

The larch cone moth, *Retinia perangustana* (Lepidoptera: Tortricidae): a remarkable new species in the Netherlands

Joop Schaffers
Tymo S.T. Muus

KEYWORDS

Expansion, larch cones, Veluwe

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In May 2016, *Retinia perangustana*, was recorded for the first time in the Netherlands. Records of adults of the species are rather rare in Europe. The sites where this species is found are related to the occurrence of larch species. The larvae feed monophagous on the seeds and cones of these trees. Due to the research on insect pests attacking the seeds and cones of larch in Europe, more than half of the sites where the species is found in Europe come from larvae. Searching for larvae on infested cones could be more effective for locating this species than searching at light. The species is probably introduced in artificial larch stands, i.e. outside the natural distribution area of *Larix decidua*, through planting of young trees carrying a certain stage of the species.

Introduction

On 11 May, 2016 the first author visited the Loenermark nature reserve in the province of Gelderland to record moths. A 125W MV bulb was used in combination with 4 TL-K 40 W actinic tubes. The weather was clear with a temperature of 19 °C falling to 17 °C and a weak westerly wind. The trapping location was on the southern edge of an eighty year old plantation of larch trees (*Larix decidua*), adjacent to an open field. Amongst the 36 species recorded were a few leafrollers (Tortricidae). These were retained for identification. In January 2018, three of them, all males, were identified by the second author as *Retinia perangustana* (Snellen) based on their external appearance. The identification was confirmed by examination of the genitalia. We hereby record for the first time the occurrence of this species in the Netherlands and propose the Dutch name 'larikskegelmot'.

Diagnosis

Adult

The species was placed in the genus *Retinia* which is related to *Pseudococcyx* and *Rhyacionia* and they are all conifer feeders. Due to its wingspan of 10-14 mm, *R. perangustana* is easily separated from its larger sister species *R. resinella* (Linnaeus), which is 16-22 mm, as well as the species of *Pseudococcyx* and *Rhyacionia* which are also larger. The three specimens from the Loenermark reserve are 12.0, 12.8 and 13.0 mm. The head, thorax and forewings are brownish grey, scattered with white scales. The apical area of the forewing has brownish scales and a dark brown apical dot. The submedian interfascia is whitish and variable, sometimes indistinct. The hindwings are greyish

brown, the scales of the fringe with a bright tip (figure 1-2).

Retinia perangustana can be confused with Dutch species of *Epinotia* and *Rhopobota* with a wingspan less than 14 mm. In set specimens (figure 2), unlike *Epinotia subsequana* (Haworth) and *E. pygmaeana* (Hübner), *R. perangustana* has unicolorous hindwings. The apical spot is more ochreous in *Epinotia tetraquetrana* (Haworth) and *E. rubiginosana* (Herrich-Schäffer). It is most similar to *Rhopobota myrtillana* (Humphreys & Westwood), but that species is smaller and has two more strongly marked and distinct fasciae.

The male genitalia are characterized by the rounded uncus in combination with the rounded and slender socii, the valva having a rounded notch halfway and greatly broadened. The saccus is rounded. The lobed uncus in the males is often characterized by a small incision (Kuznetsov 1987, Razowski 2003), however, it is more rounded in specimens originating from central Europe (Chambon 1999, Pastorális et al. 2011), such as in one of the Dutch specimens (figure 3). The female genitalia has a small sterigma, with the cingulum postmedian short and the two signa somewhat differing in size (Razowski 2003).

Larva

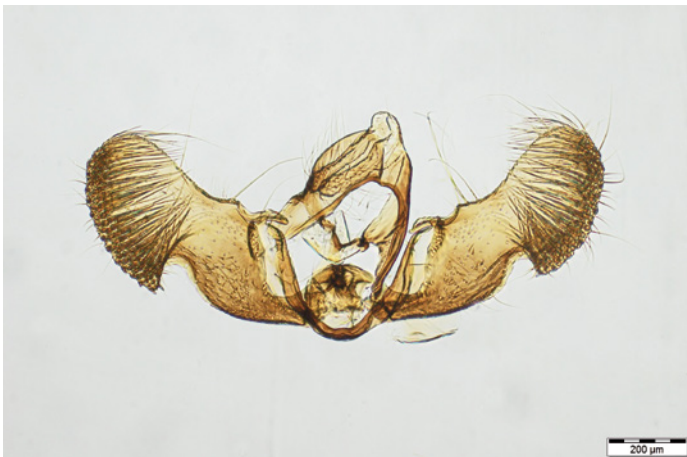
The full-grown larva is 9-11 mm long, has a dirty white colour and eight pairs of legs. The head and both halves of the prothoracic shield are brown. The anal plate is round, brown with light patches and covered with relative long hairs. The spiracles on the prothorax and the eighth abdominal segment are much larger than the others. All spiracles have brown margins (Skrzypczyńska 1977).



1. *Retinia perangustana*, (a) a female and (b) a male. Loenermark (province of Gelderland), 11.v.2016. Photo's: Joop Schaffers
1. *Retinia perangustana*, (a) een vrouwtje en (b) een mannetje. Loenermark (Gelderland), 11.v.2016.



2. Females *Retinia perangustana*, Loenermark (province of Gelderland), 11.v.2016. Photos: Joop Schaffers
2. Vrouwtjes *Retinia perangustana*, Loenermark (Gelderland), 11.v.2016.

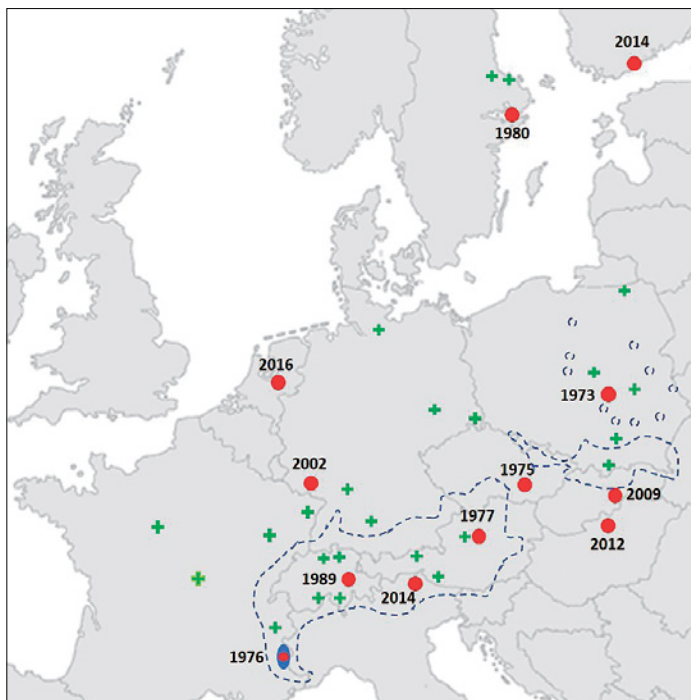


3. Male genitalia of *Retinia perangustana*, prep. Tymo Muus. Photo: Joop Schaffers
3. Mannelijk genitaal van *Retinia perangustana*, prep. Tymo Muus.

Distribution history

The species has a Palearctic distribution: east of Europa in Siberia, the Russian Far East, Mongolia and Northeast China (Razowski 2003). Records of this species in Europe are rather scarce. The species was first recorded in 1973 from Poland where it was found near Brzesko, 50 kilometres east of Kraków (Skrzypczyńska 1977). Hereafter followed first records for the

Czech Republic (Brno) in 1975 (Křístek et al. 1976), France (Briançon) in 1976 (A. Roques personal communication), Austria (Rettenbachtal) in 1977 (P. Huemer personal communication), Sweden (Munsö) in 1980 (Svensson 1981), Switzerland (five sites) in 1989 (Roques & Von Hirschheydt 1990), Germany (Kirkel an der Saar and Bad Rappenau) in 1990 (A. Roques personal communication), Slovakia (Dulova) in 2009 (Pastorális et al. 2011), Hungary (Kekesteto) in 2012 (Buschmann 2014), Italy (Taufers in South Tyrol) in 2014 (Huemer 2016) and Finland (Helsinki) in 2014 (N. Ryrholm personal communication). In some of the aforementioned countries, there have been further records since the first occurrence. Between 1973 and 1975 the species was recorded from six other sites in Poland (Skrzypczyńska 1977) and in Puszcza Borecka in 1993 (J. Buszko personal communication). In France it is found in the southern French Alps; from seven sites in the Haute-Alpes and Savoy, in larch stands below an altitude of 1600 m (Roques 1983) with a record in 2008 in Sapey (1500 m) in Savoy (J. Nel personal communication). There are also records from the Arboretum national des Barres, Saint-Junien-la-Bregère, Forêt domaniale d'Ingwiller and Forêt de Pressigny. In Austria it was recorded near Steyrling in 2007 (Wimmer 2008), from Dölsach (2005 and 2012) (Deutsch 2012) and in 2014 from Brandenburg (Huemer 2016). There are two further records from Sweden: Södersätra in 1990 (Svensson 1991) and Gysinge in 2017 (N. Ryrholm personal communication). In Germany in 2002, a specimen was observed near Herrnhut by Wauer (2003), followed by a series of records in 2009 and 2011 from Ritzerau, and then in 2012



4. Distribution of *Retinia perangustana* in Europe. The main areas are indicated by blue lines and additionally, the first records per country with date (●), further records (+), and multiple records in one area (●) are given.

4. Verspreiding van *Retinia perangustana* in Europa. Het hoofdareaal is gegeven met blauwe lijntjes en daarnaast worden de eerste vondsten per land met jaartal (●), latere vondsten (+) en meerdere vondsten in een gebied (●) gegeven.

from Doberschütz (www.lepiforum.de) and in the Roggenburger Frost (Heindel 2013).

An overview of the above history is given on a map of north-west and central Europe in figure 4. More than half of the sites on the map in this figure are of larvae in the cones of larch (22 localities), the remaining ones are adults (18 localities).

Biology

In Europe *Retinia perangustana* is associated with European larch (*Larix decidua*) and *L. polonica*, the last of which is endemic in Poland (Skrzypczyńska 1977). It has been observed on Japanese larch (*Larix kaempferi*) in Switzerland (Roques & Von Hirschheydt 1990) and France (Chambon *et al.* 1992). The almost round reddish yellow eggs, with a violet hue, are laid between April and July, depending on the elevation, on the inside of the scales, one to two per cone (M. Skrzypczyńska unpublished, A. Roques personal communication). Oviposition takes place towards the end of the growth period of the seed-bearing cones. The young larva feeds on the tissue on the inside of the scales and later also on the seeds of the cone (Roques 1983) (figure 5). Frass from the larva is visible on the outside of an infested cone (figure 6). After approximately five weeks the mature larva leaves the cone, pupating in a delicate whitish cocoon in litter on the ground, hibernating in this stage (Skrzypczyńska 1977). The moth emerges in the following spring, flying between mid-April and July (at a higher altitude). However, there is a possible prolonged diapause for up to three years (Chambon *et al.* 1992).

The percentage of infested cones varies from 1-5% in investigated Czech larch stands (Křístek *et al.* 1976) to 1-12% in investigated Polish larch stands (Skrzypczyńska 1977) and even 6-15% in investigated French larch stands (Roques 1983). Some observers have noted that records of adults are made near old,

high larch trees (Roweck & Sawenkov 2013, www.lepiforum.de). The moths at the Loenermark reserve in the Netherlands were found adjacent to an 80 year old larch stand.

Behaviour

According to Roweck & Savenkov (2013), the adults of this species are poorly attracted to light. Although their light trap was right between larch trees, very few specimens were caught. That is why they consider the moths are staying in the crowns of the trees. However, on www.lepiforum.de it is mentioned that a male was found by beating the branches of larch trees. A similar response to light has been observed by the second author in another coniferous leafroller: *Cydia strobilella* (Linnaeus). During the day, high numbers were observed flying around the tops of spruce trees, but at night at the same location very few were attracted to light.

In Europe mainly males have been recorded at light. Among the 44 recorded moths were sixteen males and three females, although the sex of the other 25 specimens was not determined. The males of *R. perangustana* are also attracted by artificial pheromones. The species has been found with pheromones in the Arboretum national des Barres in France (Chambon *et al.* 1992). Near Helsinki, Finland, males have also been lured with pheromones (N. Ryrholm personal communication). From the sixteen males mentioned above, eight were attracted by pheromones, seven to light and one was beaten from the branch of a larch tree.

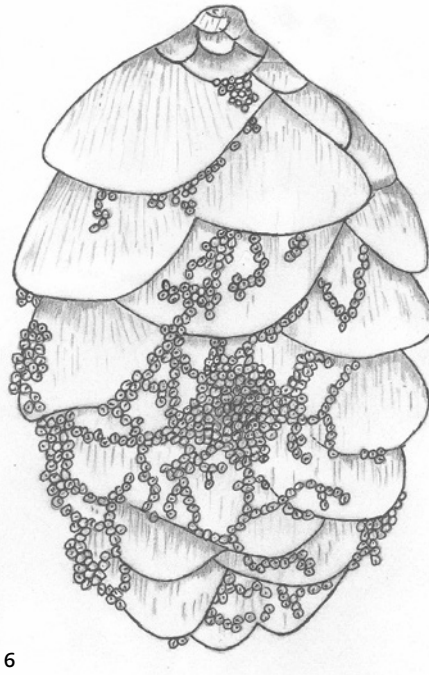
Discussion

Assuming an infestation rate of 5% of cones in larch plantations, based on Křístek *et al.* (1978), Roques (1983) and Skrzypczyńska (1977), one would expect far more moths than have been recorded. This is probably because the adults are poorly attracted to light. Given the larval infestation rates reported, it seems reasonable to suggest that the species is probably less rare than the few records of adults indicate. Searching for larvae in infested cones could, therefore, be far more effective at locating this species.

The distribution of *R. perangustana* (figure 4) shows a remarkable similarity with the natural distribution of the European larch (*L. decidua*) in Europe. This area covers the montane zones in the Alps and the Carpathians and, at lower altitudes, some larch forests in Switzerland, Poland and the Czech Republic (A. Roques personal communication). See the dotted line in figure 4, adopted from the European Forest Genetic Resources Programme (EUFORGEN, www.euforgen.org/species/larix-decidua). Most of the records in Europe are from this area. The other records on the map are near larch stands, planted by humans. The years of the first records in the different countries, mentioned next to the sites in figure 4, give no indication of natural spread, which is also a remarkable feature.

There are several explanations for the range expansion of this species. (1) The adult moths naturally colonize potentially suitable habitat (stepping stones). (2) The adult moths take advantage of air displacement on higher altitudes (windborne migration). (3) The species is introduced through infested cones used for seed collection (with larvae in the cones or pupae on the cones). (4) The species is introduced through planting of young trees carrying a certain stage of the species. Combinations of the previously mentioned theories are also possible.

The nearest locations in Germany where *R. perangustana* is recorded are Ritzerau in the northeast and Kirkel an der Saar in the southwest. The distances between those cities and the Loenermark reserve are 350 km and 327 km respectively. We



5. Infested cone with larva (black arrow).
Photo: Alain Roques
5. Aangetaste kegel met rups (zwarte pijl).

6. Frass on the cone. Drawing: Joop Schaffers, after Skrzypczyńska (1977)
6. Frass op de kegel. Tekening: Joop Schaffers, naar Skrzypczyńska (1977)

therefore believe that natural dispersal using stepping stones of suitable habitat and also windborne migration is unlikely. The introduction through seeds is also an unlikely explanation for the occurrence in the Loenermark. However, the introduction through planting of young trees is a possible pathway for arrival of this species. There are many larch stands in the Loenermark, which are planted between 1925 and 1983. If this is the explanation for the occurrence of this species, it is possible that it is not a recent arrival and it has been present for quite some time but not recorded.

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Samenvatting

De larikskegelmot, *Retinia perangustana* (Lepidoptera: Tortricidae): een opvallende nieuwkomer in Nederland

Op 11 mei 2016 werden drie exemplaren van *Retinia perangustana* op licht verzameld in het natuurgebied de Loenermark (Veluwe, Gelderland). De soort werd nog niet eerder in Nederland vastgesteld en hier wordt de Nederlandse naam larikskegelmot voorgesteld. De ontdekking is opmerkelijk omdat de soort als vlinder slecht op licht komt en de dichtstbijzijnde vindplaats zich op 327 km afstand bevindt in Duitsland. De vlinder kent een Palearctische verspreiding: ten oosten van Europa in Siberië, het Russische Verre Oosten, Mongolië en Noordoost-China. Hij werd in 1973 voor het eerst in Europa waargenomen in Polen, waarna tot en met 2017 een gering aantal waarnemingen volgde. De vindplaatsen hangen nauw samen met de verspreiding van larikssoorten, in Europa de Europese lariks (*Larix decidua*), *Larix polonica* en incidenteel de Japanse lariks (*Larix kaempferi*). De rupsen voeden zich uitsluitend met de zaden en de zachte weefsels in kegels van deze lbomen. De vondst op de Loenermark werd gedaan in de directe nabijheid van een tachtigjarige lariksofstand. Alle opstanden in het gebied zijn geplant tussen 1925 en 1983. *Retinia perangustana* is mogelijk lange tijd over het hoofd gezien. Meer dan de helft van de waarnemingen in Europa is afkomstig van onderzoeken naar insecten die schadelijk zijn voor de zaadproductie in larikskegels. Door rupsen bezette kegels worden gekenmerkt door frass op de buitenkant. Gezien het feit dat de soort slecht op licht af komt, zou het zoeken naar rupsen in bezette kegels wel eens effectiever kunnen zijn dan het vangen met licht. Ook de inzet van kunstmatige feromonen kan een bijdrage leveren aan de kennis van de verspreiding. De introductie van de soort in aangeplante lariksofstanden, dat wil zeggen buiten het natuurlijke verspreidingsgebied van de Europese lariks, vindt mogelijk plaats door aanplant van jonge boompjes. Deze dragen dan een bepaald stadium van de soort met zich mee vanuit de boomkwekerijen.



Joop Schaffers
Dalweg 88
6865 CV Doorwerth
joopschaffers@planet.nl

Tymo S.T. Muus
Hogewal 137
8331 WP Steenwijk