

Perilissine wasps (Ichneumonidae, Ctenopelmatinae) reared from sawflies (Tenthredinidae) in the Netherlands

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A survey is given of Perilissini (Ichneumonidae) reared in the Netherlands over a period of more than ten years. Five ichneumonid species are new for the fauna of the Netherlands: *Lathrolestes moravicus* (Habermehl, 1923), *Lathrolestes pleuralis* (Thomson, 1883), *Perilissus albitarsis* Thomson, 1883, *Perilissus dissimilator* Aubert, 1987 and *Trematopygodes auriculator* Hinz, 1980. The identification of *Perilissus albitarsis* and *P. pallidus* is discussed. For two ichneumonids a host has been found for the first time: *Apethymus cereus* on *Quercus robur* for *Perilissus albitarsis* and *Endelomyia aethiops* on *Rosa* for *Lathrolestes moravicus*.

Introduction

Knowledge of host relations of parasitoid wasps is still rather poor and this certainly pertains to the ichneumonids attacking sawflies (Symphyta). It is not very inviting to rear field-collected host sawfly larvae because they often spend many months, sometimes more than one year, as rather vulnerable prepupae underground. Here, we present results of more than ten years of rearing attempts with field-collected sawfly larvae, giving records of the parasitoid species in one tribe of the ichneumonid subfamily Ctenopelmatinae, the Perilissini, which are all solitary koinobiont endoparasitoids. Our work was greatly stimulated by the publication of the papers on *Lathrolestes* by Reshchikov (2013, 2015).

Material and methods

This paper is the result of a combined effort: sawfly larvae were collected by the second author, who also reared them and identified the adult sawflies (Blommers 2009, Mol & Blommers 2017, Blommers & Mol 2019), while the parasitoid specimens have been identified by the first author.

Field-collected sawfly larvae were reared on leaves of their host plant. Fully-grown individuals that did not feed any more, and are here called 'descending larvae', were transferred, often individually, to a small glass container such as a marmalade jar about half filled with a mixture of potting soil and sharp sand (Blommers 2009). Some species, of Allantinae in particular, do not burrow into the soil to pupate but seek shelter in hiding places like hollow twigs, but they readily accept – and widen it if needed – holes drilled into a slightly humid small block of solid peat. Unless stated otherwise, rearing jars were kept in an unheated garage with a small glass window on the west side. Usually, the jars were inspected every other day during the potential emergence period of adult specimens. Several of the reported ichneumonids

parasitize mining Symphyta larvae. For illustrations of these mines, see Ellis (2019).

As most reared samples originated from localities in and around the town of Rhenen (province of Utrecht), localities are only mentioned if they were outside Rhenen or if the reared ichneumonid is a new species for the fauna of the Netherlands. In these cases, the RD coordinates of the locality and the sample code (last two digits of the year.sample number) on the specimen label are given. The RD system is the national rectangular coordinate grid as used on the maps of the Netherlands' Cadastre, Land Registry and Mapping Agency (RD = Rijksdriehoeksmeting = 'National Triangulation').

In addition to the sometimes rather outdated French, British, German and Russian keys, more recent keys, when available, for smaller groups were consulted to verify the name of the sawfly adults. The electronic world catalogue of Symphyta (Taeger et al. 2018) was particularly useful for checking the most recent nomenclature, as well as the appearance of some species. For the identification of leaf mines, we also used Ellis (2019).

The subfamily Ctenopelmatinae almost entirely consists of parasitoid species attacking sawflies. Here we deal with the tribus Perilissini, consisting in our region of fourteen genera. We present species belonging to the genera *Lathrolestes*, *Perilissus* and *Trematopygodes*. For their identification the following papers have been used: for *Lathrolestes* (as defined by Townes 1970), Reshchikov (2013, 2015); for *Perilissus* (as defined by Townes 1970), Schmiedeknecht (1912); and for *Trematopygodes*, Hinz (1980) and Hinz & Horstmann (1998). For pertinent literature on the mentioned Ichneumonidae, see Yu et al. (2016). The ichneumonid specimens are deposited in the collection of the first author, the sawflies in the collection of the second one.

Table 1. Parasitoid-host relations.
Tabel 1. Parasitoïde-gastheerrelaties.

Perilissini	Tenthredinidae	Subfamily	Living
<i>Perilissus albitarsis</i>	<i>Apethymus cereus</i>	Allantinae	free
<i>Perilissus dissimilator</i>	<i>Allantus viennensis</i>	Allantinae	free
<i>Perilissus pallidus</i>	<i>Ametastegia perla</i>	Allantinae	free
<i>Perilissus spilonotus</i>	<i>Ametastegia</i> sp.	Allantinae	free
<i>Lathrolestes caudatus</i>	<i>Ardis pallipes</i>	Blennocampinae	in twig
<i>Trematopygodes aprilius</i>	<i>Periclista albida</i>	Blennocampinae	free
<i>Trematopygodes aprilius</i>	<i>Periclista pilosa</i>	Blennocampinae	free
<i>Trematopygodes aprilius</i>	<i>Periclista pubescens</i>	Blennocampinae	free
<i>Trematopygodes auriculator</i>	<i>Periclista pilosa</i>	Blennocampinae	free
<i>Trematopygodes rarus</i>	<i>Periclista pilosa</i>	Blennocampinae	free
<i>Lathrolestes luteolator</i>	<i>Caliroa annulipes</i>	Heterarthrinae	free
<i>Lathrolestes macropygus</i>	<i>Scolioneura betuleti</i>	Heterarthrinae	mine
<i>Lathrolestes moravicus</i>	<i>Endelomyia aethiops</i>	Heterarthrinae	free
<i>Lathrolestes nigricollis</i>	<i>Fenusa pumila</i>	Heterarthrinae	mine
<i>Lathrolestes pictilis</i>	<i>Fenusa dohmii</i>	Heterarthrinae	mine
<i>Lathrolestes pleuralis</i>	<i>Parna tenella</i>	Heterarthrinae	mine
<i>Lathrolestes verticalis</i>	<i>Metallus pumilus</i>	Heterarthrinae	mine
<i>Lathrolestes ensator</i>	<i>Hoplocampa testudinea</i>	Nematinae	in fruit
<i>Trematopygodes auriculator</i>	<i>Mesoneura opaca</i>	Nematinae	free

Genus *Lathrolestes* Foerster, 1869

Among the indigenous species of this genus *L. clypeatus* (Zetterstedt, 1838) is the single known species that does not attack sawflies but primitive mining moths (*Eriocrania*) in birch leaves.

Lathrolestes caudatus (Thomson, 1883)

Material 3 ♀♀ from *Ardis pallipes* (Serville, 1823) larvae in twigs of *Rosa canina*, collected 14.vi.2012, emergence of ichneumonids 27.v.2013.

Symptoms of attack by rose shoot sawfly *A. pallipes* could easily be found in and around Rhenen. The parasitoids were present in one of three tiny samples of infested shoots taken in and around the town in different years. This sample produced five descending sawfly larvae, and eventually one adult sawfly, two to three weeks before the three parasitoids emerged.

The natural history of the sawfly host (as *A. brunniventris*) has been studied by Evenhuis (1973). According to that author, the species is univoltine, with adults emerging between mid-May and the end of July, with 50% emergence around mid-July. Evenhuis (1973) reared *L. caudatus* as well.

Lathrolestes ensator (Brauns, 1898)

Between 1990 and 2000, this species was reared in large numbers from *Hoplocampa testudinea* (Klug, 1816) in apples in the experimental orchard 'De Schuilenburg' in Kesteren (province of Gelderland). The species is a specialized parasitoid of the apple sawfly *Hoplocampa testudinea* (Zijp & Blommers 1993, 2002). The host is a dominant apple pest, its vulnerability to (chemical) control coincides with flowering of the apple tree, when pollinators have to be spared (Vincent et al. 2019). The female sawfly lays single eggs under the surface of apple flower receptacles. The first instar tunnels under the surface of the fruitlet, the second instar digs deeper into the fruit and the third instar moves to another fruitlet (Vincent et al. 2016, 2019). *Lathrolestes ensator* oviposits mainly in the second and third *H. testudinea* instar and rarely in the first one.

The egg soon turns black and can be seen through the skin of the host larva. It does not hatch until two-three weeks after the fully grown host larva has entered the soil. This means that the host larva can spin its cocoon for hibernation as a prepupa

before it is killed by the parasitoid larva. In the Netherlands, the parasitoid larva is fully grown in September and spins its own cocoon inside the host cocoon. Although multiparasitism of *H. testudinea* larvae is not uncommon, only one parasitoid cocoon develops in the sawfly cocoon. Among tenthredinid larvae, a prolonged diapause over two winters is not uncommon and this happens in *H. testudinea* as well. Up to 40% of the prepupae may emerge after two winters. The same prolonged diapause was found in *L. ensator* (Zijp & Blommers 2002). Because *L. ensator* larvae kill their host larva already in summer, this implies that the prolonged diapause of *L. ensator* takes place independently of the diapause of its host. *Hoplocampa testudinea* was accidentally introduced in North America in 1939 in New York and spread from there in north eastern USA and Canada. From 2002 to 2015, its parasitoid *L. ensator* was disseminated in some orchards in Canada where the species established in Quebec and Ontario (Vincent et al. 2016).

Lathrolestes luteolator (Gravenhorst, 1829)

Material 2 ♀♀, 1 ♂ from *Caliroa annulipes* (Klug, 1816) on *Tilia*, collected 12.vi.2005, emergence 24-26.viii.2005, 1 ♂ emerged end of May 2006, i.e. one year later. 2 ♀♀ from *Caliroa annulipes* on *Salix cinerea*, collected 13.v.2008, also showed delayed emergence, appearing on 16.v.2009. 1 ♀, 3 ♂♂ from *Caliroa annulipes* (Klug, 1816) on *Tilia vulgaris*, collected 26.vi.2012, emergence 18-23.viii.2012. 1 ♀ from *Caliroa* on *Quercus*, collected 24.vi.2018, emergence after hibernation 26.v.2019.

Obviously, *L. luteolator* parasitizes free living *Caliroa* larvae (Carl 1972, 1976, Hinz 1961, Pschorn-Walcher & Altenhofer 1989, Schönrogge 1991) so references to quite different species – *Heterarthrus vagans* (Fallén, 1808) mining elder *Alnus* leaves and *Sterictiphora geminata* (Gmelin, 1790), a species of Argidae living on rose – by Aubert (2000) and Reshchikov (2015) are probably in error. The parasitoid is evidently subject to partial delayed diapause, like its host (Carl 1972).

Lathrolestes macropygus (Holmgren, 1857)

Material 1 ♀, 1 ♂ from *Scolioneura betuleti* (Klug, 1816) mines in *Betula pendula*, collected 8.x.2009, emergence 22-23.ix.2010.

Pschorn-Walcher & Altenhofer (1989) reared *L. macropygus*



1. *Endelomyia aethiops*, on *Rosa*. Photo: Leo Blommers
1. *Endelomyia aethiops*, op roos.



2. Damage by *Endelomyia aethiops* on *Rosa*. Photo: Leo Blommers
2. Bladschade door *Endelomyia aethiops* op roos.

from the same host. In this case, we consider references to non-mining hosts as probably incorrect.

Lathrolestes moravicus (Habermehl, 1923)

Material 4 ♂♂ from rearing #04.01, Rhenen (province of Gelderland), RD 168.0-441.1, from *Endelomyia aethiops* (Fabricius, 1781.) on leaves of a dwarf rose *Rosa* in a planter on a garden terrace, collected on 25.v.2004, emergence in May 2005.

Endelomyia aethiops is the first known host for *L. moravicus* which is new for the fauna of the Netherlands. The host, the so-called rose slug larva ('gewone rozenbladwesp') is a pest of rose, easily recognized for its typical feeding behaviour: grazing the tissue from the upper surface of the rose leaf (figure 1-2) (Alford 1991).

Lathrolestes nigricollis (Thomson, 1883)

Material 1 ♂ from mines of *Fenusa pumila* Leach, 1817 in *Betula pubescens*, collected 8.vii.2005, emergence 3rd week May 2006.

The male parasitoid emerged from a sample of more than 50 larvae, from which 24 male and 22 female host individuals emerged between 24-29 July 2005. The parasitoid emerged ten months later. In the following years, no other specimen of the parasitoid was seen to emerge among the nearly 50 host specimens appearing in eight rearings from different locations.

Lathrolestes nigricollis was released in 1974 as a biological control agent against *F. pumila* (syn.: *F. pusilla* Lepeletier, 1823), a foreign invasive pest on *Betula* in northern USA and Canada. In 2009, a study was undertaken to see if the species had dispersed further away from the release localities (Casagrande et al. 2009). This was the case in some regions, and there *Fenusa* was no longer a pest.

Lathrolestes pictilis (Holmgren, 1857)

Material 2 ♀♀, 1 ♂ from *Fenusa dohrnii* (Tischbein, 1846) in leaf mines in *Alnus glutinosa*, collected 25.ix.2007, emergence: ♂

8.v.2008, ♀♀ 11.v. and 25.v.2008. 2 ♂♂ from *Fenusa dohrnii* in leaf mines in *Alnus glutinosa*, collected 14.ix.2016, emergence 3.v & 7.v.2017.

The species had already been found in the Netherlands and the same host has been reported by Pschorn-Walcher & Altenhofer (1989). As the leaf miner has three annual generations in our region (Van Frankenhuyzen 1970), *L. pictilis* is expected to have two or three generations, as well.

Lathrolestes pleuralis (Thomson, 1883)

Material 1 ♀ rearing #09.34 Rhenen, city garden, RD 168.0-441.5, from *Parna tenella* (Klug, 1816) in leaf mine in *Tilia*, collected 27.v.2009, emergence 22.v.2010. 2 ♂♂ rearing #15.40 Rhenen, Plantage Willem III, from *Parna tenella* in leaf mine in *Tilia*, collected 24.vi.2015, emergence 14.v.2016.

The species is new for the fauna of the Netherlands. It is known from Germany, Finland and Italy. Pschorn-Walcher & Altenhofer (1989) report *Lathrolestes* sp. 2505 sensu Hinz reared from *Parna tenella*. That material was studied in the Zoologische Staatssammlung Munich and it appeared to belong to *L. pleuralis* as well.

Lathrolestes verticalis (Brischke, 1871)

Material 1 ♀ from *Metallus pumilus* (Klug, 1816) in leaf mine in *Rubus*, collected 22.ix.2016, emergence 30.v.2017. 2 ♀♀, 1 ♂ from *M. pumilus* in leaf mine in *Rubus*, collected 27.ix.2017, emergence ♀ 30.v.2018, 19.ix.2018, ♂ 17.ix.2018. 1 ♂ from *M. pumilus* in leaf mine in *Rubus*, collected 2.x.2017, emergence 24.v.2018. 1 ♀, 4 ♂♂ from *M. pumilus* in leaf mine in *Rubus*, collected 4.x.2017, emergence ♀ 30.v.2018, 1 ♂ 18.ix.2018, 4 ♂♂ 19.ix.2018. 1 ♂ from *M. pumilus* in leaf mine in *Rubus*, collected 17.x.2017, emergence 4.vi.2018. 1 ♂ from *M. pumilus* in leaf mine in *Rubus*, collected 10.ix.2018, emergence 20.v.2019.

Pschorn-Walcher & Altenhofer (1989) also mention *M. pumilus* as host for *L. verticalis*. Weiffenbach (1988) reared this species from *Metallus gei* (Brischke, 1883) in *Geum urbanum*.



3. *Perilissus albitarsis*, female with extra antenna base and deformed left ocellus. Photo: Kees Zwakhals

3. *Perilissus albitarsis*, vrouwtje met een extra antenne basis en verminkte linker-ocel



4. *Perilissus albitarsis*, male. Photo: Kees Zwakhals

4. *Perilissus albitarsis*, mannetje.



5. *Perilissus pallidus*, male. Photo: Kees Zwakhals

5. *Perilissus pallidus*, mannetje.

Genus *Perilissus* Foerster, 1855

As far as known, *Perilissus* species attack sawflies exclusively.

Perilissus albitarsis Thomson, 1883

Material 1 ♀ from rearing #10.P3 Buurse (province of Overijssel), Witte Venen, RD 256.2-463.0, from *Apthymus cereus* (Klug, 1818) on *Quercus robur* leaves, collected 29.v.2010, emergence 20.iv.2011.

This is a peculiar teratological specimen with an extra flagellum base emerging from the left compound eye (figure 3). This species, indeed the same specimen, was already mentioned by Mol & Blommers (2017). Its main distribution is in North and Central Europe. We could not trace any host in the literature.

The identification of *Perilissus albitarsis* Thomson, 1883 and *P. pallidus* (Gravenhorst, 1829) (see below) with Schmiedeknecht (1912), is a rather uncertain process and Schmiedeknecht himself mentions that he cannot find a convincing difference between the two species. Thomson refers in his description of *albitarsis* to *pallidus* var 1. According to Gravenhorst *pallidus* var 1 is a bit larger than *pallidus* and so we use the name *pallidus* for the smaller form and *albitarsis* for the larger form.

The two species can be separated as follows. In *P. albitarsis* the claws are pectinate and the distance from the hind ocellus to the compound eye is smaller than the diameter of an ocellus (figure 4). The length of the fore wing is usually 7.0-8.5 mm in the female and 6.0-7.5 mm in the male. In *P. pallidus* the claws are simple, at most with a few short weak setae and the distance from the hind ocellus to the compound eye is greater than the diameter of an ocellus (figure 5). The length of the fore wing is usually 5.0-6.5 mm in the female and 5-6 mm in the male.

Perilissus dissimilitor Aubert, 1987

Material 1 ♂ rearing #12.89, Rhenen RD 168.0-441.5, from *Allantus viennensis* (Schrank, 1781) on leaves of *Rosa*, collected 20.ix.2012, emergence first week of July 2013. 3 ♂ rearing #12.52, Rhenen, from *Allantus viennensis* on *Rosa* leaves in garden, collected 18.vii.2012, emergence 15.vi. and 24.vi.2013. 2 ♂ rearing #17.38, Rhenen, Kwintelooijen, from *Allantus viennensis* on *Rosa* leaves, collected 5.ix.2017, emergence 28.v. and 8.vi.2018. 1 ♀ rearing #18.28A, Rhenen, Laarsenberg, from *Allantus viennensis* on *Rosa* leaves, collected 12-vi-2018, emergence 12.vii.2019.

2 ♂ rearing #18.45A, Rhenen, Kwintelooijen, from *Allantus viennensis* on *Rosa* leaves, collected 4.ix.2018, emergence 10 and 16.vi.2019.

Aubert (1987) described this species from specimens he reared from *A. viennensis*. The species is new for the fauna of the Netherlands. We have no explanation why so few females have emerged. For a picture of the host larva, see figure 6. The host species was apparently rare in the Netherlands before the present millennium, as there were no specimens of this rather striking species (figure 7) present in the former Dutch sawfly collection of the Zoologisch Museum of the University of Amsterdam when the first specimens appeared in our rearings in 2009. Since then we have reared specimens from about 50 usually small samples. In fact, *A. viennensis* was the dominant species of the four *Allantus* living on rose bushes in and around Rhenen in those years. It could be found everywhere on roses in gardens, as well as on wild roses (mainly *Rosa canina* and *R. rubiginosa*) in nearby nature reserves.

Perilissus pallidus (Gravenhorst, 1829)

Material 1 ♀, Wageningen, from *Ametastegia perla* (Klug, 1818) on *Salix alba* leaf, collected 20-ix-2012, emergence 4.vi.2013.



6. *Allantus viennensis*. Photo: Leo Blommers
6. *Allantus viennensis*.



7. *Allantus viennensis*, male in typical posture with elevated abdomen. Photo: Leo Blommers
7. *Allantus viennensis*, mannetje in karakteristieke houding met opgericht abdomen.

This finding created a question as Weiffenbach (1988) recorded the species as a parasitoid of *Monsoma pulveratum* (Retzius, 1783) on *Alnus glutinosa*. Is the same species involved? While both host species belong to the subfamily Allantinae, *A. perla* is smaller than *M. pulveratum*; adult sizes 5-6 and 7-9 mm respectively (Muche 1969). Weiffenbach's material is present in the collection of the Zoologische Staatssammlung in Munich and was studied. It turned out to be *P. albitarsis*. This is in agreement with the larger host size of *M. pulveratum* (see under *P. albitarsis*).

Perilissus rufoniger (Gravenhorst, 1829)

Material 1 ♀ from rearing #07.24 from an unidentified Symphyta larva on *Glyceria maxima*, collected 12.vi.2007, emergence 6.v.2008.

The large host larva (figure 8) does not resemble the larvae of the two sawfly species known to feed on *Glyceria* (Liston 1995) as figured in Lorenz & Kraus (1957), but resembles more some *Dolerus* larvae.



8. Host of *Perilissus rufoniger*, unidentified larva on *Glyceria maxima*. Photo: Leo Blommers
8. Gastheerlarve van *Perilissus rufoniger* op *Glyceria maxima*.

Perilissus spilonotus (Stephens, 1835)

Material 1 ♀ reared from *Ametastegia* Costa, 1882 in a corrugated cardboard band around the trunk of an apple tree in the experimental orchard 'De Schuilenburg', Kesteren (province of Gelderland), collected February 1990. She emerged in an open-air insectary on 4.v.1990.

Like other Allantinae larvae, the full-grown larvae of *Ametastegia* seek an aerial shelter, often on a tree trunk, to pupate and/or overwinter and some even make themselves such a hiding place by gnawing a cavity in a ripening apple (Alford 1984).

Genus *Trematopygodes* Aubert, 1968

Hinz (1980) treats four species, including his new species *T. femorator*, described from the Mediterranean. All four have been reared from the free-living larvae of *Periclista*, associated with oak *Quercus*. Horstmann (1990) described a fifth species: *T. rarus*.

Trematopygodes aprilius (Giraud, 1872)

This is the main parasitoid of *Periclista albida* (Klug, 1816), itself being the most common species of the genus in our region. According to Fauna Europaea its distribution is apparently

limited to a few countries in central West Europe; it is not reported from either Spain, Poland or Scandinavia (Zwakhals 2013).

Adult parasitoids emerged in samples of this sawfly species from the province of Utrecht: Rhenen (Zwijnsbergen, Plantage Willem III, Grebbeberg), province of Gelderland: Laag-Wolfheze (Kabeljauw) and Nunspeet (Elspeeter Struiken) and province of North-Holland: Naarden (dunes Gooimeer). Samples of the related *Periclista pilosa* Chevin, 1971 (figure 9) from the last two locations also yielded the species, as did a sample of *Periclista pubescens* (Zaddach, 1859) from Rhenen, Zwijnsbergen.

While *P. albida* often showed a delayed adult emergence of one year, this was not observed for the parasitoid. For example, a sample of ten larvae (rearing #13.09), collected from a row of old oak trees in the nature reserve Plantage Willem III, yielded one parasitoid on 21.iii.2014, plus three male and three female sawflies between March, 28 - April, 3 2014; while another three male sawflies emerged shortly before April, 15 the following year. The early emergence of the parasitoid, before the host adult, was apparently incidental, as the opposite happened in other rearings. Emergence of both sawflies and parasitoids sometimes started before the end of March and could proceed until the end of April.



9. *Periclista pilosa* on oak leaf. Photo: Leo Blommers
9. *Periclista pilosa* op eikenblad.



10. *Mesoneura opaca* on oak leaf, full grown larva (right) and prepupa (left). The prepupa has lost all blackish marks and ceased feeding. Photo: Leo Blommers
10. *Mesoneura opaca* op eikenblad, volwassen larve (rechts) en prepupa (links). De prepupa heeft alle zwarte markeringen verloren en is gestopt met eten.

Trematopygodes auriculator Hinz, 1980

Material 1 ♀ rearing #06.41, Wolfheze, Kabeljauw, RD 182.3-445.4, from *Periclista pilosa* Chevin, 1971, collected under oaks 24.v.2006, emergence in the second week of April 2007. 1 ♂ rearing #08.01, Rhenen, Palmerswaard, RD 166.4-441.5, from *Mesoneura opaca* (Fabricius, 1775) on *Quercus robur* leaf, collected 13.v.2008, emergence 5.iv.2009. 1 ♂ rearing #08.07, Rhenen, Plantage Willem III, RD 163.8-443.8, from *M. opaca* on *Quercus robur* leaf, collected 14.v.2008, emergence 8.iv.2010. Rearing #06.41 concerned a single green larva with green spines, which should have been *P. pilosa*. Rearing #08.01 contained 11 larvae: apart from the parasitoid, 2 ♀ *M. opaca* emerged 7 and 12.iv.2009, 6 ♀ 6-13. iv.2010, 1 ♂ 13.iv. and 1 ♀ 17.iv.2011. Rearing #08.07 concerned a single larva, at the time recorded as *M. opaca*.

Hinz described the species from a single female reared from *Periclista albida*. An important character is found in the shape of the base of the petiolus. Based on the constriction, the petiolus is widened, which gives the base the impression of having 'ears', hence the name. Up to now, the male was not known, it is absent from the key in Hinz & Horstmann (1998). The *T. auriculator* male can be distinguished from *T. aprilinus* by the following features: punctuation more close and coarser. On the temple, the distance between punctures is smaller than their diameter. Occipital carina dipped down centrally. Flagellum underside black. Malar space half as long as the width of the mandible and 1.5 times as long as the width of the first flagellar segment. Mesopleurum closely punctate over its entire surface (smooth centrally in *T. aprilinus*). Mesosoma and metasoma black, without yellow marks. In the male the 'ears' that occur on the petiolus of the female are absent. Stigmata on the petiolus protruding strongly.

The species is new for the fauna of the Netherlands. The larva of *M. opaca* is shown in figure 10.

Trematopygodes rarus Horstmann, 1990

Material 2 ♂♂ rearing #10.18, Naarden (province of Noord-Holland), RD 143.0-480.1, from *Periclista pilosa* on *Quercus robur* leaves, collected 5.vi.2010, emergence 20.iv.2011.

The holotype was described from a male in collection Hinz, reared from *Periclista albida* (Horstmann, 1990). The species was recorded by Teunissen (1953) as *T. blancoburgensis*. According to

Horstmann (1990), *T. blancoburgensis* (Schmiedeknecht, 1912) is a junior synonym of *T. aprilinus* (Giraud, 1872) and Horstmann introduced the name *T. rarus* for the species incorrectly recorded as *blancoburgensis* by Teunissen (1953) and Hinz (1980).

Discussion

This paper is the result of research that started with simple attempts to rear field-collected sawfly larvae in order to get more reliable pictures of the larvae of various species (Blommers 2007, Blommers & Mol 2019). Various parasitoid species also appeared in these rearings and they were initially donated to the late Prof. Dr. K. Horstmann in Würzburg, Germany, who kindly identified them.

With up to 100 rearing batches per year, proper recognition of different species might be tricky, especially if several related species live on the same plant. For example, tapping of *Periclista* species from oak, or *Allantus* from roses usually produces mixed samples that need to be treated with extra care. Moreover as the fully grown larvae lose most of their specific features and only try to disappear underground or into some shelter, there is always a risk some species being overlooked.

The emergence dates noted should be rather realistic for most species that overwinter underground, as the muffled temperatures in the rearing units in the garage should have been comparable with those outside. Evidently, the great variation in winter and spring temperatures over years forbids more generalizations, while temperatures in the rearing units might have been less realistic for prepupae normally dwelling inside (sunlit) twigs.

Evidently, the parasitoid species reported as new to the Dutch fauna, should not be included in any list of rare or endangered species. Most of them are likely rather common, but have been overlooked until now as too few people find joy in rearing wild sawfly larvae. Like Pschorn-Walcher & Altenhofer (1989), we believe that the great majority of *Lathrolestes* species are very specific in the selection of their host species. For example, it seems very unlikely that mining and free living sawfly larvae share the same parasitoid, as suggested in some references listed by Reshchikov (2015). Of course, this needs to be proven in rearing experiments as for example described in Van Achterberg & Shaw (2016) for Braconidae.

The host spectra of the Perilissini appear rather well de-

finied. Seven of the nine *Lathrolestes* species treated here attack sawfly larvae belonging to the subfamily Heterarthrinae (Leppänen et al. 2012). They are all real leafminers except for the two grazing species *Caliroa* and *Endelomyia* (figure 1-2), the taxonomic position of which is still open to some debate (Prous et al. 2019, Taeger et al. 2018). The hosts of the two other *Lathrolestes* species, *L. ensator* and *L. caudatus* belong to other subfamilies but also live inside plant tissue: *Hoplocampa* (Nematinae) in fruits and *Ardis* (Blennocampinae) in shoots.

If *Trematopygodes* attacks larvae of both *Periclista* (Blennocampinae) and *Mesoneura opaca* (Nematinae), a historical host change can easily be imagined. All the various *Periclista* species and *M. opaca* live on oak during the same period of the year. They are free living, of the same size, and they have a similarly ordinary life cycle. In our experience, beating oak branches in

May always results in mixed samples, with larvae of either *P. albida* or *M. opaca* usually being the most numerous. In this case adopting a host species of a different subfamily might not be a great change.

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References

- Alford DV 1984. A colour atlas of fruit pests. Wolfe Publishing.
- Alford DV 1991. A colour atlas of pests of ornamental trees, scrubs and flowers. Wolfe Publishing.
- Altenhofer E & A Taeger 1998. Zur Kenntnis der Gattung *Scolioneura* Konow, 1890 (Hymenoptera: Tenthredinidae). In: Taeger A & Blank S M 1998. (Hrsg.) Pflanzenwespen Deutschlands (Hymenoptera, Symphyta). Kommentierte Bestandsaufnahme. Goecke & Evers
- Aubert JF 1984. Douze Ichneumonides non pétiolées mal connues ou inédites. Bulletin de la Société Entomologique de Mulhouse 1984 (avril-juin): 17-23.
- Aubert JF 1987. Deuxième prélude à une révision des Ichneumonides Scolobatinae. Bulletin de la Société Entomologique de Mulhouse: 33-40.
- Aubert JF 2000. Les ichneumonides ouest-paléarctiques et leurs hôtes. 3. Scolobatinae (=Ctenopelmatinae) et suppl. aux volumes précédents. Litterae Zoologicae 5: 1-310.
- Blommers LHM 2009. Het kweken van bladwespen (Hymenoptera: Symphyta). Entomologische Berichten 69: 101-110.
- Blommers LHM & Mol AWM 2019. Nieuwe en interessante Nederlandse bladwespen van het genus *Pristiphora* (Hymenoptera: Tenthredinidae: Nematinae). Entomologische Berichten 79: 11-22.
- Carl KP 1972. On the Biology, Ecology and Population Dynamics of *Caliroa cerasi* (L.) (Hym., Tenthredinidae). Zeitschrift für angewandte Entomologie 71: 58-83.
- Carl KP 1976. The natural enemies of the pear slug, *Caliroa cerasi* (L.) (Hym., Tenthredinidae), in Europe. Zeitschrift für angewandte Entomologie 80: 138-161.
- Casagrande R, Van den Driesche RG, Mayer M, Fuester R, Gilrein D, Tewskbury L & Faubert H 2009. Biological control of *Fenusa pusilla* (Hymenoptera: Tenthredinidae) in the north eastern United States: a thirty-four year perspective on efficacy. Florida Entomologist 2009: 243-247
- Ellis W 2019. Plant parasites of Europe. Leafminers, galls and fungi. Available on: www.bladmineerders.nl [accessed December 28, 2019].
- Evenhuis HH 1973. Investigations on the rosette-infesting sawfly *Ardis brunniventris* (Hymenoptera, Tenthredinidae). Mededelingen van de faculteit Landbouwwetenschappen Rijksuniversiteit Gent 38: 1127-1131.
- Hinz R 1961. Über Blattwespenparasiten (Hym. und Dipt.) Mitteilungen der Schweizerischen Entomologischen Gesellschaft 34: 1-29.
- Hinz R 1980. Die europäischen Arten der Gattung *Trematopygodes* Aubert (Hymenoptera, Ichneumonidae). Nachrichtenblatt der Bayerischen Entomologen 29(5): 89-93.
- Hinz R & Horstmann K 1998. Holarctic species of *Trematopygodes* Aubert. Spixiana 21: 241-251.
- Horstmann K 1990. Revision einiger Typen der von Otto Schmiedeknecht beschriebenen paläarktischen Ichneumonidae (Hymenoptera). Beiträge zur Entomologie 40: 31-61.
- Leppänen SA, Altenhofer E, Liston AD & Nyman T 2012. Phylogenetics and evolution of host-plant use in leaf-mining sawflies (Hymenoptera: Tenthredinidae: Heterarthrinae). Molecular Phylogenetics and Evolution 64: 331-341.
- Liston AD 1995. Compendium of European Sawflies. List of species, modern nomenclature, distribution, foodplants, identification literature. Gottfrieding, Chalastos Forestry.
- Lorenz H & Kraus M 1957. Die Larvalsystematik der Blattwespen (Tenthredinoidea und Megalodontoidea). Abhandlungen zur Larvalsystematik der Insekten, Berlin 1: 1-389.
- Mol AWM & Blommers LHM 2017. Nieuwe en interessante bladwespen (Tenthredinidae: Allantinae) in Nederland. Entomologische Berichten 77: 248-260.
- Muche WH 1969. Die Blattwespen Deutschlands. III. Blennocampinae (Hymenoptera). - Entomologische Abhandlungen. Staatliches Museum für Tierkunde in Dresden, Leipzig 36 [Supplement][1967/1970]: 97-155.
- Prous M, Liston A, Kramp K, Savina H, Vårdal H & Taeger A 2019 The West Palaearctic genera of Nematinae (Hymenoptera, Tenthredinidae). ZooKeys 875: 63-127.
- Pschorn-Walcher H & Altenhofer E 1989. The parasitoid community of leafmining sawflies (Fenusini and Heterarthrini): a comparative analysis. Zoologischer Anzeiger 222: 37-56.
- Pschorn-Walcher H & Altenhofer E 2000. Langjährige Larvenaufsammlungen und Zuchten von Pflanzenwespen (Hymenoptera, Symphyta) in Mitteleuropa. Linzer biologische Beiträge 32: 273-327.
- Reshchikov A, Soper A & Van Driesche RG 2010. Review and key to Nearctic *Lathrolestes* Foerster (Hymenoptera: Ichneumonidae), with special reference to species attacking leaf mining tenthredinid sawflies in *Betula* Linnaeus (Betulaceae). Zootaxa 2614: 1-17.
- Reshchikov A 2013. Two new species of *Lathrolestes* (Hymenoptera, Ichneumonidae) from Norway, northern Russia and Finland with a key to western Palearctic species. Zootaxa 3681: 59-72.
- Reshchikov A 2015. Review of North European species of the genus *Lathrolestes* (Hymenoptera, Ichneumonidae) with description of one new species from Öland (Sweden). Zootaxa 433: 1-47.
- Scheibelreiter GK 1973. Die Tenthrediniden der Rose (*Rosa spec.*). Zeitschrift für angewandte Entomologie 72: 225-259.
- Schmiedeknecht O 1912. Opuscula Ichneumonologica fascicule 32: 2483-2562.
- Schönrogge K 1991. Zur Biologie der Eichenblattwespen *Caliroa cinxia* und *Caliroa annulipes* und deren Larvalparasitoiden. Journal of Applied Entomology 111: 365-379.
- Taeger A, Liston AD, Prous M, Groll EK, Gehroldt T & Blank SM 2018. ECatSym - Electronic World Catalog of Symphyta (Insecta, Hymenoptera). Program version 5.0 (19 Dec 2018), data version 40 (23 Sep 2018). Senckenberg Deutsches Entomologisches Institut (SDEI), Münchenberg. Available on: <https://sdei.de/ecatsym> [accessed December 29, 2019].
- Teunissen HGM 1953. Anciens et nouveaux Tryphonides (Ichneumonides, Hyménoptères). Tijdschrift voor Entomologie 96: 13-49.
- Townes HK 1970. The genera of Ichneumonidae, part 3. Memoirs of the American Entomological Institute 13.
- Van Achterberg C & Shaw MR 2016. Revision of the western Palaearctic species of *Aleiodes* Wesmäl (Hymenoptera, Braconidae, Rogadinae). Part 1: Introduction, key to species groups, outlying distinctive species, and revisionary notes on some further species. ZooKeys 639: 1-164.
- Van Frankenhuyzen A 1970. De levenswijze van *Fenusa dohrnii* (Tischbein, 1846) (Hym., Tenthredinidae), een mineerwesp op *Alnus glutinosa*. Entomologische Berichten 30: 49-52.
- Vincent C, Appleby M, Eaton A & Lasnier J 2016. Dissemination of *Lathrolestes ensator* (Ichneumonidae), a larval parasite of the European apple sawfly, *Hoplocampa testudinea* (Tenthredinidae), in Eastern North America. Biological Control 100: 1-6.

- Vincent CD, Babendreier W, Świergiel H, Helsen L & Blommers LHM 2019. A review of the apple sawfly, *Hoplocampa testudinea* Klug (Hymenoptera: Tenthredinidae). *Bulletin of Insectology* 72: 35-54.
- Weiffenbach H 1988. Über einige aus Blattwespenlarven (Hymenoptera, Symphyta) gezogene Ichneumoniden (Hymenoptera, Ichneumonidae). *Nachrichtenblatt der Bayerischen Entomologen* 37: 103-107.
- Yu DSK, Van Achterberg C & Horstmann K 2016. *Taxapad 2016*, World Ichneumonidea 2015. Nepean, Canada.
- Zijp JP & Blommers L 1993. *Lathrolestes ensator*, a parasitoid of the apple sawfly. *Proceedings Experimental & Applied Entomology*, N.E.V. Amsterdam 4: 237-242.
- Zijp JP & Blommers LHM 2002. Impact of the parasitoid *Lathrolestes ensator* (Hym., Ichneumonidae, Ctenopelmatinae) as antagonist of apple sawfly *Hoplocampa testudinea* (Hym., Tenthredinidae). *Journal of Applied Entomology* 126: 366-377.
- Zwakhals CJ 2013 *Fauna Europaea: Ichneumonidae*. In: *Fauna Europaea: Ichneumonidea & Symphyta* (Van Achterberg C ed). *Fauna Europaea* version 2017.06. Available on: <https://fauna-eu.org> [accessed December 2019].

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Samenvatting

Perilissini (Ichneumonidae, Ctenopelmatinae) gekweekt uit bladwespen (Tenthredinidae) in Nederland

De tweede auteur kweekt al meer dan tien jaar in het veld gevonden bladwesplarven op, om die beter te leren kennen. Daarbij verschenen uiteraard ook sluipwespen. Hier wordt een overzicht gegeven van de sluipwespen die tot het tribus Perilissini behoren. Het onderzoek leverde een vijftal nieuwe soorten op voor de Nederlandse fauna: *Lathrolestes moravicus* (Habermehl, 1923), *Lathrolestes pleuralis* (Thomson, 1883), *Perilissus albitarsis* Thomson, 1883, *Perilissus dissimilator* Aubert, 1987 en *Trematopygodes auriculator* Hinz, 1980. *Trematopygodes rarus* Horstmann, 1990 werd ook uitgekweekt en deze soort was al door Teunissen (1953) vermeld onder de onjuist geïnterpreteerde naam *Lathrolestes blancoburgensis*. Voor het eerst werd voor *L. moravicus* en *P. albitarsis* een gastheer vastgesteld, respectievelijk *Endelomyia aethiops* op roos *Rosa* en *Apethymus cereus* op zomereik *Quercus robur*. De Perilissini laten een interessant gastheerspectrum zien. Er zijn twee 'typen' gastheren: minerende en vrijlevende soorten. Larven die in bladeren mineren worden met name gebruikt door *Lathrolestes*-soorten en larven die vrij op bladeren leven door *Perilissus* en *Trematopygodes*. Alle minerende bladwespen behoren sinds kort dankzij DNA-analyse tot een enkele subfamilie, de Heterarthrinae. Twee vrij levende soorten *Caliroa* en *Endelomyia* welke ook sinds kort bij deze subfamilie zijn ingedeeld, worden eveneens door *Lathrolestes*-soorten belaagd, evenals *Hoplocampa* (Nematinae) en *Ardis* (Blennocampinae). Deze laatste twee leven als jonge larve dicht onder de oppervlakte, waar ze bereikbaar zijn voor *Lathrolestes*, maar dringen later dieper door in vruchten, respectievelijk scheuten. In literatuurlijsten met gastheer-parasitoïd-relaties wordt nogal eens een sluipwesp uit beide typen gastheren vermeld. Het lijkt zeer onwaarschijnlijk dat dit correct is.



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