1880; Mitterberger 1909; Spuler 1910
	A. platanoides	Buszko & Baraniak 1989
	A. monspessulanum	Spuler 1910
	A. saccharinum	Buszko 1990
C. fribergensis (Fritzsche)	*A. pseudoplatanus*	Klimesch 1956; Patočka & Zach 1995; Spuler 1910
	A. monspessulanum	Klimesch 1956
C. acericolella (Kuznetzov)	*A. semenovii*	Kuznetzov 1981

Box 1

Material

Abbreviations: *Ac* = mines found on *Acer campestre*, *Ap* = mines found on *Acer platanoides*, SC = Sifra C. Corver, TM = Tymo S.T. Muus, WNE = Willem N. Ellis

Province of Drenthe Assen, 30.x.2008, *Ac*; Gasselte, 28.vi.2009, *Ac*; Meppel, Wolddijk, 23.ix.2010, *Ac*, TM.
Province of Flevoland Lelystad, 22.x.2010, 2 mines *Ac*, J. Windig.
Province of Friesland Zandburen, 19.vii.2007, *Ac*; on serveral places at Drachten, 21.viii.2007 2♂ reared, *Ac* and *Ap*, coll. TM; Drachten, Folgeralaan, 18.viii.2008, *Ac*; Beetsterzwaag, 28.viii.2007, *Ac* and *Ap*; Leeuwarden, Burgum, Tytjerk and Hardegarijp, 7.ix.2007, *Ac*, but at Hardegarijp also on *Ap* and here reared 1♀ dried pupa; Eernewoude, 22.ix.2007, *Ac*; Gorredijk, Oldeberkoop, Jubbega, Oudehorne, 6.x.2007, *Ac*; Heerenveen, 18.x.2008, *Ac*; Oosterwolde, Donkerbroek, 7.x.2009, *Ac*; Dokkum, 12.x.2009, *Ac*; Oenkerk, 16.x.2010, 2 mines *Ac*, all leg. TM
Province of Gelderland Twello, 23.vii.2003; 4.vi.2004; 7.v.2006; 21.v.2006; 10.vi.2007; 11.v.2008; 12-16.vi.2009; 15.vii.2009 all individuals trapped on light, and in the autumn of 2009 several mines on *Ac*, same locality, all leg. J.B. Wolschrijn; Twello, 23.vii.2007, 1♂, C. Alders; Ede, Wageningen, 15.x.2007, TM & SC, *Ac*; Wezep, 24.vii.2008, 1♂, K.J. Huisman, det. TM; Apeldoorn, JC Wilslaan; Deventer, centrum; Hattem, Stadslaan, 4.x.2010, mines *Ac* TM.
Province of Groningen Marum, 'Trimunt' near Opende, 13.x.2007, *Ac*, TM; Groningen, Hunzeboord, 19.x.2010, *Ac*, K. van Dijken; Groningen, Sontweg, 20.x.2010, *Ac*, TM; Groningen, stadspark; Peizerhoven, 22.x.2010, 18 mines *Ac*, Th. Bakker; Zuidwolde, Beijum, 22, 24.x.2010, total 40 mines *Ac*, K. van Dijken.
Province of Limburg De Meinweg, 20.vii.2009, *Ac*, SC & TM; Kunder, Kunderberg, 24.vii.2009, *Ac*, SC.
Province of Noord-Holland Amsterdam, Nieuwendam, 12.viii.2007, *Ac*, WNE; Hoofddorp, 18.ix.2007, *Ac*, SC; Egmond, 20.x.2010, *Ac*, L. Knijnsberg; Alkmaar, 9.xi.2010, J. van Roosmalen, *Ac*.
Province of Overijssel Zwolle, Wibergstraat, 30.viii.2010, 3 mines *Ac*; Steenwijk, Tukseweg, 22.x.2010, 2 mines *Ac*, TM.
Province of Zeeland Serooskerke, 26.x.2007 and 11.x.2008, *Ac*, WNE; Kamperland, 10.v.2008, 1♂, J. van Vuure; Middelburg, 21.vii.2010, at light, G. Troost.
Province of Zuid-Holland Dunes of Meijendel near Wassenaar, 27.vii.2007, 1♂ and mines on *Ac*, SC & TM; Leiden, 16.vi.2007, *Ac*; Den Haag, 5.viii.2007, *Ac*; Zoetermeer, 6.vi.2007-20.ix.2007,



1-1. Sites where specimens of *Caloptilia hemidactylella* were collected.
1-1. Locaties waar *Caloptilia hemidactylella* is verzameld.

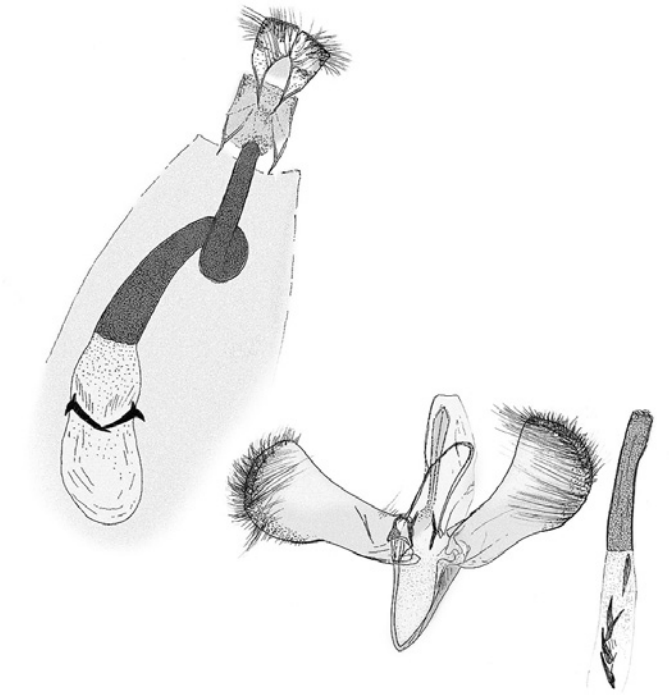
4♂ 2♀ reared (genitalia slide JCK6934), *Ac*; Hazerswoude-dorp, 18.ix.2007, *Ac*; Boskoop, 18.ix.2007, *Ac*, all leg. SC; Naaldwijk, 13.xi.2008, *Ac*, J. Scheffers; On serveral places at Vlaardingen, from 2007-2009; Delft, 19.x.2007 and 9.x.2008; Schiedam, 16.x.2008; Nootdorp, 25.x.2008; Hoogvliet, 31.x.2008; Spijkenisse, 16.xi.2008, .ix.2009; Abbenbroek, 9.x.2009; Maasland, 18.x.2009; Rhoon, 6.xi.2009; mines on *Ac*, all leg. B. van As; Leiderdorp, 14.xi.2008, mines, A. Deelman; Katwijk, 23.iv.2008, 1♂, B. Haasnoot det. TM (illustration in Haasnoot 2008); Ouddorp, 2.vii.2009, 1♂, K.J. Huisman (genitalia slide JCK7324); Rotterdam, Museumpark, 7.x.2009, *Ac*, W. Moerland; Rotterdam, Gerard Scholtenstraat, 23.iii.2010, at light, leg. J. de Gans; Leiden, Merenwijk, 13.ix.2010; Rotterdam, Zuidwijk, 18.ix.2010, Rotterdam, Groot-IJsselmonde, 14.x.2010, *Ac*, W. Moerland.

Morphology

Adults

The wingspan of *C. hemidactylella* is approximately 11-14 mm. The head, head tufts, thorax and abdominal segments are pale ochreous on the top of the head to chestnut brown at dorsal view. The base of the antennae has the same colour as the head: pale ochreous. The antennae are creamy white, especially from two thirds of the base. The antennae are annulated, with darker segments; chestnut brown to darker brown. The antennae have the same length as the forewings. The ground colour of the labial palpus is pale ochreous, but the first segment is darker brown near the end. The colour between the main segments is reddish, and the final segment is darker, but has a pale ochreous tip. The maxillar palpus is pale ochreous to chestnut brown. The forewing is yellowish-orange brown. Darker coloured specimens (forewing more chestnut-brown) have also been recorded (Kramfors, Sweden, leg. K. Holmqvist). The forewing has a brighter and large basal spot at one third of the wing length. This spot is narrower on the remaining two thirds of the wing and always ends just prior to reaching the apex. The colour of the basal spot varies from pale yellow to deep ochreous yellow, usually more intense near the apex. Old specimens can show a brighter basal blotch. The forewings are more intensely coloured between the forewing base and the basal spot; has sometimes a purple tinge, especially near the edges of the basal spot. There is a darker zone on the outer edge of the fringe. Costal strigulae are present but small, and are darker brown to black

2. *Caloptilia hemidactylella*, the first specimen collected at Wezep by K.J. Huisman, the second specimen from Drachten by T. Muus. Foto: T. Muus
2. *Caloptilia hemidactylella*, het eerste exemplaar verzameld in Wezep door K.J. Huisman, het tweede exemplaar uit Drachten door T. Muus.

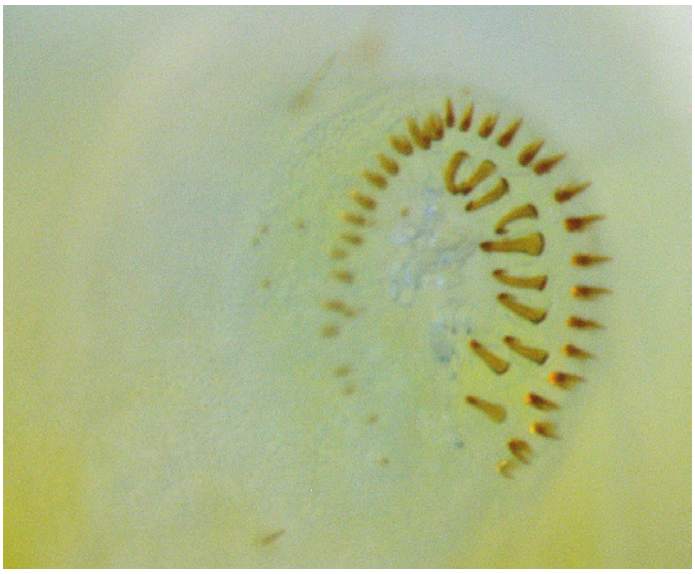


3. The female (upper-left) and male (lower-right) genitalia of *Caloptilia hemidactylella*. Drawing: T. Muus
3. Het vrouwelijk (linksboven) en mannelijk (rechtsonder) genitaal van *Caloptilia hemidactylella*.

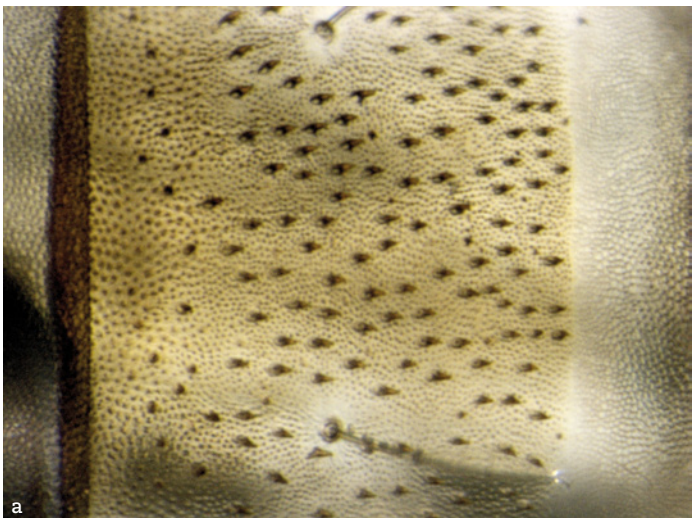
coloured. The Hind wings are greyish and considerably bended (figure 1 and 2).

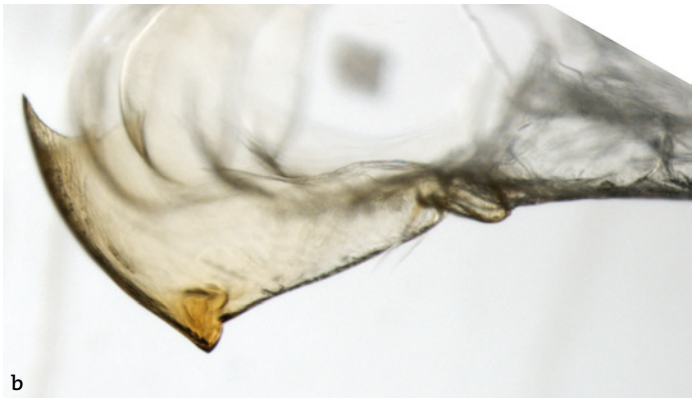
For positive identification of the adults, one should rely on genitalia dissection, as the adults strongly resemble other *Caloptilia* species, mostly *C. falconipennella*. According to Stainton (1851), *C. hemidactylella* can be distinguished from *C. falconipennella* because the latter has longer, narrower and darker anterior wings with costal spots being more distinct. When both species can be observed next to each other, *C. hemidactylella* can be immediately distinguished by its smaller size. The labial palpus and the head of *C. hemidactylella* are often more bright coloured. The more alpine species *C. fribergensis* is very similar as well, but this species is generally smaller and has dark ringed antennae with a broader basal spot starting halfway and ending near the apex. All specimens of *C. hemidactylella* show a white tarsus, but in *C. fribergensis* it is more creamy coloured. According to Brown (1947) the 19th century material from Britain of *C. hemidactylella* turned out to be the well-blotched form of *C. betulicola*. Such a well-blotched form occurs more rarely in *C. elongella*, which is very similar to *C. betulicola*. Both last mentioned species are often larger and they have slender wings.

4. The full grown larva of *Caloptilia hemidactylella* on field maple (*Acer campestre*). Photo: T. Muus
4. De volgroeide rups van *Caloptilia hemidactylella* op spaanse aak (*Acer campestre*).



5. Detail of the crochets of the larval legs. Photo: W. Ellis
5. Detail van de hakenkrans van de rupsenpoten.





6. a. The pupa: fifth segment, b. frontal protuberance, c. cremaster. Photos: W. Ellis
6. a. De pop: vijfde segment, b. uitsteeksel op de kopplaat, c. cremaster.

Genitalia

Drawings of male and female genitalia are published in Patzak (1986) and Kuznetzov (1990). A rough drawing of the female genitalia was given by Opheim (1980). In the male genitalia the valvae are rounded with many dark scales among the costa; the tegumen is weakly sclerotized, an uncus is not present, the tuba analis are very short and with a slender subscaphium; the aedeagus is darkened and elongated with both ends not ventex; it has mostly five cornuti. The 8th abdominal segment has two tufts of long androconial scales.

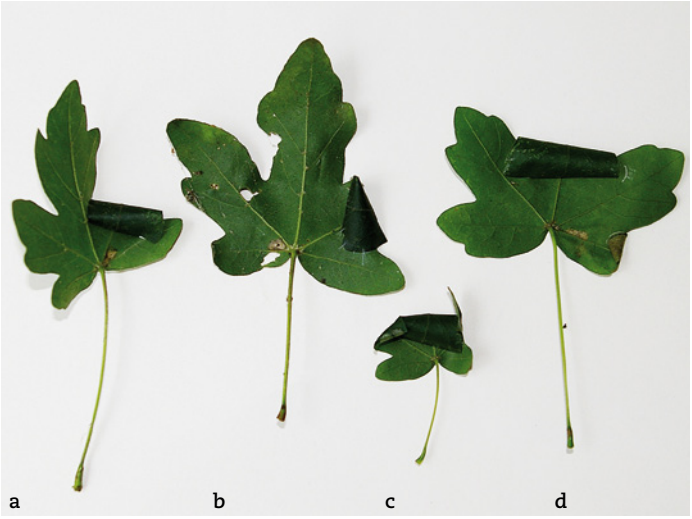
In the female the apophyses posteriores are same sized as the anteriores, the anteriores are long and triangle shaped; the sterigma is weakly sclerotized; the ductus bursae is robust, dark and completely sclerotized. There is no membranous region on the basis of corpus bursae, but two remarkable dark horn-shaped signa are present (figure 3).

Larvae

The larva of *C. hemidactylella* (figure 4) has superficially been described in literature (Emmet *et al.* 1985). The full grown larva is semitransparent whitish-yellowish with a fresh green to dark green gut (depending on contents) and cannot be separated from other *Caloptilia* species with the naked eye. The larva has no pigmentation, except for the eye patch. The lack of pigmentation, especially on the pronotum, is a general feature of *Caloptilia* larvae and differentiates them from *Parornix* larvae. The thoracic legs and claws are well developed. The mouthparts are strongly sclerotised. The mouth region is reddish brown, in contrast to, for example, *C. rufipennella*, which has more dark brown coloured mouth parts (personal observation Muus & Corver; Emmet *et al.* 1985). To the knowledge of the authors, this might be the only visible or easy to observe feature that seperates this *Caloptilia* species from other species. It is however highly unreliable to use as a single identification feature. The abdominal prolegs are typical for the Gracillariidae and consist of three pairs. Close examination of the abdominal prolegs of *C. hemidactylella* revealed that each has a crown of crochets in a mesal open ellipse shape with caudally a small row of bigger crochets inside (see e.g., Stehr 1987) (figure 5). The shape and configuration of the crochets might be a reliable feature to separate this species from other *Caloptilia* larvae. Specific larval differences compared to the other *Caloptilia* species feeding on *Acer campestre*, *C. onustella* and *C. hauderi* however, is currently unknown.

Pupae

Just like all other *Caloptilia* species, the oval cocoon resembles pergament paper and has a silvery appearance. The cocoon is all round attached to the leaf, the upperside is flat. The pupa is only very weakly sclerotised, having an almost hyaline appearance. Close examination of the pupa revealed that it has no recognizable frontal bristles. Segment 1 has no spines. Segments 2-7 are covered with abundant small spines. Segment 5 is shown in figure 6a. Segment 8 has no noticeable characteristics. The pronotum has medially shallow depressions with no noticeable characteristics. In contrast to Patočka & Turčáni (2005) and Patočka & Zach (1995), in our material the frontal protuberance is short and plump (figure 6b). The 10th abdominal segment (cremaster) has pairs of short, blunt spines (figure 6c). Again, specific differences between the pupa of *C. onustella* and *C. hauderi* is currently not known.



7. Four leaves with fresh mines of *Caloptilia hemidactylella*. Photo: C. Corver
7. Vier bladeren met verse mijnen van *Caloptilia hemidactylella*.

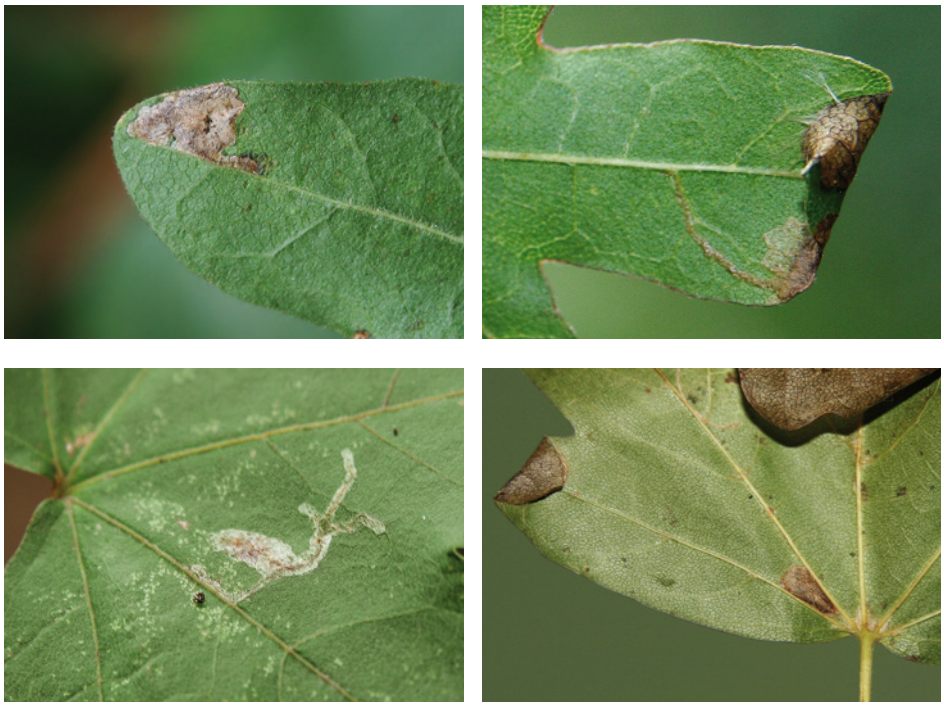
Biology

Until now, little was known about the biology and feeding signs of *C. hemidactylella* (Emmet *et al.* 1985). The life history has been described by Stainton (1851), Spuler (1910) and Emmet *et al.* (1985), but they are not complete or partly incorrect, often describing only the final leaf roll and not the earlier stages. According to literature, the host plants for *C. hemidactylella* are *A. campestre* (Buszko & Baraniak 1989; Klimesch 1950; Patočka & Zach 1995), *A. pseudoplatanus* (Frey 1880; Mitterberger 1909; Spuler 1910), *A. platanoides* (Buszko & Baraniak 1989), *A. monspessulanum* (Spuler 1910) and *A. saccharinum* (Buszko 1990). In the UK and Ireland the species has only been found on *A. platanoides* and *A. campestre* (Emmet *et al.* 1985). In our experience, *A. campestre* was the most common food plant for *C. hemidactylella* within The Netherlands. On sites were both *A. pseudoplatanus* and *A. campestre* were present, *C. hemidactylella* was found solely on *A. campestre*. However, only two specimens had been bred from *A. pseudoplatanus* and also in Belgium the species was bred from this host (De Prins 2004). In Finland and northern Scandinavia, the species has also been bred from *A. pseudoplatanus* and it seems this is the most accepted *Acer* here.

Caloptilia hemidactylella lives during its larval phase subsequently in an initial superficial gallery and after that in rolled up leaves. Especially the initial mine and the first leafroll are often found close together on the same leaf. It also occurs that the larva, after abandoning its old mine, occupies a new leaf nearby, which means that one single larva can occupy one up to three leaves during its larval stage. Figure 7 shows the feeding signs of *C. hemidactylella*.

The egg is laid either on the upper- or underside of the leaf, though the latter seems to be far more common. The egg is often laid near the base of the leaf between two veins. Sometimes, it is laid far from a vein, in the middle of the leaf or near the edge of a lobe. After hatching, the larva immediately starts a superficial mine within the leaf directly on the oviposition site, either on the upper or underside of the leaf, eating the mesophyl. The first mine consists of one or more galleries often merging into a semi-transparent blotch mine. In some cases, the narrow gallery is quite long and the blotch is formed far from the oviposition site. In most cases, however, the initial galleries merge directly into a blotch mine. If the egg has been laid near a vein, the extending galleries often follow the vein, but never cross it. The typical epidermal mine, which is either on the upper or under side of the leaf, has a silvery appearance. The later formed blotch is always a semi-transparent mine and never fully transparent (or 'full depth'). The larva leaves the mine by biting a hole through the epidermis of the leaf, often in the centre of the blotch. The most common variations occurring in the first mine are shown in figure 8.

The second feeding site is a small rolled, triangular, lobe near the edge of the leaf, with a cone shaped form. The third feeding site is a large cone (single rolled lobe in form of a cone) with the wide end being closed using a nearby lobe. Especially when the largest central lobe of the leaf is used, it doesn't have a cone like shape, but rather is a rolled up leaf, which is closed on both ends using the nearby lobes on either side of the same leaf. During the second and third feeding stage, the larva eats the complete leaf tissue from the inside out, only leaving the veins, giving the cone or leaf roll a netted appearance. Vacated cones turn brown.



8. The most common variations occurring in the first mine. Photos: Photos: S. Corver & T. Muus
8. De meest voorkomende vormen van het eerste mineerstadium.

The full grown larva pupates on the underside of the leaf in a silvery oval cocoon. This has been established during field observations. However, in captivity, some larvae also pupated on the upper side of the leaf. Prior to adult emergence, the pupa breaks through the cocoon. When the adult emerges, it leaves the exuviae sticking halfway out the cocoon.

It is currently not fully understood how the mines and cones of *C. hemidactylella* can be distinguished from those of *C. hauderi and C. onustella,* both also making cones on *A. campestre*. However, recent larval records of *C. onustella* in the United Kingdom and Austria seem to indicate differences in feeding signs compared to *C. hemidactylella*. The best observable difference seems to concern the final feeding site. Whereas *C. hemidactylella* always uses one lobe of the leaf for the leaf roll, *C. onustella* sometimes uses two lobes, instead of one, wrapping both lobes into one cone, giving the final feeding sight a very different appearance. Taking into consideration that the feeding signs of *C. hauderi* are relatively unknown, and that *C. onustella* can make very similar cones compared to *C. hemidactylella* vacated cones cannot be identified with certainty without breeding the larvae. Also empty pupae, which can be found near vacated mines, cannot be identified with certainty as long as the specific differences between the pupa of C. hemidactylella ,*C. hauderi and C. onustella* is unknown.

Hymenopterous parasites

Hymenopterous parasites, which are known to use Gracillariidae as a host, are two Eulophidae wasps, *Sympiesis sericeicornis* (Nees) (Vidal & Buszko 1990) and *Pnigalio pectinicornis* (Linnaeus) (Noyes 1991), and the Braconidae wasp *Apanteles laetus* (Marshall). A large number of parasites were bred from the collected material. In total, about 80% of the collected larvae had been parasitized. The parasites were identified by Dr. Kees van Achterberg. The most common parasite bred from *C. hemidactylella* larvae turned out to be *Apanteles laetus*. The parasite is known to use Gracillariidae as a host (personal communication Dr. K. van Achterberg). *Apanteles laetus* leaves its host during its full-grown larval stage and pupates immediately within the leaf cone. *Apanteles laetus* is new for the Dutch fauna. A second Hymenoptera species, which was bred from the collected material, was an unidentified species of Campopleginae (Hymenoptera: Ichneumonidae). The parasite leaves his host after the larva has spun its cocoon but prior before pupation of the larva. The adult parasite emerges in a few days, breaking a small round hole in the middle of the cocoon.

Voltinism

According to Emmet *et al.* (1985) and Patočka & Zach (1995) the species is univoltine. This does not apply to The Netherlands. We have found fresh abandoned mines in mid-June (indicating a larval period from roughly April through mid-June) and a second larval period from August until the beginning of September. This suggests that *C. hemidactylella* is bivoltine. Adults have been caught in March, April, May, June, July and in mid-September. The adults caught in June and July were mostly fresh specimens, suggesting the first generation to fly from June until July, and the second generation from mid-September until mid-June and hibernating as an adult. These observations (bivoltine, overwintering as an adult) resemble the life history of other *Caloptilia* species (Patočka & Zach 1995).

Habitat and ecology

Caloptilia hemidactylella can be found almost everywhere, sometimes in high numbers, especially in (sub)urban habitats where the food plant is available in good numbers, growing near edges of woodland and in parks in half shaded places. This leaf miner seems to have a clear preference for larger trees and large, undamaged, healthy, dark green leaves. Most cones can be found quite high up in the trees, at an average height of about 2-3 meters. The mines have also been found on isolated smaller plants but not in hedges or on small infected leaves.

Acknowledgements

We would like to thank Erik van Nieukerken for reading an earlier draft of this article and his helpful comments. We also would like to thank Paolo Triberti (Italy) for providing pictures of the genitalia, which have been used for the drawings of the genitalia in this article. Furthermore, we appreciated the help of Christine Corver for collecting larvae, Nathan Poirier (United States) for reading the English manuscript, Kees van Achterberg for the identification of the reared parasites and Sjaak Koster for the genitalia identification. Finally, we would like to thank people who participated in the collective search. John Langmaid, Guy Meredith (United Kingdom) and Ken Bond (Ireland) are also thanked for providing detailed information about the species in the UK and Ireland.

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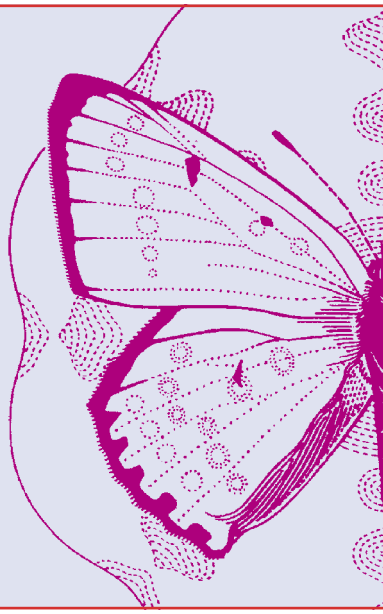
Accepted: 8 January 2011

Samenvatting

***Caloptilia hemidactylella*: nieuw voor Nederland. Aantekeningen over verspreiding, morfologie en biologie (Lepidoptera: Gracillariidae)**

De soort *Caloptilia hemidactylella* (Gracillariidae) is in 2003 voor het eerst in Nederland waargenomen. Zij is na die tijd gevonden in acht provincies en circa vijftig vindplaatsen, waarbij er zowel adulten als mijnen met rupsen werden verzameld. Dit artikel beschrijft de resultaten van een uitgebreid onderzoek gedurende 2007 en 2008 naar de vraatsporen, levenswijze van de larve als mede de morfologie van de larve, pop en adult. Daarnaast wordt een diagnose gegeven tussen verschillende soorten uit het geslacht, gezien de soort in het verleden vaak verward is met tal van andere soorten uit het geslacht. De studie leverde nieuwe informatie op, welke nog niet eerder in de literatuur beschreven was. De soort is uit grote delen van Europa bekend, onlangs werd zij ook voor het eerst in Denemarken gevonden en in dit artikel wordt kort ingegaan op de herontdekking in Groot-Brittannië. Voor België worden er twee nieuwe provinciemeldingen van de soort vermeld. Tenslotte meldt het artikel *Apanteles leatus* (Braconidae) als nieuw voor de Nederlandse fauna, zij heeft *C. hemidactylella* als gastheer.



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