# THE MICRO MOTH GENUS *AGONOPTERIX* IN THE NETHERLANDS

# (LEPIDOPTERA: ELACHISTIDAE: DEPRESSARIINAE)

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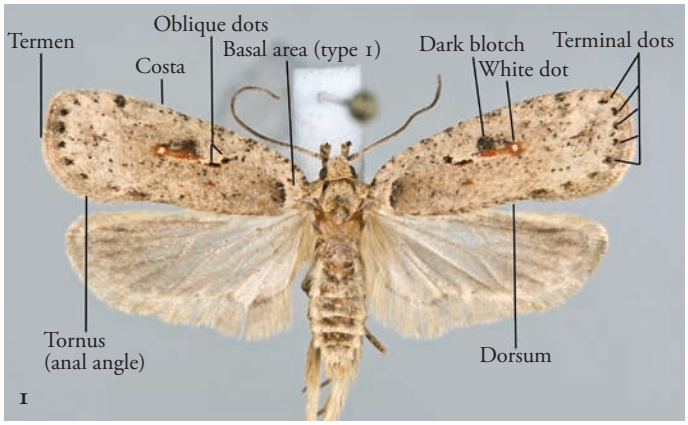
**In this paper the Dutch species of the micro moth genus *Agonopterix* are presented. The identification is notoriously difficult. Therefore high quality illustrations of the male and female genitalia are provided. A revision of the Dutch material proved that *A. atomella* and *A. capreolella* have to be removed from the Dutch list, whereas *A. oinochra* is new to the Dutch fauna. Several species have disappeared from the Netherlands, of which *Agonopterix laterella* is the most conspicuous. The caterpillar lives on cornflower, a beautiful blue flower that once gave colour to the Dutch agricultural landscape. Now it has almost disappeared, taking *Agonopterix laterella* along in its fall. Distribution maps and phenology charts are provided for all 23 Dutch species.**

## INTRODUCTION

The genus *Agonopterix* Hübner, 1825 is a group of micro moths that is notoriously difficult to identify. In the Netherlands the study of this genus has been neglected for a long time. Snellen (1882) gave useful descriptions and a key in his standard work on the Dutch Lepidoptera. Just like all his papers and books this is a work of excellent quality, but the key is based on external characters alone and is verbose and complicated to use. It was not until 1961 that another paper on *Agonopterix* was published in the Netherlands. Van Laar (1961) treated the females of the genus, based on the genitalia. He gave a key and illustrated the eighth segment with the ostium and also the signum. Even though this is an important contribution, the figures are unfortunately rather schematic and the characters in the key are not always clearly defined. Shortly afterwards he published a similar paper on the male genitalia, with somewhat better figures, but with a selection of rather variable and partly doubtful criteria for the key (Van Laar 1964).

Abroad important papers on the genus were published by Hannemann (1953, 1954, 1958), very thorough and detailed descriptions of the male genitalia of the majority of species from Western and Central Europe and an indispensable base for further exploration, but very difficult to handle as a key, because of the variability of the characters and some inaccuracies in the text and unclearness in the rather schematic figures. A brief survey of the British species was given by Jacobs (1978). Palm (1989) published a book on the Oecophoridae of Northern Europe, with beautiful figures of the adults. Unfortunately the photographs of the genitalia are often disappointing. In Volume 4 of The Moths and Butterflies of Great Britain and Ireland, Harper et al. (2002) treat the Oecophoridae, including the Depressariinae, with detailed description of the species, keys, based on external characters, for the adults and beautiful and reliable drawings of male and female genitalia, a great improvement for our diagnostic possibilities. The appreciation of the genital characteristics remains difficult. Therefore it is a pity that they do not give keys based on the genitalia.

The need for reliable keys, together with the necessity of a modern treatment of the Dutch *Agonopterix* fauna, forms the motive for the present paper.



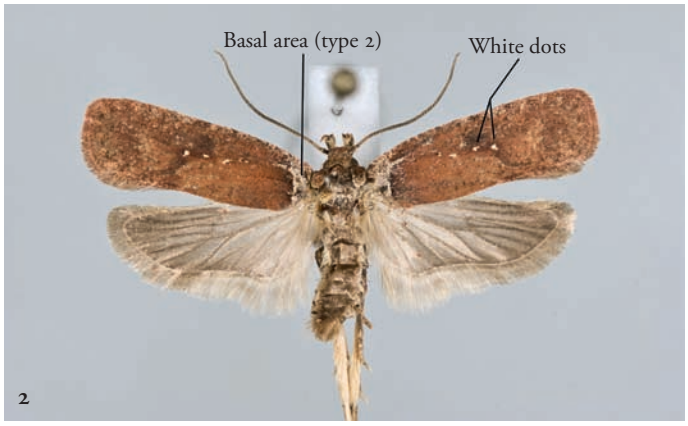




Figure 1-2.
Anatomical terminology.
Figuur 1-2.
Anatomische terminologie.

## MATERIAL AND METHODS

### Terminology

The used terminology is explained in figures 1-4, and some terms in the following list.

*Forewings* (**fig. 1-2**)
**Costa** Anterior margin (when mounted with spread wings).
**Dorsum** Hind margin or inner margin in the case of a specimen at rest.
**Termen** Terminal (distal) margin.
**Tornus** Corner between dorsum and termen.

The terms for various dots and other markings are explained in the section 'External morphology' and in figures 1 and 2.

*Female genitalia* (**fig. 4**)
**Height of the eighth segment** Distance between the posterior or anal (upper) and the anterior or oral (lower) edge of the segment.
**'Height' of the ostium** The distance between the anterior (oral) edge of the ostium and the anterior edge of segment 8 (in fact the height of the implantation, related to the height of segment 8).
**Lamina antevaginalis** Part of segment 8 between ostium and anterior edge.
**Lamina postvaginalis** Part of segment 8 between ostium and posterior edge.
**Width of the bursa** The transverse diameter of the bursa.
**Size of the signum** In general the transverse (longest) diameter.

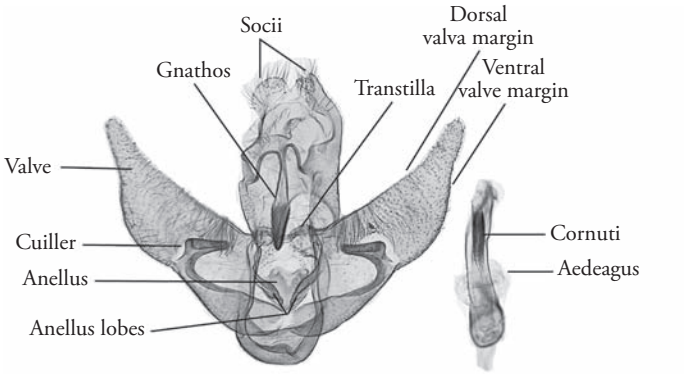



Figure 3. Anatomical terminology of the male genitalia.
Figuur 3. Anatomische terminologie van de mannelijke genitalia.

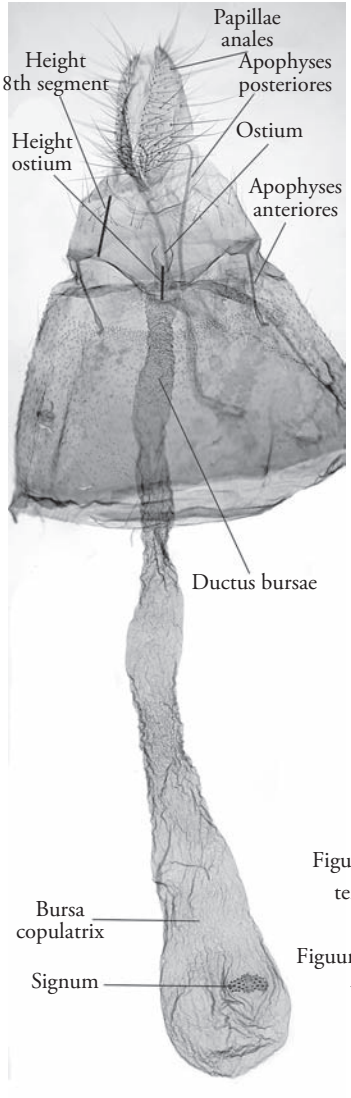



Figure 4. Anatomical terminology of the female genitalia.
Figuur 4. Anatomische terminologie van de vrouwelijke genitalia.

The terms 'height, high, low, upward and downward' in the description of the genitalia are in this paper used for mere practical reasons. They are based on the usual way of illustrating the genitalia, not on anatomical correct positions.

**Genitalia dissection**

Genitalia were dissected as described by Robinson (1976) and Brown (1997). To highlight the sclerotised parts, male genitalia were stained with orange G, sclerotised parts of the female genitalia were also stained with orange G, and less sclerotised parts were stained with chlorazol black. Genitalia were embedded on the slide in euparal.

**Photographs**

Macro photographs of the moths were taken with a Nikon D80 camera, fitted with a105 mm/ f2.8 DAF Micro Nikkor lens. Moths were illuminated in a light-box by a circular, full spectrum fluorescent lamp. The light-box measures 35×35×35 cm; the sides and roof are made of 'hammered' aluminium which disperses light; the bottom is covered with a white sheet of paper. The moths were staged on a glass screen and placed centrally in the light-box, approximately 10 cm above the bottom, to avoid shadows. Photographs were processed digitally with Adobe Photoshop CS3.

Microphotographs of the genitalia were made with a Nikon D300 camera, mounted on a Olympus BH-2 microscope. The magnification changed in relation to the size of the genitalia.

The camera was computer controlled with camera Control Pro software from Nikon. Photographs were stored directly on the hard disk of the PC. Processing of the photographs was done with Adobe Photoshop CS4. Female genitalia figures were assembled from several photographs, using the stitching option in Adobe Photoshop CS4. Finally to obtain higher contrast all genitalia illustrations were converted to grey scale.

**Maps and diagrams**

The distribution maps and the diagrams were compiled from the data in 'Noctua', the faunistic database of Lepidoptera in the Netherlands, managed by the Werkgroep Vlinderfaunistiek (WVF in short, working group Lepidoptera faunistics, European Invertebrate Survey, the Netherlands) and De Vlinderstichting (Butterfly Conservation The Netherlands), daily manager Willem Ellis.

The maps and the diagrams with the number of observed specimens per ten day period are based on the data of about 4300 specimens, seen by the author. They originate from the collections of NCB Naturalis in Leiden (now incorporating the former Leiden collections and the former Zoological Museum Amsterdam), Natuurmuseum Fryslan in Leeuwarden and from many larger or smaller private collections (from A. Cox, C. Gielis, F. Groenen, K.J. Huisman, J.C. Koster, J. van Vuure and J. Wolschrijn), supplemented with about 1075 reliable field observations. For the rarest species the number of specimens was too low to permit a graphical representation of the phenology.

The data for the distribution maps are divided over three periods, before 1950 (□), 1950-1979 (○) and 1980-2009 (●).

In the flight diagrams the ten day period with the highest number of specimens is set to 100 and the other periods are given as a percentage of the highest number.
The methods for the calculation of the abundance can be found on the website 'Vlindernet' (Ellis 2011).

## SYSTEMATICS

**The genus *Agonopterix***

The genus *Agonopterix* Hübner, 1825 is the largest of the five genera of the subfamily Depressarinae, occurring in the Netherlands. Some authors treat this group as a separate family, the Depressariidae (e.g. Hannemann 1995), others as a subfamily of the Oecophoridae (Bradley et al. 1972, Harper et al. 2002), but nowadays the most cited taxonomic position is as a subfamily of the Elachistidae (Hodges 1998, Van Nieukerken et al. 2011). As the Depressariinae themselves form a well-defined group, we can here disregard the higher classification.
In the Netherlands the genus *Agonopterix* has 23 indigenous species, *Depressaria* Haworth, 1811 (13 species), *Levipalpus* Hannemann, 1953 (one species), *Luquetia* Leraut, 1991 (one species) and *Semioscopis* Hübner, 1825 (three species).

In general we can say that recognising the subfamily is relatively easy, in contrast with the identification of the species in the genera *Agonopterix* and *Depressaria*. As to the differentiation from the Oecophorinae, all Depressariinae, with the exception of the genus *Luquetia,* possess ocelli and in the male a spiny gnathos. Within the subfamily the genera can be separated by the presence of tufts of raised scales on the forewing (*Luquetia*) and by the absence (*Semioscopis*) or presence (the other genera) of a pecten on the antennal scape. Of practical importance is the differentiation between *Agonopterix* and *Depressaria*, as mistakes are not infrequent. In *Agonopterix* the veins CuA1 (vein 3) and CuA2 (vein 2) of the forewing are stalked, in *Depressaria* they arise separately from the cell. Examination of wing venation is by many people considered difficult and therefore often not checked. However, in this case it is not hard at all. By viewing the underside of the forewing, and sometimes also the upper side, with a good hand lens and with oblique lightning and by gradually changing the point of view, with a little patience and experience it is nearly always possible to see the stalked veins. At least one can notice the

curved path, more distally, of the stalked veins in *Agonopterix* or the stretched path of CuA2 with a more proximal origin in *Depressaria*.

## EXTERNAL MORPHOLOGY

Head with ocelli. Antennae about three-quarters of forewing. Scape with pecten. Labial palp long and recurved; segment 3 shorter than segment 2, smooth-scaled and often with dark rings. Segment 2 rough-scaled, brush-like frontally.

Forewings rather long and of moderate width. Termen rounded, not or hardly oblique. Apex rounded, sometimes more or less square, exceptionally even subfalcate. Hindwings broad, ovate, with distinct, somewhat protruding, but rounded anal angle. At rest, the wings are positioned in a characteristic way: laying flat over the abdomen, with one forewing folded over the other.

The forewings have some common or at least frequently found markings (fig. 1, 2). Many species have a dark patch in the distal part of the midcell, clearly defined or cloudy, round or triangular. This patch is hereafter called 'the dark blotch' (fig. 1, 7). More proximal in the midcell are placed two little black dots, the upper one nearer to the base than the lower: 'the oblique dots' (fig. 1, 28). Of diagnostic importance is the presence or absence of one or two white dots in the midcell between the oblique dots and the dark blotch or eventually at the position of the dark blotch (fig. 2, 10). In a small number of species a pale angulated fascia in the outer third of the wing, so typical for the genus *Depressaria*, is faintly visible.

At the base of the wing a marked basal area is often found: more or less paler coloured and bordered by a band of dark scales, running upwards from the dorsum. Just above the middle of the wing this band can turn sideways with a rounded arc, for a short distance running parallel with the costa. The paler colour then also flows out along the costa. This is here called 'basal area, type 1' (fig. 1, 14). In other species the band runs upwards, nearly reaching the costa, or, when eventually turning sideways, then higher and with a less rounded angle: 'type 2' (fig. 2, 12). Finally there is a group of species where the basal area is not separated from the rest of the forewing; at most there is a little black dot just above the dorsum. This is 'type 3' (fig. 15, 26).

At the end of the veins on the termen little black dots may be present: the terminal dots (fig. 1, 7).

Hindwings with short fringe, longer at the anal angle. Fringe sometimes with two or more darker lines, running parallel to the border of the wing. Abdomen dorso-ventrally flattened.

## GENITALIA

The genitalia of males and females within the genus are rather uniform.

**Male genitalia (fig. 3)**
Valves oblong, with moderate and gradual variation in length and width. In the usual positioning on slides they are folded sideways and in most cases slightly bent upward, more or less tapering, but nearly always with rounded tip. The sacculus ends in a free projection, directed towards the costa, the cuiller or clasper. The cuiller is varying in form and is an important diagnostic feature. A projection at the base of the sacculus (clavus), as often found in the genus *Depressaria*, is absent in *Agonopterix*.

The transtilla is a rather narrow band, sometimes medially broadened more or less abruptly (fig. 38). Anellus on both sides with lobes of varying shapes, sometimes resembling a small knob, in other cases a long fold. Socii well developed. Uncus a small prominence between them. Gnathos placed on two long arms, round, oval or elongated, sometimes nearly cylindrical, always spiny. Aedeagus (phallus) in general rather short and thick, in some cases more slender, in the majority of species with a bunch of sometimes very tiny cornuti.

**Female genitalia (fig. 4)**
Papillae anales generally with a considerable number of irregularly placed long hairs.
Segment 8 simply built; the dimensions vary between the species. In many species there are more or less developed sclerotic folds, mostly as a semicircle below or besides the ostium. Ostium also simply built, placed at a higher or lower level on sternum 8. This position is of diagnostic value.
Ductus bursae long or short, with some variation in width. There is only one Dutch species with sclerotization in the ductus (*A. curvipunctosa*).
Bursa copulatrix mostly ovate, strongly varying in size, with a single signum. This signum is large or small, round, ovate or subquadrate, with large or with small triangular teeth.

## BIOLOGY

**Life history, hostplants and larval feeding**
Adult specimens of the genus *Agonopterix* occur throughout the year, but with a peak in late summer and autumn. There is only one generation. The majority of the species hibernate as adults. An exception is *A. assimilella* which hibernates as young larva. Harper et al. (2002) state that hibernation as adults is known from nearly 60% of the British species. They suppose that the other species overwinter as egg. The dates we have collected from the Netherlands suggest that this is not always the case. From *A. cnicella* and *A. conterminella* there are sporadic observations of adults in spring. Actual oviposition in the autumn has not been observed. The question needs further investigation.

The flight diagrams (fig. 78-96) intend to give an impression of the usual behaviour of the species. At first sight some flight diagrams appear to suggest the existence of two generations. The data of the larvae show that there is only one generation, so it is likely that there are two periods of activity of the adults, one in the autumn and one, sometimes surprisingly long, in the spring. Under favourable weather conditions some species are even more or less active during the winter months, such as *A. heracliana*. Some species are found throughout the year. The probable explanation is the long duration of life of the adults and lack of complete synchronisation in development. When reading the diagrams it must be kept in mind that collecting activity is lower in winter than in summer.

The moths are night active and fly more or less readily to light, but for many species dedicated search for caterpillars is one of the best ways to obtain biological and faunistic information. They are often easy to find and easy to rear. Good examples of this practice are the recent findings of *A. cnicella* and *A. nanatella* (Van Haaften 2010, Wijker in prep.)

Hostplants are mainly herbaceous plants and small bushes, only two species feed on *Salix* sp. From the remaining species occurring in the Netherlands eight feed on Apiaceae, seven on Asteraceae, four on Fabaceae, one on Hypericaceae and the hostplant of one species is uncertain. The larvae, living on Apiaceae are rather polyphagous within that family. Within the Asteraceae, *Agonopterix* species feed mainly on thistles and *Centaurea* species, in the Fabaceae on the brooms, *Cytisus* and *Genista*. Most larvae feed on the leaves, spinning them together to a tube or in spun shoot. When young, most larvae start feeding by mining a leaf. They soon emerge from the mine and continue feeding within the spun leaves or shoots. Only the species feeding on thistles generally have a longer mining period; those of *A. nanatella* on *Carlina vulgaris* mine even for the largest part of their larval life. The larvae of *A. assimilella* start mining in a stem, hibernate there and feed in the spring between spun stems. There are no Dutch species feeding on flowers. Pupating takes place in a cocoon, on the ground between detritus or just under the soil surface. The hibernating adults are hidden in dense cover, wood stacks, scrub, thatch, or even indoors.

There is little known about economic interest of the genus. Hannemann (1995) mentions damage in the culture of artichoke (*Cynara cardunculus* var. *scolymus*) by the larvae of *A. subpropinquella*.

Table 1. Abundance of the Dutch species of the genus *Agonopterix* over 12 periods.
Tabel 1. Abundantie van de Nederlandse soorten van het genus *Agonopterix* over 12 perioden.

| | 1850-1924 | 1925-1949 | 1950-1959 | 1960-1969 | 1970-1974 | 1975-1979 | 1980-1984 | 1985-1989 | 1990-1994 | 1995-1999 | 2000-2004 | 2005-2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *A. alstromeriana* | 52 | 1 | 0 | 2 | 0 | 2 | 2 | 2 | 6 | 0.6 | 0.4 | 0.4 |
| *A. angelicella* | 31 | 7 | 0 | 3 | 0 | 8 | 0 | 4 | 2 | 1 | 0.2 | 0.2 |
| *A. arenella* | 47 | 19 | 6 | 10 | 23 | 38 | 33 | 32 | 51 | 27 | 30 | 13 |
| *A. assimilella* | 48 | 34 | 0 | 1 | 5 | 4 | 0,6 | 4 | 5 | 1 | 0.4 | 0.3 |
| *A. ciliella* | 46 | 15 | 2 | 11 | 3 | 5 | 4 | 8 | 6 | 7 | 4 | 0.7 |
| *A. cnicella* | 5 | 6 | 0 | 5 | 4 | 1 | 4 | 2 | 0.7 | 0.3 | 0.6 | 1 |
| *A. conterminella* | 35 | 12 | 3 | 25 | 1 | 5 | 5 | 12 | 11 | 2 | 7 | 2 |
| *A. curvipunctosa* | 8 | 11 | 0 | 0 | 1 | 0 | 5 | 3 | 0.4 | 0 | 0 | 0.1 |
| *A. heracliana* | 125 | 98 | 34 | 43 | 54 | 94 | 82 | 109 | 89 | 37 | 39 | 21 |
| *A. kaekeritziana* | 17 | 10 | 7 | 3 | 3 | 0 | 8 | 3 | 0.4 | 0.4 | 0.7 | 0.7 |
| *A. laterella* | 43 | 12 | 2 | 0 | 18 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| *A. liturosa* | 3 | 7 | 0 | 2 | 11 | 1 | 2 | 1 | 0 | 0.4 | 0.2 | 0.2 |
| *A. nanatella* | 3 | 0 | 0 | 0 | 0 | 0 | 0.6 | 0.6 | 0 | 0 | 0 | 0 |
| *A. nervosa* | 27 | 46 | 0.1 | 16 | 21 | 40 | 14 | 19 | 19 | 4 | 0.7 | 0.6 |
| *A. ocellana* | 68 | 42 | 3 | 12 | 20 | 24 | 24 | 32 | 36 | 19 | 14 | 8 |
| *A. oinochroa* | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *A. pallorella* | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *A. propinquella* | 32 | 17 | 65 | 14 | 8 | 18 | 22 | 22 | 29 | 7 | 18 | 12 |
| *A. purpurea* | 23 | 3 | 2 | 1 | 1 | 1 | 2 | 0.6 | 3 | 1 | 1 | 2 |
| *A. scopariella* | 26 | 7 | 4 | 5 | 4 | 10 | 7 | 5 | 21 | 6 | 5 | 2 |
| *A. subpropinquella* | 56 | 28 | 18 | 11 | 3 | 1 | 17 | 24 | 15 | 5 | 6 | 0.8 |
| *A. umbellana* | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.2 | 0 | 0 |
| *A. yeatiana* | 87 | 47 | 15 | 18 | 13 | 17 | 9 | 36 | 19 | 14 | 15 | 6 |

For all species some specific data on the biology are given. Unfortunately, there are rather few accurate and systematically documented data available on larvae and hostplants in the Netherlands. Most biological data are therefore taken from Harper et al. (2002) and compared with the situation in the Netherlands, unless otherwise stated.

**Changes in abundance**

From table 1 it can be concluded that nearly all species have declined in numbers (see Ellis (2011) for the method). Only *A. heracliana* and *A. arenella* and to a lesser degree *A. nervosa*, *A. ocellana*, *A. propinquella* and *A. yeatiana* remain stable and common species. *Agonopterix oinochroa* and *A. pallorella* disappeared from the Netherlands, *A. laterella* probably also. This fits the general pattern of decline of the Lepidoptera fauna in the Netherlands (Groenendijk & Ellis 2011). However, this is more a statement than an explanation. In our opinion there is a multitude of causes that could play a varying part in the decline of various species. In the case of *A. laterella* it is evident that the disappearance of the cornflower (*Centaurea cyanus*) from our fields has

caused the decline of the moth. *Agonopterix alstromeriana* lives on hemlock (*Conium maculatum*), a plant that is only locally common. Besides, the search for caterpillars is the easiest way to find this species. Therefore the abundance of this species is more depending on collector's activity than in other species in the genus. The same applies to *A. umbellana*. The hostplant *Ulex europaeus* is a rare and very local plant in the Netherlands. Still, this can not be the explanation for the rarity of *A. curvipunctosa* or the fluctuating abundance of *A. purpurea*, species that feed on common plants. It is plausible to think that the changing climate plays an important role here. Even if this is true, it does not explain the mechanisms behind the changes. Yet it is good to keep it in mind and to continue our search for the principal causes.

## KEYS AND SPECIES DESCRIPTIONS

Most species show a wide range of variation and many of the characters that are necessary for the identification show gradual transitions between the species. Only a very small number of characters is either present or absent, and thus easy to score. The keys are based on a broad range of variability, but it is nearly impossible to take into account all extremes.

Many species of *Agonopterix*, at least the typical forms of them, can be recognised on external characters. The author is grateful he had the opportunity to make use of the key, based on external characters, of Harper et al. (2002). This key has served as a base for the key presented here, with some changes and adaptations to the Dutch situation. When identifying on the basis of external characters, it is strongly recommended to use specimens that are as fresh as possible. In cases of doubt it is always recommended to dissect the genitalia. Concerning the keys for the genitalia it was very important to find the most useful diagnostic criteria. Van Laar (1964) uses in the males the sudden widening of the transtilla as the main character. This is not advisable because of the strong intraspecific variation of this character. The cuiller has been chosen as a fairly constant diagnostic character. Of course there remains a group of species in which further characters are needed. These were found in the shape of the valves, in the anellus lobes and in the gnathos.

In the females it is more difficult to find constant and consistent diagnostic characters. The sclerotic lines in segment 8 have been chosen as one of the few 'present-or-absent-features'. Only in exceptional cases this will fail. The position of the ostium is another important character. This runs parallel with the distinction between lamella antevaginalis and postvaginalis by van Laar (1961) and by Hannemann (1995), but these authors do not give an indication how to measure the lamella postvaginalis exactly. In the practice of identification this results in many errors. The shape of the ostium and of segment 8 can be helpful characters.
A conspicuous feature is the size and the shape of the signum. As the size varies and gradually increases, this is unfortunately only useful under certain conditions and chiefly in the more extreme cases. One must keep in mind that the key for the female genitalia is based on typical specimens. In fact one cannot give a satisfactory key for all specimens and for all species. Diagnosis is based on a combination of external and genitalia characters by a process of elimination.
In the description of the species emphasis has not been laid on completeness, but more on the diagnostic characters.

## CHECKLIST

At the start of our study 24 species of *Agonopterix* were known from the Netherlands (Kuchlein & De Vos 1999). In the course of our research we discovered that all specimens until now identified as *A. atomella*, proved to be *A. assimilella* and that *A. capreolella* comprised a mixture of species, but no correctly identified *A. capreolella*.
The majority of these belonged to *A. oinochroa*, here recorded for the first time. The rest proved to be *A. heracliana* and *Depressaria pimpinellae* Zeller, 1839.

Therefore we remove *A. atomella* and *A. capreolella* from the Dutch list and add *A. oinochroa*. As both *A. atomella* and *A. capreolella* are known from all neighbouring countries, the occurrence in the Netherlands cannot be excluded. In order to facilitate correct identification we include both species in the keys and also give a brief description. Because of the lack of reliably identified foreign specimens of *A. capreolella* in the studied collections, we have refrained from figuring the adult and genitalia. If necessary, one should consult the excellent figures by Harper et al. (2002).
This leads to the following checklist of the Dutch *Agonopterix* species, with addition of two potential Dutch species. As we have no really satisfying classification of the species within the genus, we have chosen the alphabetical sequence.

Agonopterix Hübner, 1825
alstromeriana (Clerck, 1759)
angelicella (Hübner, 1813)
arenella (Denis & Schiffermüller, 1775)
assimilella (Treitschke, 1832)
ciliella (Stainton, 1849)
cnicella (Treitschke, 1832)
conterminella (Zeller, 1839)
curvipunctosa (Haworth, 1811)
    *zephyrella* (Hübner, 1813)
heracliana (Linnaeus, 1758)
    *applana* (Fabricius, 1798)
kaekeritziana (Linnaeus, 1767)
    *liturella* (Denis & Schiffermüller, 1775)
    *flavella* (Hübner, 1796)
laterella (Denis & Schiffermüller, 1775)
liturosa (Haworth, 1811)
    *liturella* (Hübner, 1796), nec Denis & Schiffermüller, 1775
    *hypericella* auct., nec Hübner, 1816
    *huebneri* Bradley, 1966
nanatella (Stainton, 1849)
nervosa (Haworth, 1811)
    *costosa* (Haworth, 1811)
ocellana (Fabricius, 1775)
oinochroa (Turati, 1879)
pallorella (Zeller, 1839)
propinquella (Treitschke, 1835)
purpurea (Haworth, 1811)
scopariella (Von Heinemann, 1870)
subpropinquella (Stainton, 1849)
umbellana (Fabricius, 1794)
    *ulicetella* sensu Schnack, nec Stainton, 1849
yeatiana (Fabricius, 1781)

**Excluded species**
atomella (Denis & Schiffermüller, 1775)
    *pulverella* (Hübner, 1825)
capreolella (Zeller, 1839)

Figure 5-28. Habitus of the Dutch *Agonopteryx* species.
Figuur 5-28. Habitus van de Nederlandse *Agonopteryx*-soorten.

5. A. alstromeriana

6. A. angelicella

7. A. arenella

8. A. assimilella

9. A. atomella

10. A. ciliella

11. A. cnicella

12. A. conterminella

13. A. curvipunctosa

14. A. heracliana

15. A. kaekeritziana

16. A. laterella

17. A. liturosa

18. A. nanatella

19. A. nervosa

20. A. ocellana

21. A. oinochroa

22. A. pallorella

23. A. propinquella

24. A. purpurea

25. A. scopariella

26. A. subpropinquella

27. A. umbellana

28. A. yeatiana

**KEYS**

**Key based on external characters**

| | | |
|---|---|---|
| 1 | Forewing dark purplish or purplish brown. Basal area type 2 (sometimes less distinct, more like type 3) (fig. 12) | **2** |
| – | Forewing coloured different. Basal area type 1, 2 or 3; when forewing dark, then generally type 1 | **4** |
| 2 (1) | Wingspan 11-15 mm | **purpurea** |
| – | Wingspan 17-21 mm | **3** |
| 3 (2) | Tegula dark purplish brown, contrasting with the buff thorax. Palp: segment 2 anterior side light-coloured, segment 3 yellowish white with dark tip | **liturosa** |
| – | Tegula and thorax concolorous, brownish. Palp brown | **conterminella (part)** |
| 4 (1) | Forewing with apex subfalcate. Terminal cilia in apical half darker, pink to purplish brown, tornal half buff | **nervosa** |
| – | Forewing otherwise | **5** |
| 5 (4) | Forewing with veins dark-lined (fig. 27) | **6** |
| – | Forewing with veins not dark-lined | **7** |
| 6 (5 ) | Forewing faintly dark-lined. Disc with small dark blotch and a white dot beneath it, more distal. Oblique dots clearly present | **yeatiana (some specimens)** |
| – | Forewing generally more strongly dark-lined. Disc without dark blotch and white dot. Of the oblique dots only the lower present | **umbellana** |
| 7 (5 ) | Forewing at least with one whitish dot in disc (sometimes obscure) (fig. 14) | **8** |
| – | Forewing without any whitish dots in disc (fig. 26) | **19** |
| 8 (7) | Forewing with some red marks in disc under the dark blotch (fig. 20) | **9** |
| – | Forewing without red marks; dark blotch present or absent | 10 |
| 9 (8 ) | Head, thorax and ground colour forewings whitish grey. Wingspan 16-18 mm. Dark blotch large, touching the costa | **alstromeriana** |
| – | Head, thorax and ground colour of the forewings yellowish grey or sometimes darker. Wingspan 20-24 mm | **ocellana** |
| 10 (8 ) | Segment 3 of labial palp entirely buff | **atomella (part)** |
| – | Segment 3 of palp with one or more dark bands or mottled with fuscous scales beneath | **11** |
| 11 (10) | Forewing with one white or whitish dot in disc (fig. 28) | **12** |
| – | Forewing with more than one white or whitish dot in disc (fig. 11) | **14** |
| 12 (11) | Forewing dull dark brownish fuscous. Segment 3 of palp with one broad dark band; extreme tip pale. Oblique dots generally united, forming a distinct black streak | **conterminella (part)** |
| – | Forewing buff or greyish. Segment 3 of palp with two dark fuscous bands. Oblique dots not or not clearly united | **13** |
| 13 (12) | Forewing greyish, greyish brown or brown. 16-17 mm | **curvipunctosa (some specimens)** |
| – | Forewing buff. 18-22 mm | **yeatiana (part)** |
| 14 (11) | Basal area type 1. Oblique dots black, more or less pronounced (fig. 10) | **15** |
| – | Basal area type 2. Oblique dots obscure. Wings often with a mixture of black, reddish brown and white scales. White dots in cell often more or less red-bordered | **cnicella** |
| 15 (14) | Smaller species, 14-18 mm. Rather uniformly coloured and marked (fig. 21) | **16** |
| – | On average larger species, 16-23 mm, often with more vivid markings | **17** |
| 16 (15) | Small species, 14-16 mm. Forewings greyish brown; basal area clear. Hindwing dark grey | **capreolella** |

– Wingspan 15-18 mm. Forewings uniformly dark brown with two white dots in disc on 3/5 and 4/5, small red-bordered, sometimes unclear. Basal area faint. Hindwing paler grey ..... **oinochroa**

17 (15) Forewing with outer two-thirds of costa and apical half of termen straight; apex square. Forewing rather smoothly coloured ..... **scopariella**

– Forewing with costa gently arched; apex rounded. Termen gently rounded. Forewing more roughly and often vividly coloured ..... **18**

18 (17) On average the largest species, 20-23 mm. Forewing generally vividly coloured, reddish or yellowish brown. Hindwing cilia more or less pink-tinged, with five fuscous ciliary lines ..... **ciliella**

– More variable in size and colour. 17-22 mm. Forewing more roughly coloured, from yellowish brown to dark brown, clearly marked or uniform. Hindwing with ciliary lines less distinct; usually three of them visible ..... **heracliana**

19 (7) Foreleg with upper aspect of tibia and tarsus uniformly dark fuscous or black. Pale yellowish buff species ..... **20**

– Foreleg otherwise; generally buff or brown. Forewing darker buff or brown ..... **21**

20 (19) Forewing yellowish buff, variously mixed with orange or ferruginous scales, (exceptionally without any trace of them) and marked with black dots and a cloudy blotch near the tornus ..... **kaekeritziana**

– Forewing buff without red scales, marked with small black dots and a fuscous streak parallel to the dorsum Always a small black dot at the base, just above the ... **dorsum pallorella**

21 (19) Segment 3 of labial palp entirely buff ..... **22**

– Segment 3 with dark rings or sometimes with scattered dark scales ..... **23**

22 (21) Forewing with a dark blotch, more or less extending toward tornus by a cloudy streak. Basal area type 2 ..... **angelicella**

– Forewing without dark blotch or only with a shade of it. Basal area indistinct . **atomella (part)**

23 (21) Forewing with dark blotch in disc (fig. 7) ..... **24**

– Forewing without dark blotch (fig. 18) ..... **29**

24 (23) Forewing with faint dark blotch at 2/3 of disc, in most cases with small extension toward tornus. Forewing pale buff, mostly with a discrete mottled appearance ..... **assimilella**

– Forewing and blotch otherwise. Blotch placed more medially ..... **25**

25 (24) Basal area type 1 (fig. 7) ..... **26**

– Basal area type 3 (fig. 18) ..... **28**

26 (25) Forewing buff, irregularly suffused brown. Markings distinct. Clear fuscous dots along costa. Sometimes a short and tiny fuscous streak along a part of vein M1 ..... **arenella**

– Forewing otherwise, more greyish or reddish brown and with faint dots along the costa ..... **27**

27 (26) Forewing more evenly coloured, greyish or yellowish brown. Dark blotch pronounced, round. Few other markings ..... **propinquella (part)**

– Forewing ochreous brown or reddish brown, mottled with tiny black dots. Dark blotch cloudy, often triangular ..... **laterella**

28 (25) Small buff species, 14-17 mm. Segment 3 of palp with some scattered dark scales and buff tip. Dark blotch hardly visible, if present ..... **nanatella (some specimens)**

– Larger species, 18-22 mm. ochreous or reddish brown. Palp with dark rings. Dark blotch cloudy, but clearly visible ..... **subpropinquella (part)**

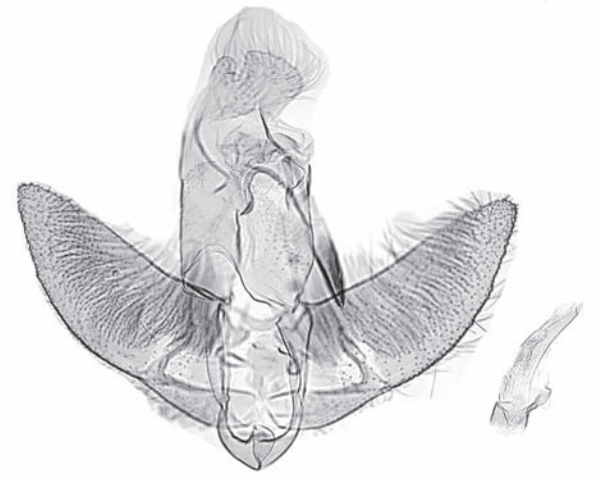
29 (23) Basal area type 1 (fig. 13) ..... **30**

– Basal area type 3 (fig. 18) ..... **31**

**30 (29)** Forewing with a row of blackish terminal dots.
Forewing less greyish ..... **propinquella (some specimens)**
– Forewing without terminal dots (sometimes with faint brown or blackish brown dots). Forewing more greyish and delicately mottled.
Oblique dots elongate ..... **curvipunctosa (part)**
**31 (29)** Larger species, 18-22 mm, ochreous or reddish brown.
Segment 3 of palp with dark rings. Terminal dots inconspicuous, but in most cases present ..... **subpropinquella (some specimens)**
– Small buff species, 14-17 mm. Segment 3 without rings, but with some scattered dark scales. Terminal dots absent ..... **nanatella (part)**

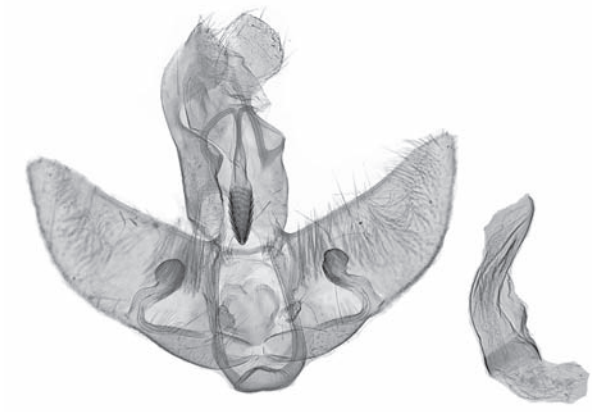
Figure 29-53. Male genitalia of the Dutch *Agonopteryx* species.
Figuur 29-53. Mannelijke genitalia van de Nederlandse *Agonopteryx*-soorten.

29. A. alstromeriana

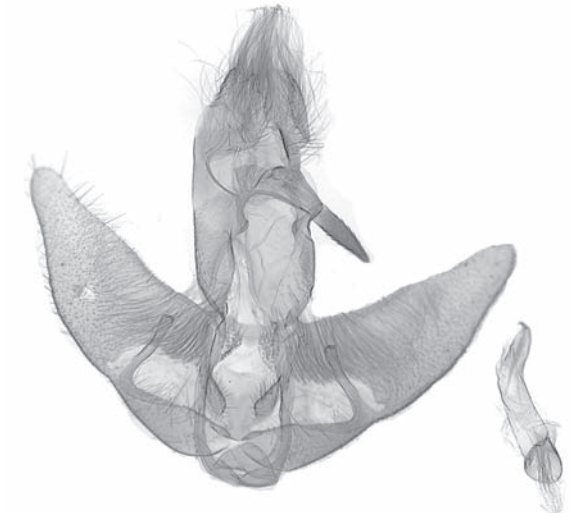


30. A. angelicella

31. A. arenella

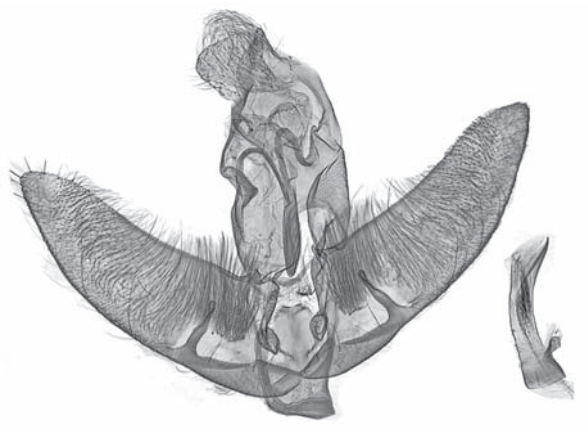


32. A. assimilella

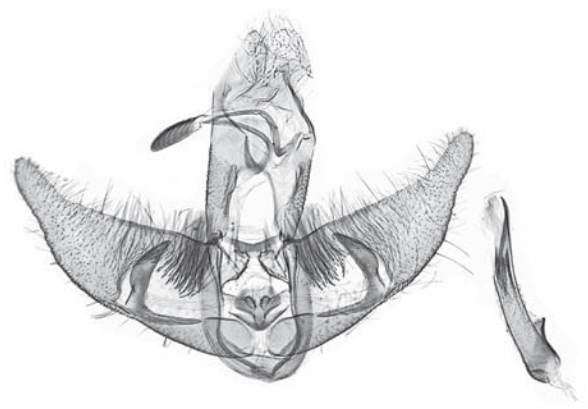


33. A. atomella

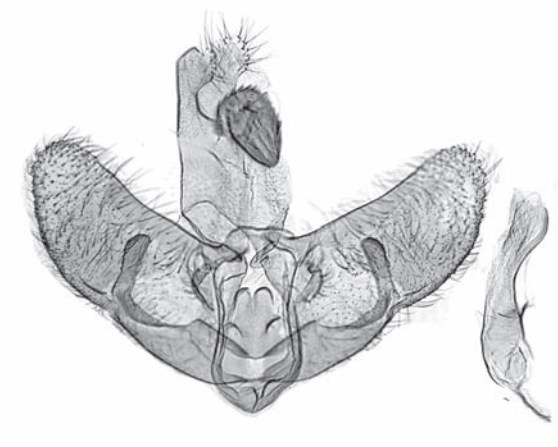
34. A. ciliella



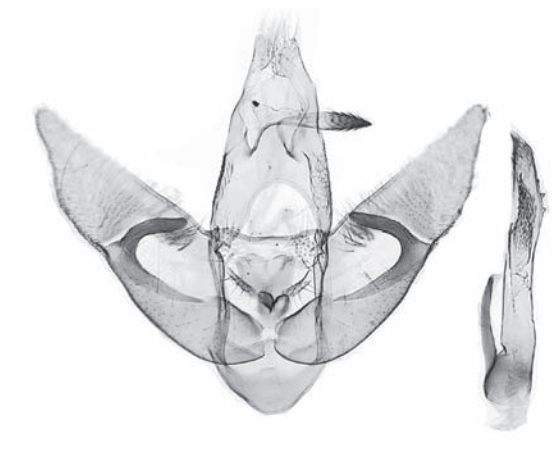
35. A. cnicella



36. A. conterminella



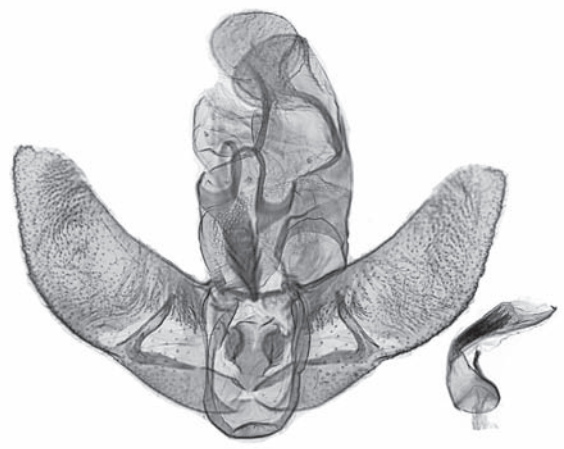
37. A. curvipunctosa



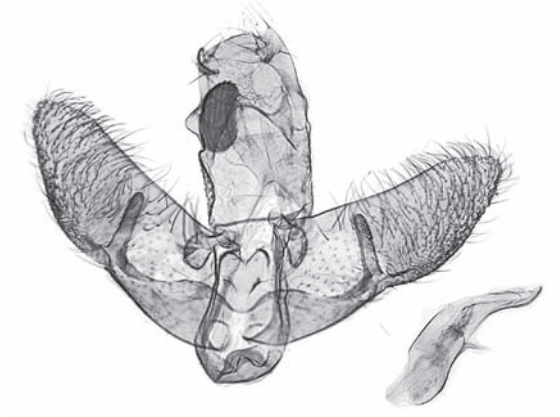
38. A. heracliana

39. A. kaekeritziana

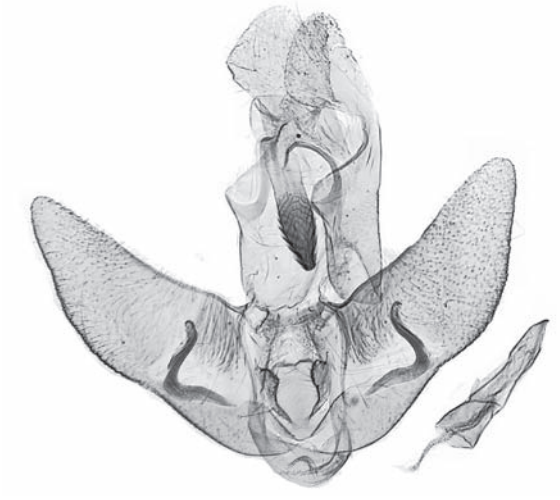
40. A. laterella



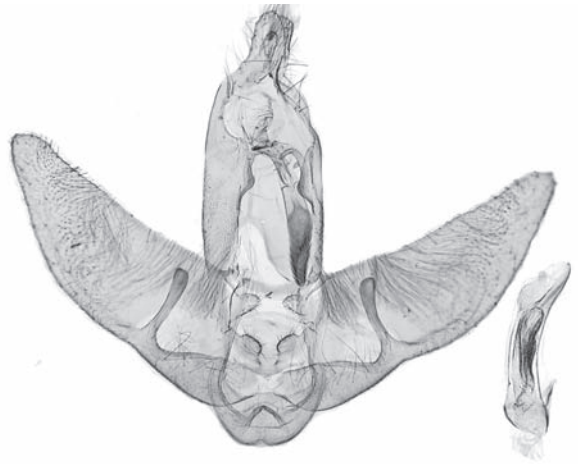
41. A. liturosa



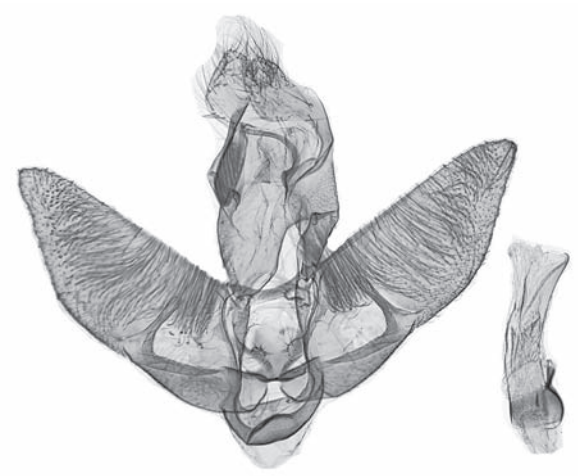
42. A. nanatella



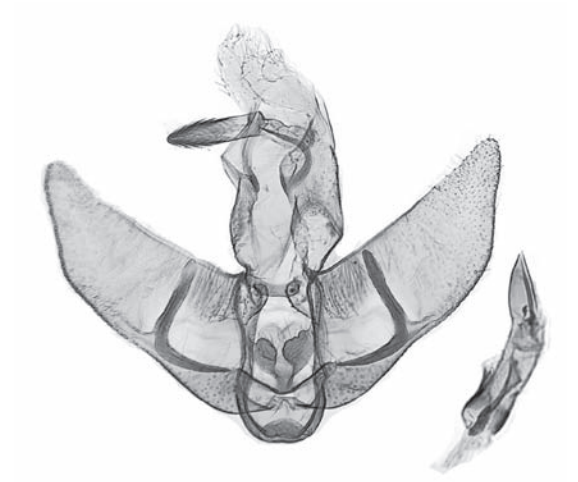
43. A. nervosa



44. A. ocellana

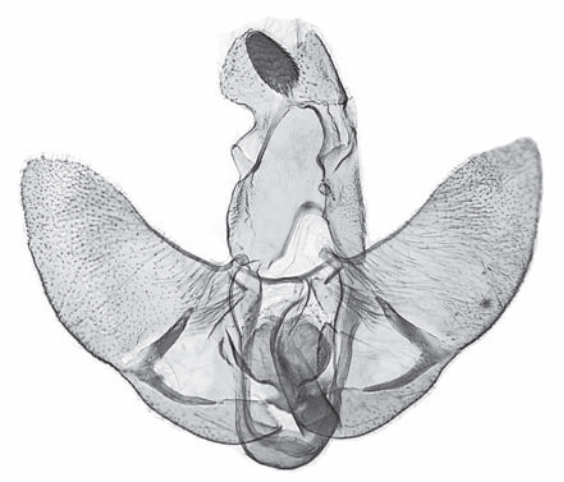


45. A. oinochroa

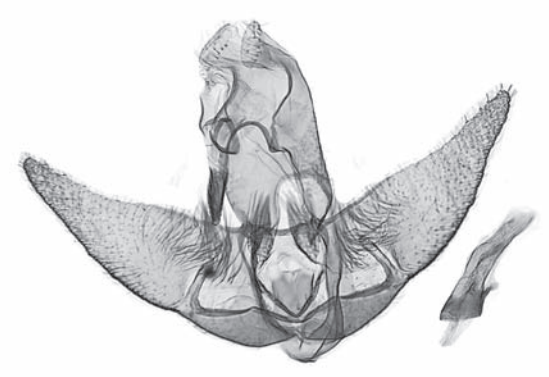


46. A. pallorella

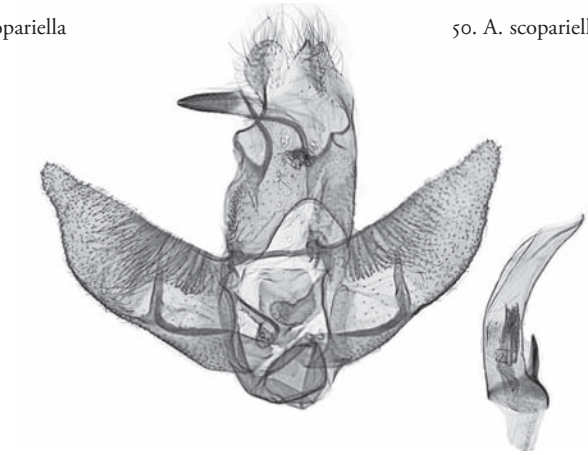
47. A. propinquella



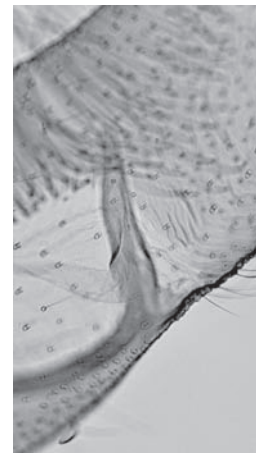
48. A. purpurea



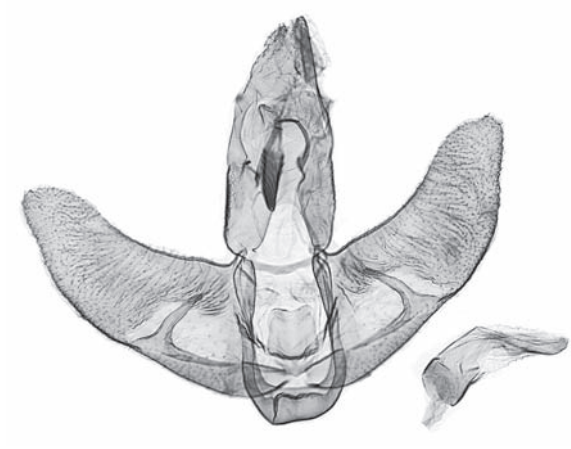
49. A. scopariella



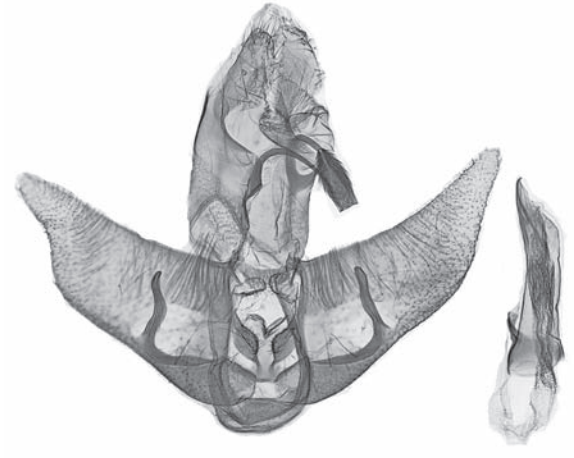
50. A. scopariella, detail



51. A. subpropinquella



52. A. umbellana



53. A. yeatiana

**Key based on male genitalia**

| | | |
|---|---|---|
| 1 | Gnathos rhomboidal, more or less asymmetrical. Cuiller straight or only slightly bent; distal fifth longitudinally striated, but with almost smooth tip. Aedeagus slender, rather long | **angelicella** |
| – | Gnathos otherwise, oval or conical, symmetrical. Cuiller otherwise; not striated. Aedeagus generally less slender | **2** |
| 2 (1) | Cuiller above the comparatively narrow base notably enlarged (fig. 22) | **3** |
| – | Cuiller not enlarged above base. Part of the edge of the cuiller dentate (fig. 12) | **5** |
| – | Cuiller otherwise, above base not notably enlarged; smooth edges | **8** |
| 3 (2) | Cuiller sickle-shaped and bent inward, with small base, then gradually broadening, towards tip slightly narrowing | **cnicella** |
| – | Cuiller above the narrow base abruptly thickened and angularly bent inward; in the second half gradually narrowing | **yeatiana** |
| | Cuiller otherwise, with thickened tip | **4** |
| 4 (3) | Cuiller with rather broad base, narrower in the middle, tip much broadened, axe-like. Valves slightly narrowing at tip | **arenella** |
| – | Cuiller with narrow base, the second half much broadened and directed obliquely sideward. Valves a little more narrowed toward tip | **pallorella** |
| – | Cuiller with narrow base and thickened, club-like tip. Valves strongly narrowing toward tip | **capreolella** |
| 5 (2) | Cuiller only at the tip with small knobs and trenches. Cuiller rather stout and with slightly broadened tip | **assimilella** |
| – | Cuiller laterally dentate or with grooves | **6** |
| 6 (5 ) | Cuiller slightly curved, laterally dentate only in the middle. Gnathos slender, conical or cylindrical. Valves rather narrow | **alstromeriana (part)** |
| – | Cuiller straight, more dentate or grooved laterally. Gnathos broadly oval | 7 |
| 7 (6) | Cuiller stout. Valves rather short and broad. | **conterminella** |
| – | Cuiller less stout, dentations of lateral margin less distinct. Valves more narrowed toward tip | **liturosa** |

**8 (2)** Cuiller upright at lower edge of valve. Cuiller straight and regular, nearly equally broad at all levels (fig. 20) ..... **9**

– Cuiller otherwise; not all these characteristics combined ..... **10**
The difference between both alternatives is not absolute; when in doubt follow both.
See also 20.

**9 (8 )** Cuiller broad and stout, length 2/3 of valval width. Valves long and moderately broad. Anellus lobes rather broad, knob-like ..... **ocellana**
Width of cuiller strongly varying within this species. The cuiller in our photograph belongs to the narrower group, as well as the figure in Harper et al. (2002).

– Cuiller length 2/3 of valval width as well, but narrower. Valves of moderate width, but shorter. Anellus lobes rather broad and long, trunk-like ..... **scopariella (part)**

– Cuiller narrower and shorter, length slightly more than ½ of valval width Valves narrow, pointed and short. Anellus lobes narrow ..... **purpurea**

**10 (8 )** Cuiller more or less sinuate or twisted (fig. 14) ..... **11**

– Cuiller not sinuate or twisted ..... **14**

**11 (10)** Valves long, hardly bent upward, hardly tapering to the tip. Gnathos long, nearly cylindrical. Anellus lobes knob-like (fig. 34) ..... **12**

– Valves shorter, more or less broad, more bent upward and narrower at the tip. Gnathos oval. Anellus lobes long and broad (fig. 39) ..... **13**

**12 (11)** Cuiller distinctly sinuate. Valves slightly more than twice as long as wide. Transtilla much broadened in middle ..... **heracliana**

– Cuiller less sinuate, distal half twisted. Valves more than 2.5 times as long as wide. Transtilla in general less broadened ..... **ciliella**
These species are closely related and sometimes difficult to differentiate.

**13 (11)** Valves broad, at tip moderately narrowed, caused mainly by a gradual curving of ventral margin of valve. Cuiller long, 4/5 of valval width ..... **kaekeritziana**
In this species the form of the cuiller can vary strongly.

– Valves less broad, strongly tapering toward tip by more abrupt curving of ventral margin ..... **umbellana**

**14 (10)** Cuiller relatively long, nearly reaching dorsal margin of valve (fig. 45) ..... **15**

– Cuiller shorter, less than 4/5 width of valve (fig. 50) ..... **17**

**15 (14)** Cuiller solid, slightly bent inward, reaching to or beyond dorsal margin Valves narrow, directed obliquely upward. Aedeagus long and slender, with pair of broad teeth dorsally ..... **curvipunctosa**

– Cuiller relatively shorter. Valves and aedeagus otherwise ..... **16**

**16 (15)** Cuiller slender and long, nearly reaching dorsal margin, regularly, but very slightly, bent outward. Valves gradually tapering to tip. Anellus lobes trunk-like ..... **atomella**

– Cuiller longer, just reaching dorsal margin; straight or in some specimens gently bent outward. Valves narrower, more abruptly tapering to tip. Anellus lobes broader ..... **oinochroa**

**17 (14)** Cuiller regularly and distinctly bent outward (fig. 43) ..... **18**

– Cuiller otherwise, straight, bent inward or irregularly and faintly bent outward (fig. 51, 47) **19**
Consider also 18a.

**18 (17)** Cuiller stout, rather long, with clear-cut, regular edges, regularly curved outward; exceptionally hardly curved. Base slender, cuiller then very gradually broadened toward tip. Valves rather large. Gnathos long, conical ..... **nervosa**

– Cuiller smaller, less clear-cut; in some cases sinuate; tip with sclerotic edge. Valves rather narrow ..... **nanatella**

**19 (17)** Cuiller straight, but not regularly shaped. Species with narrower valves and knobbed anellus lobes (fig. 49) ..... **20**

– Cuiller within the species varying in direction, but never fully straight. Species with valves slightly broader and with long, narrow anellus lobes (fig. 51) ..... **21**

**20 (19)** Cuiller straight, upright, just below middle slightly broadened, often angulated. At that place often an oblique, sclerotised line (fig. 50). Valves rather narrow, with more or less pointed tip. Anellus lobes distinct, trunk-like. Transtilla a narrow band. Aedeagus stout ..... **scopariella (part)**

– Cuiller straight, distal fifth narrowed by an indentation at the inner edge. Valves moderately long, with wide truncated tip. Anellus lobes like a large knob ..... **laterella**

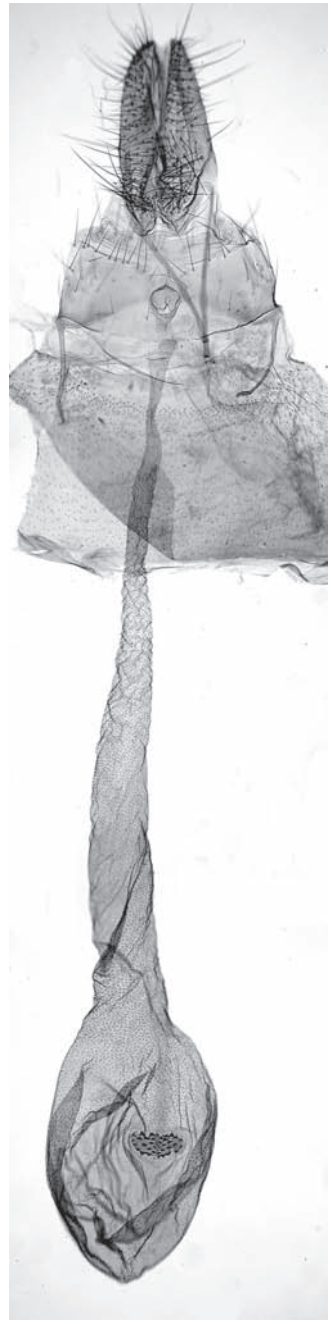
– Cuiller generally upright, sometimes slightly bent outward, medially regularly broadened. Valves not pointed. Transtilla slightly broadened in the midst. Anellus lobes medium-sized knobs. Aedeagus small ..... **alstromeriana (part)**

**21 (19)** Cuiller upright or directed outward. Valves broad (our *Agonopterix* with the broadest valves). Gnathos oval. Anellus lobes of moderate length and rather narrow ..... **propinquella**

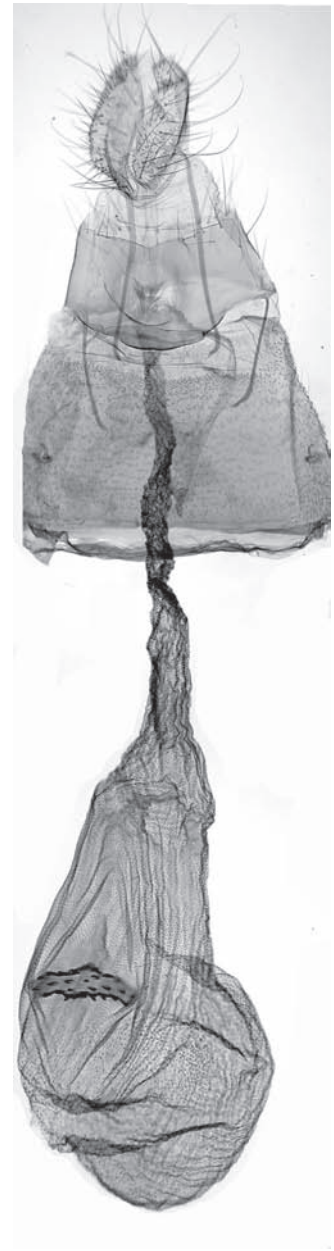
– Cuiller sometimes more or less upright, but generally bent inward, in some specimens very strongly. Valves slightly narrower than valves of *propinquella*, more bent upward. Gnathos narrowly conical. Anellus lobes characteristically long and narrow ..... **subpropinquella**

Figure 54-77. Female genitalia of the Dutch *Agonopteryx* species.
Figuur 54-77. Vrouwelijke genitalia van de Nederlandse *Agonopteryx*-soorten.

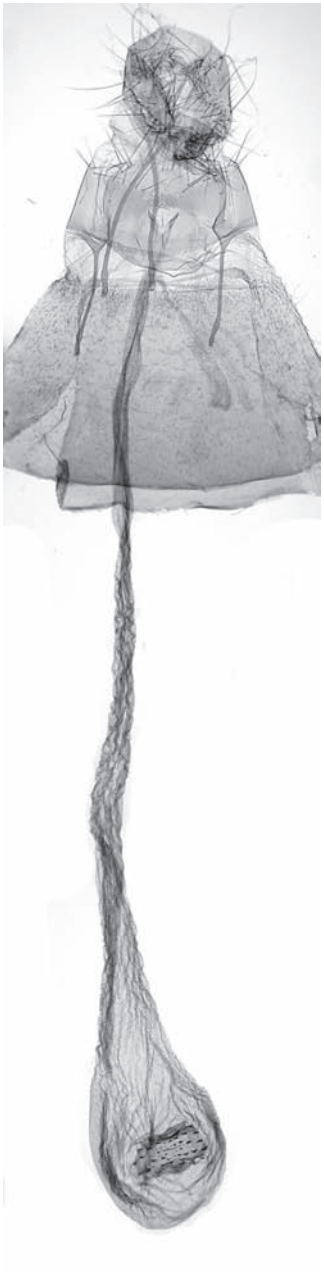
54. A. alstromeriana



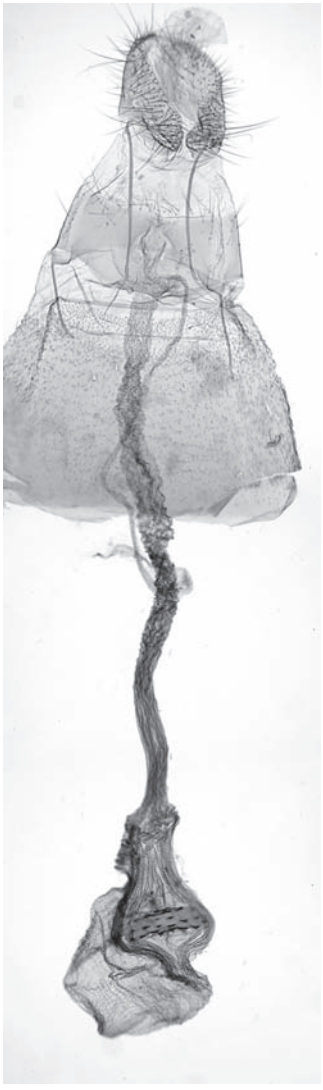
55. A. angelicella



56. A. arenella



57. A. assimilella



58. A. atomella

59. A. ciliella

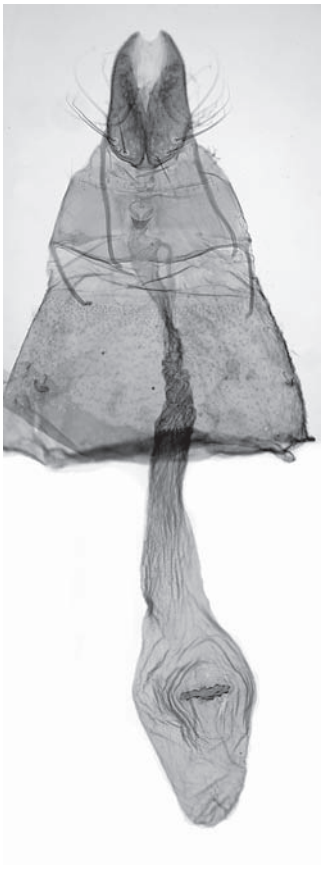
60. A. cnicella

61. A. conterminella

62. A. curvipunctosa

63. A. heracliana

64. A. kaekeritziana



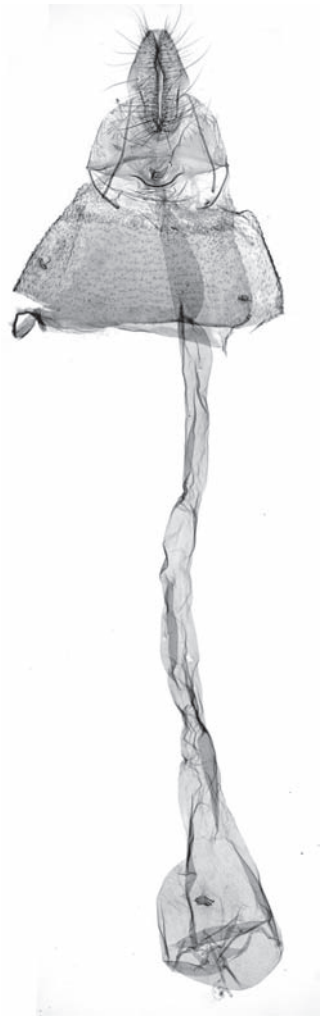
65. A. laterella

66. A. liturosa

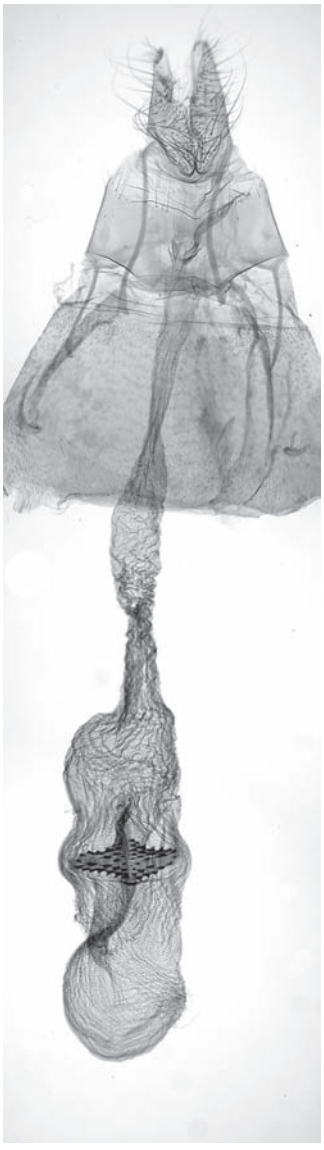
67. A. nanatella

68. A. nervosa

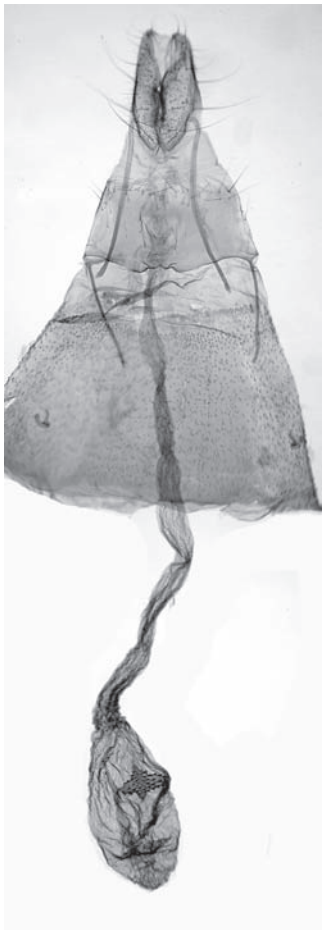
69. A. ocellana



70. A. oinochroa



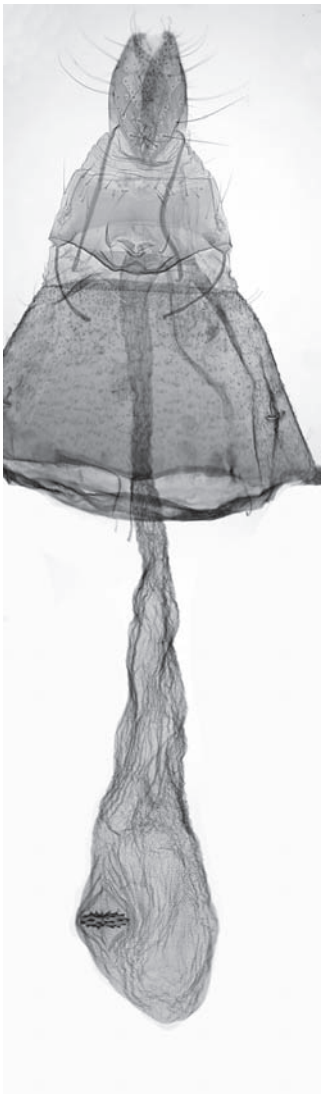
71. A. pallorella



72. A. propinquella

73. A. purpurea

74. A. scopariella



75. A. subpropinquella

76. A. umbellana

77. A. yeatiana

**Key based on female genitalia**

| | |
|---|---|
| 1 | Papillae anales almost completely without hairs, except a regular row of 6-8 long hairs at anterior edge ..... **laterella** |
| – | Papillae anales covered with hairs, not in rows (fig. 59) ..... **2** |
| 2 (1) | Ductus with sclerotization: whole antrum and left wall of most distal part of ductus sclerotised. Signum a very flat disc ..... **curvipunctosa** |
| – | Ductus without sclerotization ..... **3** |
| 3 (2) | Segment 8 with special structures: lobes or sclerotic folds below or beside the ostium (fig. 74) ..... **4** |
| – | Eighth segment without special structures (fig. 55) ..... **12** |
| 4 (3) | Below the ostium an arc-like sclerotic fold, either short or long, thick or narrow (fig. 56) .... **5** |
| – | Other structures: differently formed folds or lobes or a combination of folds and lobes (fig. 75) ..... **9** |
| 5 (4) | The sclerotic arc situated considerably above the lower edge of segment 8, may be on a variable level (fig. 56) ..... **6** |
| – | The sclerotic arc situated just above the lower edge or overlapping it (fig. 68) ..... **8** |
| 6 (5 ) | Arc generally thick and distinct, situated halfway between ostium and lower edge. Bursa long and wide; signum large, 2/5 of width segment 8, a flat or somewhat triangular disc ..... **arenella** |
| – | Arc less distinct, level less constant. Bursa of moderate size, signum smaller ..... 7 |
| 7 (6) | Arc generally situated just at lower edge of ostium, or a little below. Bursa moderately large; signum rather small (1/5 of segment 8), rounded or a semicircle with small teeth ..... **umbellana** |
| – | Arc less distinct; level varying. Bursa of medium size; signum moderately large, 1/3-2/5 of segment 8, a flat or low triangular disc with coarse teeth ..... **cnicella (part)** |
| 8 (5 ) | Sclerotic arc thick, sometimes formed as a pure circle, sometimes as two partial arcs just above the lower edge of segment 8. Ostium and bursa broad. Signum diamond-shaped ..... **nervosa** |
| – | Sclerotic line distinct, undulate, in the midst just above the lower edge of segment 8 or overlapping it. Ductus narrow, bursa rather small. Signum small, 1/7 of segment 8, round ..... **oinochroa** |
| – | Sclerotic line thin, fully overlapping lower edge of segment 8. Signum small ..... **capreolella** |
| 9 (4) | Species with a short sclerotic arc, embedded in a great protuberance at the lower edge of segment 8, with sinuate walls. Ostium narrow and high. Bursa large. Signum rather large, 1/3-2/5 of segment 8, a broad disc ..... **scopariella** |
| – | Sclerotic lines different. No protuberance ..... **10** |
| 10 (9 ) | Sclerotic line distinct, shaped as an open trapezium on lower edge of segment 8. Ostium at low level. Bursa large. Signum medium-sized, 1/3 of segment 8, rectangular ..... **yeatiana** |
| – | Sclerotic line distinct, a flattened W, just above lower edge of segment 8. Below ostium another fold, flat W-shaped with long projections beside the ostium. Bursa elongate. Signum hardly medium-sized, about 1/4 of segment 8, flattened or round ... **subpropinquella** Sclerotization different, less distinct (fig. 72) ..... **11** |
| 11 (10) | Sclerotization formed by two short lines, running up from lower edge of segment 8, beside the antrum, obliquely upward and sideward. Ductus narrow, bursa rather small. Signum much alike kaekeritziana ..... **propinquella** |

– Sclerotization forms upper edge of two small lobes, at lower edge of segment 8 and directed to antrum. Ductus broader, bursa medium-sized. Signum medium-sized, just less than 1/3 segment 8, disc-shaped or diamond-shaped ..... **kaekeritziana**

**12 (3)** Ostium low implanted, below 1/5 height segment 8; broad (fig. 61) ..... **13**

– Ostium implanted higher, above 1/5 height segment 8; generally narrrower (fig. 57) ..... **14**

**13 (12)** Signum large, about 2/5 of width segment 8, triangular or broadly disc-shaped, coarsely dentate. Ductus broad, bursa large, hardly smaller than width segment 8. Papillae anales stout ..... **conterminella**

– Signum smaller, between 1/5 and ¼ of segment 8, more rounded, less coarsely dentate. Bursa 4/5 of width segment 8. Papillae anales less stout ..... **liturosa**

**14 (12)** Bursa large, as broad as or broader than segment 8; signum large, about 3/5 of width segment 8 ..... **ocellana**

– Bursa always smaller than segment 8, signum nearly always smaller ..... **15**

**15 (14)** Ostium high situated, above 3/5 of height segment 8. Rather small genitalia, length 3.5 mm (3/4 length mean *Agonopterix* species). Signum rather small, about ¼ of segment 8, a flat or indented disc ..... **nanatella**

– Ostium lower situated (fig. 63) ..... **16**

**16 (15)** Small genitalia, length 2.8 mm (2/3 of mean length). Signum small, less than 1/5 width segment 8, hemi-spherical, finely dentate ..... **purpurea**

– Genitalia larger. Signum generally less small ..... **17**

The following species can hardly be identified on female genitalia alone. The given measures have a mere indicative meaning.

**17 (16)** Signum relatively small, 0.11-0.22 width segment 8. Ostium simple, elongated oval, generally with sharp lined edges, evenly converging in posterior direction (fig. 59) ..... **18**

– Signum medium-sized, 0.21-0.33. Ostium otherwise shaped. Segment 8 rather low (fig. 55) ..... **19**

Signum larger, 0.35-0.46. Ostium rather high implanted, 0.36-0.57 height segment 8. Segment 8 higher (fig. 57) ..... **20**

**18 (17)** (Closely related species, difficult to differentiate)
Signum more or less oval or triangular, somewhat larger than signum of *A. ciliella*, but strongly varying ..... **heracliana**

– Signum rather small, rounded ..... **ciliella**

**19 (17)** Ductus rather long (4.5- 5 times width segment 8), gradually widening towards bursa. Ostium height about 0.30 height segment 8 ..... **alstromeriana**

– Ductus shorter (3-3.5 times width segment 8). Ostium height 0.35-0.40 height segment 8 ..... **angelicella**

**20 (17)** Ostium height about 0.36 height segment 8. Signum 0.35-0.39 width segment 8, flat triangular ..... **cnicella (part)**

– Implantation ostium (somewhat) higher. Signum in general more stout (fig. 57) ..... **21**

**21 (20)** Ostium height 0.41-0.57. Signum large, 0.52-0.56 width segment 8, flat rhomboidal. Bursa rather long and narrow ..... **pallorella**

– Bursa and signum otherwise ..... **22**

**22 (21)** Ostium high implanted, 0.50-0.57. Signum a large box, 0.30 width segment 8, yet stout owing to the considerable height of segment 8 ..... **assimilella**

– Ostium 0.44-0.54. Signum 0.30-0.40 width segment 8, also box-like, but less high ..... **atomella**

## *Agonopterix alstromeriana*
(fig. 5, 29, 54, 78, 97)

**Diagnosis** *A. alstromeriana* is externally one of the easiest species to recognise, with a characteristic grey ground colour and a large dark median blotch touching the costa.
The genitalia, on the contrary, have hardly any specific features. The males sometimes have a cuiller with tiny teeth laterally; female with a small bursa and a rather small signum.
**Adult** (fig. 5) Wingspan 16-18 mm. Head, palp and thorax grey. Palp segment 3 with distinct dark ring above middle, sometimes with some dark scales basally and at tip. Forewing whitish grey, clouded yellow, with dark scales in the border of basal area and in outer field. Blotch in midcell large, touching costa, reddish brown in its lower part, rounded; then upwards broadening and darkening towards costa. Oblique dots clearly visible. A row of black terminal dots is present, most distinctly just below apex. Basal area and a streak along the costa towards the dark blotch whitish. Basal area type 1.
**Male genitalia** (fig. 29) Valves medium-sized, gradually narrowing to tip. Cuiller relatively big, sometimes slightly sinuate; lateral edge in the median part occasionally with small teeth. Gnathos nearly cylindrical. Transtilla moderately enlarged in the central part. Anellus lobes medially knobbed.
**Female genitalia** (fig. 54) Segment 8 rather narrow, without special structures. Ostium implanted rather low, between ¼ and 1/3 of height of segment. Ductus varying in length from rather long to fairly short. Bursa small. Signum rather small, irregularly triangular or more flattened.
**Biology** Larva May to early July, on *Conium maculatum*, in tubes made of rolled leaflets.
In the Netherlands caterpillars were found abundantly on *Conium maculatum* in the Amsterdamse Waterleidingduinen (Dunes near Haarlem) in 2002 and 2003 (pers. comm. J. Wolschrijn). Adult August to June.

**Distribution** Local in more or less wet localities, mostly in the coastal dunes of the provinces Noord- and Zuid-Holland and more inland around the cities of Amsterdam and Rotterdam and along the larger rivers. Searching for caterpillars is perhaps the best way to discover new localities.

## *Agonopterix angelicella*
(fig. 6, 30, 55, 79, 98)

**Diagnosis** Characterized by the reddish brown ground colour and an extension of the dark blotch obliquely towards tornus. The male genitalia are easily recognizable by the rhomboid shape of the gnathos. The best characterization of the female genitalia is the lack of any special features. It is very well possible to identify typically coloured and marked specimens, but yellowish moths without the cloudy streak out of the dark blotch can give great difficulties. Exceptionally, such worn females cannot even be identified with certainty, because of the great similarity of the female genitalia of *A. angelicella* and *A. assimilella*.
**Adult** (fig. 6) Wingspan 15-19 mm. Head and thorax yellowish brown or dark reddish brown. Palp: segment 2 brown, on outer side with darker scales, segment 3 unicolorous, paler. Forewings ground colour usually reddish brown, sometimes more yellowish brown, mixed with scattered dark scales. The oblique dots less clear, often partly absent. Dark blotch placed at two-thirds of the wing. An ill-defined streak runs from dark blotch obliquely towards dorsum just before tornus, only occasionally reaching the dorsum itself. Often this streak is incomplete, but rarely fully absent. Basal area pale, type 2.
**Male genitalia** (fig. 30) Valves moderately bent upwards, somewhat narrowing towards tip. Cuiller rather robust, often with irregular margins. Tip with little trenches, not really dentate. Cuiller usually straight, sometimes slightly bent inwards or outwards. *Agonopterix angelicella* is the only Dutch species with a rhomboid gnathos. The distinct form of the gnathos is even evident

in poor slides. Anellus lobes resembling folds, in the median part more or less knobbed. Aedeagus slender.
**Female genitalia** (fig. 55) Segment 8 of medium height, without any particular structure. Ostium implanted rather high, just below middle of segment. Ductus fairly long. Bursa medium sized, signum rather small, like a moderately dentated semicircle.
**Biology** Larva May, June. The main hostplant is *Angelica sylvestris*. Less often the caterpillar is found on *Heracleum sphondylium* and *Peucedanum palustre*. Also recorded from other Apiaceae: *Pimpinella*, *Pastinaca*, *Angelica* and *Aegopodium* (Hannemann 1995). In the Netherlands reared from *Angelica sylvestris* (collections J. Wolschrijn, C. Doets). The caterpillars live from the middle of May gregariously in groups of ten to twenty specimens on young plants in a large web.
For rearing purpose it is wise to collect these webs early June (pers. comm. J. Wolschrijn). Adult end June to late August, exceptionally in May.
**Distribution** More or less local in wet areas, along the larger rivers and in the south of Limburg.

### *Agonopterix arenella*
(fig. 7, 31, 56, 80, 99)

**Diagnosis** A robust species, vividly marked, bright yellow with distinct spots along the costa and a cloudy darkening, especially in the outer area. The male genitalia are characterized by the typical, club-like cuiller, the female genitalia by a distinctly sclerotised, curved line below the ostium.
**Adult** (fig. 7) Wingspan 17-21 mm. Head and thorax yellowish ochreous. Palp yellow; segment 3 with black base, a broad black ring at 2/3 and a small dark tip. Ground colour forewing bright ochreous yellow, with tiny black speckling and yellowish brown cloudy little spots all over the wing, but mainly in the outer third. Along costa a row of dark spots. Oblique dots and dark blotch distinct. Basal area type 1.
**Male genitalia** (fig. 31) Valves rather broad, only slightly bent. Cuiller robust, at base slightly thickened, then for a small distance narrower and with distal half much broadened and rounded. Gnathos long, oval. Transtilla not broadened. Anellus lobes with oval knobs. Aedeagus large.
**Female genitalia** (fig. 56) Segment 8 very broad. Ostium implanted relatively high. Halfway between ostium and lower margin of segment a distinct, sclerotised arc. Ductus not long. Bursa large. Signum large, shaped as a broad disk or a strongly flattened globe, coarsely dentate.
**Biology** Larva May to July, on various Asteraceae: *Cirsium* and *Carduus* sp., *Arctium* sp. and *Centaurea* sp. Also recorded from *Carlina*, *Sonchus* and *Knautia* (Dipsacaceae) (Hannemann 1995, Palm 1989). In our country caterpillars have been found on *Carlina vulgaris* (pers. comm. A. Wijker), *Arctium lappa*, *Centaurea jacea*, *Cirsium arvense* and *Onopordum acanthium* (reared by C. Doets). Adult mainly from August to October and after hibernation from April to June, but in fact the moth can be found throughout the year. The spring activity seems to be at least as extensive as the activity in the autumn.
**Distribution** Found all over the country, in many localities common.

### *Agonopterix assimilella*
(fig. 8, 32, 57, 81, 100)

**Diagnosis** The forewings are dull yellow or ochreous and rather densely sprinkled with small dark dots, giving them a mottled appearance. This, together with the faint dark extension of the dark blotch towards the tornus, is the most reliable feature in recognising the species. The male genitalia are distinguished by the dentation of the cuiller tip. The female genitalia are unspecific, the signum is rather stout. In our country *A. assimilella* has often been confused with other species, in particular with *A. atomella* and with the pale form of *A. angelicella*. *Agonopterix atomella* has no dark scales on palp segment 3, the forewings are darker ochreous with only a shade of a

dark blotch; in *A. angelicella* the forewings are more reddish brown and a diffuse dark sprinkling is absent. Unfortunately these characters are often indistinct and then the dissection of the genitalia is necessary.

**Adult** (fig. 8) Wingspan 15-19 mm. Head, palp and thorax yellowish. Palp segment 3 just below the tip with a small dark ring; not infrequently only a few darker scales of this ring remain. Forewing dull ochreous, rather densely irrorate with small blackish brown scales, forming a kind of regular network. The pair of oblique dots present, but only upper one distinct. Blotch in disc ill-defined, dark rusty brown, sometimes hardly visible. An extension of this blotch runs like a short streak in the direction of the tornus, sometimes halfway, usually less far. Often only a trace of it is discernable. In exceptional cases just below the blotch some red scales. Specimens with cloudy thickening of network and dark blotch also occur. Basal area, if present, pale, yellowish, often hardly visible; type 1.

**Male genitalia** (fig. 32) Valves rather long, gradually narrowing with small, rounded tip. Cuiller moderately slender, rather long, slightly bent outwards, on tip a cap of small teeth. Gnathos long-drawn, nearly cylindrical. Anellus lobes resembling long, stretched, oval knobs. Transtilla narrow, rarely thickened in middle part.

**Female genitalia** (fig. 57) Segment 8 broad, without peculiar structures. Ostium implanted high, in middle of segment. Ductus long. Bursa of average size. Signum moderately large, rather high and box-like.

**Biology** The caterpillar feeds on common broom (*Cytisus scoparius*), September to May. Also found on *Genista* sp. (Lvovski 1981). In the Netherlands often reared from common broom. Hibernates as a young larva in the stem and lives in March and April between spun stems. Adult: end May to early September, exceptionally earlier in spring.

**Distribution** Found all over the country where broom grows, hence mainly in the dunes and on sandy grounds of the east, the centre and the south of the Netherlands, generally not abundant.

### *Agonopteryx ciliella*

(fig. 10, 34, 59, 82, 101)

**Diagnosis** The species is very similar to *A. heracliana*. The wings of both species are brownish with two white dots in the disc. *Agonopterix ciliella* generally is slightly larger and more warmly and vividly coloured, more reddish brown. Hindwings cilia faintly pink-tinged, with five dark lines, whereas *A. heracliana* has three lines, often obscure. More unicolorous specimens, the dull brown and the smaller ones are mostly *A. heracliana*. Male genitalia with long and nearly straight valves; cuiller distinctly sinuate in *A. heracliana*, slightly sinuate and more twisted in *A. ciliella*. Transtilla in the middle considerably (*A. heracliana*) or moderately (*A. ciliella*) thickened. Females with a long ductus and a small or rather small signum. The female genitalia of *A. ciliella* and *A. heracliana* are very much the same. There is a slight difference in the signum: that of *A. ciliella* is usually small and round, that of *A. heracliana* a little bit larger and more oval or irregularly shaped, the eighth segment of *A. heracliana* is slightly higher, but there is a great overlap and often it is impossible to differentiate between them.

**Adult** (fig. 10) Wingspan 20-23 mm. Head and thorax brown. Palp yellow, segment 2 with dark scales on outer side, segment 3 with two broad black rings. Forewing ground colour yellowish brown or reddish brown, mixed with darker, blackish brown scales. Pale angulated fascia often visible. Basal area and a narrow field along costa somewhat paler coloured. Basal area type 1. Costa and termen maculated. In disc, beyond midway, two white dots, usually clearly visible. The oblique dots often with white scales on outer side. The wings, on account of colour and markings, give a vivid impression. In hindwing cilia five dark lines, parallel to margin. Basal and two exterior ciliary lines usually rather distinctly visible, preferably viewed with oblique lightning, at anal angle of wing, but lines 2 and 3 often less clear.

**Male genitalia** (fig. 34) Valves long, not very broad, hardly bent upwards, hardly narrowing

toward tip. Cuiller somewhat sinuate, above middle twisted on its long axis. Gnathos long, oval, nearly cylindrical. Transtilla somewhat broadening towards middle. Aedeagus rather long.
**Female genitalia** (fig. 59) Few specific features. Segment 8 rather narrow, lower margin slightly undulating, ostium at 1/3. Ductus rather long, broadening towards bursa. Bursa of average size, elongate. Signum small, generally round, but frequently oval or flattened.
**Biology** Caterpillar head brown or blackish. From May until early August on a broad range of plants from the family Apiaceae, particularly *Angelica sylvestris*, *Pastinaca sativa* and *Heracleum sphondylium*. In our country reared from *Heracleum sphondylium* and *Angelica sylvestris* (pers. comm. J. Wolschrijn), *Anthriscus sylvestris* and *Peucedanum palustre* (collection C. Doets). Adult found throughout the year, but most numerous from April to October with a maximum in September and the end of April.
**Distribution** Found throughout the whole country, though not yet recorded from all provinces, but much less common than *A. heracliana*.
**Remarks** *Agonopterix ciliella* and *A. heracliana* are very close and difficult to identify. Many of the diagnostic characters are highly variable and do not always correlate. For our country there is a great need of well-documented reared specimens of which the genitalia are checked. DNA barcoding may be another way to study the value of the relevant differences.

## *Agonopterix cnicella*
(fig. 11, 35, 60, 83, 102)

**Diagnosis** Typical specimens are easily recognizable by the warm brownish ground colour, contrasting with the light coloured basal area of type 2 and the distinct white dots with a faint red edging. The male genitalia possess a very characteristic sickle-shaped cuiller. The female genitalia can be recognized by a sclerotised arc below the ostium.

**Adult** (fig. 11) Wingspan 18-21 mm. Palp yellowish grey, segment 2 with darker reddish brown scales, segment 3 with black ring at base and narrower ring at 2/3. Collar, thorax and tegulae reddish brown. Forewing ground colour warm brown, reddish brown or sometimes darker, slightly purplish or olive brown. Basal area light, greyish, generally sharply bordered, type 2. White dots in disc clear, edged by scattered red scales, outer one generally larger than the median. On the place of the oblique dots sometimes an elongated white dot. Overall the wings make a unicolorous impression. Specimens with aberrant colours or markings exist, with less distinct basal area, rarely type 1, or with indistinct white dots.
**Male genitalia** (fig. 35) Valves in outer half strongly narrowing, sometimes gradually, often more abrupt. Cuiller typical: large, just above base much broadened and then sickle-shaped bent inwards and gradually tapering. Gnathos elongated oval. Transtilla sometimes broadened. Aedeagus rather long and slender.
**Female genitalia** (fig. 60) Segment 8 moderately broad, ostium about 1/3. Between ostium and lower margin of segment 8 at varying height an arched, sclerotised semi-circle, in general clearly visible, sometimes almost absent. Ductus of average length. Bursa rather large. Signum: size just above the average, a low triangle or more a flattened disk.
**Biology** Larva: May to early June between spun leaves of *Eryngium* sp. In our country mainly found on *Eryngium campestre*, which is locally common, especially near the rivers. Sea holly *E. maritimum* is more restricted to the yellow dunes close to the sea, and only locally abundant, but where it grows, caterpillars are usually present. On a small piece of sand with abundant growth of sea-holly the caterpillars were found in numbers (Muus & Corver 2011, pers. comm. T. Muus). Adult mainly from the end of June to September, with irregular records in April and May, but the number of our data is low. Hibernation as adult is not confirmed by Harper et al (2002) and Hannemann (1995). The species often comes readily to light, but this is not everywhere the case.

**Distribution** The species is naturally limited by the occurrence of the hostplants. *Eryngium campestre* is found along the coast, mainly in the Delta area and along the larger rivers. The moths have been caught at some places in the dunes in Zuid- and Noord-Holland and along the larger rivers (Van Haaften & Verhoeven 2010).
We expect that the species will also be found in Zeeland; on the neighbouring isle of Goeree-Overflakkee at any rate the moth is not rare.

### *Agonopterix conterminella*
(fig. 12, 36, 61, 84, 103)

**Diagnosis** Recognizable by the combination of a dark brown or purplish brown ground colour and a curved black mark, the connection between the oblique dots. This mark is also found in other species of the genus, but seldom as clear and as constant as in *A. conterminella*. This species is similar to *A. liturosa*, but the forewings are more dull and unicolorous and the thorax and palpi are darker. In the male genitalia the stout, straight cuiller is conspicuous and the gnathos is broader than in most other species; in the female the very low-placed ostium and the large signum are significant. Distinguished from *A. liturosa* in the male genitalia by the stronger dentation of the cuiller and the slightly larger valves and cuiller, in the female by the slightly larger papillae anales and particularly by the larger signum.
**Adult** (fig. 12) Wingspan 17-21 mm. Palp yellowish grey, segment 2 on outer side strongly dark scaled, segment 3 at base slight, below tip broad and diffusely darkened, so diffuse that it hardly gives the impression of a ring. Thorax brown, more or less darkened, patagia darker. Sometimes thorax paler, greyish or greyish brown, but generally darker than *A. liturosa*. Forewings rather unicolorous, dark brown, sometimes with a shade of purple. Oblique dots connected, forming a slightly curved black mark, often with some light-coloured scales laterally. Distally another small black dot or tiny line and eventually a faint yellowish grey point. Costa faintly maculated. In specimens with paler wings, there is a trace of the angulated fascia in the marginal field. Basal area not clearly marked, bordered by a yellowish line, type 2. A specimen, bred by C. Doets, has the forewings monotonous ochreous-grey. All specimens of this reared series are rather pale coloured.
**Male genitalia** (fig. 36) Valves short, comparatively broad. Cuiller big, straight, often slightly broadening to tip; outer margin dentate, especially upper half. Width of cuiller somewhat varying. Gnathos broadly oval. Anellus lobes only visible as clear, sclerotic arcs. Upper edge of anellus also sclerotised. Aedeagus big.
**Female genitalia** (fig. 61) Papillae anales large. Segment 8 moderately high. Ostium implanted low, just above lower margin of segment. Ductus broad. Bursa large. Signum large, a flattened half-ball, sometimes more triangular.
**Biology** Caterpillar in May on a wide variety of *Salix* sp. In our dunes often found on *Salix repens* (pers. comm. J. Wolschrijn). Adult from the end of June to September and, less frequently, in April and May. Obviously the species hibernates as adult. This corresponds with the statement of Hannemann (1995), but does not match with the British dates (Harper et al. 2002).
**Distribution** Found all over the country, mostly along the coast, along the larger rivers and in wet areas.

### *Agonopterix curvipunctosa*
(fig. 13, 37, 62, 85, 104)

**Diagnosis** The species is more or less distinguishable by the light greyish brown or yellowish brown forewings, speckled with darker scales, giving them a somewhat granulated appearance, and by the dots along the costa. Oblique dots nearly always elongated. The male genitalia are very recognizable by the narrow valves, directed obliquely upwards, with a long cuiller and also by the teeth of the long aedeagus. The female has a unique sclerotization in the antrum and in the beginning of the ductus.

**Adult** (fig. 13) Wingspan 16-18 mm. Palp greyish, head and thorax brown or greyish brown. Palp segment 3 pale yellowish grey, with darker ring at base, varying in size and with broad ring in upper half. Tip yellowish grey. Forewing brownish grey, sometimes with a more yellowish brown tone, regularly sprinkled with tiny, dark greyish brown dots, giving wing a granular aspect. Costa with row of distinct blackish brown dots, most conspicuous towards apex. Oblique dots are of the same colour; often they are elongated or even connected. Sometimes an additional dark point in the disc more lateral, exceptionally a white dot. Very seldom dark blotch present. Basal area type 1.
**Male genitalia** (fig. 37) Valves narrow, directed obliquely upwards, gradually narrowing to tip. Cuiller relatively robust, long, at least reaching dorsal margin of valves, rather regularly bent inwards. Gnathos very narrowly oval. Anellus lobes touching one another, upper edge medially slightly sclerotised. Aedeagus long, slender, generally straight; dorsally with one or two teeth.
**Female genitalia** (fig. 62) Segment 8 rather narrow. Ostium just above 1/3. Antrum sclerotised. The sclerotization is continuing in proximal part of ductus in the form of an oval patch on the left side. Bursa relatively large. Signum a flat, slightly curved disk. *Agonopterix curvipunctosa* is the only Dutch species with sclerotization in antrum and ductus.
**Biology** According to the English literature (Harper et al. 2002) the caterpillar is found on *Anthriscus* sp. and *Chaerophyllum temulum*, according to Palm (1989) also on *Angelica* sp. Adult July to June next year. The few Dutch data suggest that the spring activity is nearly as great as that in the autumn.
**Distribution** This rare species has been observed mainly along the coast, chiefly the northern part. There are old records from 's Gravenhage and Zandvoort. More recently the moth has been found on Terschelling (leg. Zumkehr) and a number of specimens in Ried (Friesland) (leg C. Gielis). In 1994 the species was also found in Papenvoort (Drenthe) (leg. Witmond) and in 2009 in Dalfsen (Overijssel) (leg. Goutbeek).

## *Agonopterix heracliana*
(fig. 14, 38, 63, 86, 105)

**Diagnosis** This is the most common Dutch species and at the same time the most variable one. Yet in most cases it is possible to identify it externally by the combination of the ground colour, brown in varying shades, and a somewhat dull, dirty appearance. Of importance are the two white dots in the disc, often distinct, sometimes only discernible by focussed searching. The male genitalia can give a definitive identification by the long, rather straight valves, the sinuate cuiller and the thickened transtilla. The most prominent, but unspecific features of the female genitalia are segment 8 without sclerotization, the simple ostium and the long bursa with a moderately small signum. The moth can be confused with many others, from *A. capreolella* and *oinochroa* to *A. ciliella*, *cnicella*, *conterminella*, *laterella*, *scopariella* and *subpropinquella*. It is important to note the presence or absence of white dots, dark blotch and basal area and the quality of the ground colour. In the case of the differentiation from *A. scopariella*, it is necessary to pay attention to the form of the forewing, but in individual specimens the pointed apex of the latter is not always obvious. Most difficult is the differentiation from *A. ciliella*. The relevant differences are treated under that species. The ground colour is warmer brown and slightly more vivid in *A. ciliella*, specimens of *A. heracliana* are somewhat smaller and often duller and rough-coloured. The fringes of the hind wings of *A. ciliella* have five ciliary lines, of *A. heracliana* three, often indistinct, but this difference is gradual. Differentiation on external characters is sometimes arbitrary; the male genitalia offer in the majority of cases reasonable certainty, but the females can give great problems. The differences, referred to in literature, were not constantly found in our genital slides.
**Adult** (fig. 14) Head and thorax dark brown. Palp greyish brown, segment 2 dark scaled at outer side. Segment 3 with two sharp marked black rings, distal one broad, tip light coloured, extreme tip black. Forewing brown, lighter or darker,

sometimes unicolorous, sometimes more diverse with a dispersion of lighter coloured scales. Nearly always the moth is somewhat untidy-looking. In disc two white dots, edged by black scales. In a few cases more laterally yet another white point. Although the white dots are rather often indistinct, yet nearly always something can be found of them. Oblique black dots present, sometimes elongated, in latter case with some white scales laterally Only a shade of a dark blotch in the disc. In more marked specimens the marginal field can be darkened with at the inner border a shade of the light angulated fascia. Basal area type 1; not always clearly visible. Hindwing with 3 ciliary lines, one basally and two more distally, often obscure.

**Male genitalia** (fig. 38) Valves long, hardly bent upward, but slightly narrowing towards tip. Valves a fraction shorter than in *A. ciliella*. Cuiller clearly sinuate. Gnathos nearly cylindrical. Transtilla in middle abruptly and considerably enlarged, more than is the case in *A. ciliella*. Aedeagus slender, of average length.

**Female genitalia** (fig. 63) Segment 8 moderately narrow without specific structures. Lower margin below ostium often projecting as an inverted trapezium. Ostium simply formed, narrow, oval, implanted at 1/3. Ductus rather long. Bursa of average size. Signum smaller than usual in the genus, but generally larger than that in *A. ciliella*, varying in form from round and flattened to elongate oval or triangular.

**Biology** Caterpillar found on a variety of plants of the family *Apiaceae*, particularly on *Anthriscus sylvestris*, *Chaerophyllum temulum* and *Heracleum sphondylium*, but also on *Angelica sylvestris*, *Pastinaca sativa* and many others. In the Netherlands the moth has been reared from *Aegopodium podagraria*, *Angelica sylvestris*, *Anthriscus sylvestris*, *Chaerophyllum temulum*, *Conium maculatum*, *Heracleum sphondylium* and *Pastinaca sativa* (leg. J. Wolschrijn, C. Doets, E.J. van Nieukerken). Caterpillar: head greenish, sometimes greenish black. May to the beginning of August. Adult: from July to June. In fact the species can be found in all months throughout the year. There is a remarkable activity in the spring and even in the winter months under favourable weather conditions.

**Distribution** Found throughout the whole country, in most places common.

### *Agonopterix kaekeritziana*

(fig. 15, 39, 64, 87, 106)

**Diagnosis** A striking light coloured species, bright, pale yellow, with few black marks. Fore- and midlegs dark. Male genitalia with broad valves; cuiller rather long, somewhat sinuate. Anellus lobes large, directed upwards. Female genitalia with high segment 8 and two lobate folds below the ostium. *Agonopterix kaekeritziana* can be confused with other pale coloured species such as *A. yeatiana* and *A. pallorella*. *Agonopterix yeatiana* sometimes has more or less darkened forelegs, but this species never lacks the oblique black dots, nor the dark blotch and a white dot in the disc. In *A. pallorella* the dark streak above the dorsum is more prominent and a dark patch between disc and tornus is absent.

**Adult** (fig. 15) Wingspan 18-22 mm. Head, palp and thorax pale yellow. Palp segment 2 on outer side mixed with darker scales, segment 3 unicolorous and yellow. Antennae uniformly blackish brown. Forewings bright pale yellow. Markings deviating from usual pattern: two black or brownish dots in disc, at 1/3 and 2/3 of forewing length and a cloudy patch between outer black dot and tornus. Sometimes dots sharply marked, sometimes hardly visible. The patch is nearly always present, cloudy, varying in size, always lighter paler than dots, brown or greyish brown, with varying amount of ferruginous scales. Often there is a similarly coloured cloudy streak just above and parallel to dorsum, from 1/3 to 2/3 of wing. Wing sprinkled with tiny or cloudy dark dots and with small groups of ochreous-coloured or ferruginous scales, strongly varying in number and clearness. Terminal dots on both wings, particularly on forewing. Fore- and midlegs with dark tibiae and tarsi.

**Male genitalia** (fig. 39) Valves broad, slightly bent upwards, more or less abruptly tapering to tip. Sometimes tip rather narrow. Cuiller long, 4/5 of valval width, slender, usually sinuate. Gnathos narrow oval. Anellus lobes rather large, directed upwards.
**Female genitalia** (fig. 64) Segment 8 broad. Ostium high implanted, halfway height of segment 8. On both sides of the ductus, at the lower margin of the segment a sclerotised fold, like two lobes, directed to the middle. Ductus broad, gradually passing into the bursa. Signum of medium size, diamond-shaped.
**Biology** Hostplant: *Centaurea* sp.(Harper et al.2002), in our country probably particularly on *C. jacea* and *scabiosa*, but also *Knautia* (Emmet 1979, Palm 1989) and *Cirsium* and *Scabiosa columbaria* (Lvovsky 1990). Caterpillar first in spun shoots, later in rolled leafs, May-June. In the Netherlands reared from *C. jacea* (Doets 1946). Adult June till the beginning of September.
**Distribution** The species is uncommon in the Netherlands, found scattered in eight provinces, mostly in singletons, in various biotopes, on the chalk hills in Zuid-Limburg as well as in dune slacks. Perhaps this is related to the somewhat erratic occurrence of the hostplants. On the other hand, older records seem to be just as scarce. At this moment the best Dutch localities are a wet meadow near Rouveen, with abundant growth of *Centaurea jacea* as well as of *Succisa pratensis* (a potential host?), and the chalk-hills in Zuid-Limburg.

## *Agonopterix laterella*
(fig. 16, 40, 65, 88, 107)

**Diagnosis** Difficult to identify with certainty. Ground colour yellowish brown with a faint reddish shade. The cloudy dark blotch in the disc more or less triangular. The species resembles *A. ciliella* and some colour forms of *A. heracliana*, but the white dots in the disc are absent. Compared with *A. arenella* the dark blotch in *A. laterella* is much less pronounced and the wing colour is different. Dissecting the genitalia is necessary for a certain identification, if combined with external features. The male genitalia do not have good clues either. The cuiller is somewhat narrowed unilaterally in the distal fifth part. The female genitalia on the contrary have a unique characteristic in the absence of hairs on the papillae anales.
**Adult** (fig. 16) Wingspan 17-21 mm. Palp and thorax reddish brown, palp segment 3 with two broad rings, upper one largest. Forewings reddish brown or more yellowish brown, sprinkled with minute black dots. Oblique dots present, but often hardly visible. More laterally in disc nearly always another black dot. Dark blotch more or less triangular. Costa near apex faintly maculated. Basal area inconspicuous, type 1; dark border a straight line, running from dorsum obliquely upwards.
**Male genitalia** (fig. 40) Valves of average width and length, slightly narrowed and bent upwards. Cuiller also of average size, nearly perpendicular on edge of valve or hardly deviating inwards; distal fifth narrow, caused by an indentation of inner side. Gnathos elongated oval, more bristled than usual in the genus. Anellus lobes conspicuous knobs. Bunch of tiny cornuti in aedeagus distinct.
**Female genitalia** (fig. 65) Papillae anales in distal half bald. In basal half a regular row of 6-8 long, isolated hairs on both sides and a few scattered hairs on the rest of the surface. Segment 8 of moderate height, lower margin undulate. Ostium implanted high, at or above middle of segment 8. Ductus short, relatively broad. Bursa rather large. Signum of moderate size, a flat disk.
**Biology** Caterpillar in June on cornflower (*Centaurea cyanus*), exceptionally perhaps also on other *Centaurea* species. Adult from mid-July to October, with isolated records in spring.
**Distribution** The old records suggest that formerly the moth was not rare in the Netherlands, mainly in the provinces Gelderland, Noord-Brabant and Limburg. Locally the species was regularly found. Now it has probably disappeared from our country. This decline certainly correlates with the loss of the cornflower from our cornfields. Between 1972 and 1979 J. Wolschrijn collected

quite a number of *A. laterella* in Heerde. There were rye fields not far from his home (pers. comm. J. Wolschrijn). These were the last Dutch records.
**Remarks** Snellen (1882) describes the species as 'very recognizable by the vine-red shade', Hannemann (1995) as 'reddish yellow' while Palm (1989) speaks about an 'orange-red ground colour'. Such a clear reddish colour we have never seen in our specimens. Perhaps this is more obvious in fresh moths.

### *Agonopterix liturosa*
(fig. 17, 41, 66, 89, 108)

**Diagnosis** This moth is very similar to *A. conterminella*, but it is more constantly purplish brown, with a clear contrast between the dark tegulae and the light-coloured thorax. Generally the forewings are vividly marked. The male and female genitalia also resemble those of *A. conterminella*. Cuiller smaller, the teeth at the outer side less distinct. In the female the ostium is situated very low and the signum is considerably smaller.
**Adult** (fig. 17) Wingspan 17-21 mm. Palp yellow. Palp segment 2 at outer side irregularly mixed with somewhat darker scales, but often pale areas remain visible. Segment 3 yellow, tip darker, with exception of extreme tip. Thorax yellow or yellowish brown, nearly always paler than tegulae. Forewing purplish brown, irregularly mixed with light coloured scales. Along costa small irregularly formed yellowish spots. All this gives the moth a vivid appearance. Dull specimens are an exception. Oblique dots present, often connected to form narrow or broad stripe; sometimes the latter is elongated. Basal area type 2; border particularly conspicuous. Basal area not much paler than other wing parts.
**Male genitalia** (fig. 41) Valves rather short, slightly shorter and slenderer than in *A. conterminella*, on tip somewhat narrowing. Cuiller straight and robust, slightly narrower than *A. conterminella*, outer margin irregular, but not always with distinct teeth. Gnathos oval or broadly oval. Anellus and anellus lobes as in *A. conterminella*: upper edge of anellus slightly sclerotised, anellus lobes mainly visible as sclerotic arcs. Socii small.
**Female genitalia** (fig. 66) Papillae anales smaller than in *A. conterminella*. Segment 8 moderately high. Ostium broad, very low placed, seated on lower margin of segment or just above it. Ductus broad. Bursa rather large. Signum of average size, round or more rhomboid, notably smaller than in *A. conterminella*.
**Biology** Caterpillar on *Hypericum* sp. in spun shoots in May and June. Adult: June till September. In our country mainly reared from *Hypericum perforatum*.
**Distribution** Up to now found in some localities in the centre of our country and in Noord-Brabant, several places in the dunes and more inland and in the south of Limburg. It is highly probable that the search for caterpillars on *Hypericum* species will result in more records.

### *Agonopterix nanatella*
(fig. 18, 42, 67, 109)

**Diagnosis** A small yellowish ochreous species without dark blotch, without marked basal area and without terminal dots. The genitalia are rather unspecific. Males with pronounced outwardly bent cuiller, the females with ostium high implanted and with flat signum of average size. *Agonopterix nanatella* can be confused with other yellowish species of the genus, in our country particularly with worn specimens of *A. assimilella*. The latter species is on average larger and it has a characteristic dark blotch; besides it is slightly granulated. In typical cases differentiation is not difficult, but sometimes these features let us down.
**Adult** (fig. 18) Wingspan 15-16 mm. Palp, head and thorax yellow. Palp segment 3 just above middle with more or less distinct, but not sharply defined black ring. Forewing ochreous or more yellowish ochreous, sprinkled with some minute black dots. Of the two oblique black dots at least one present. Dark blotch absent; sometimes replaced by faint darkening. No terminal dots.

Basal area not developed; often a dark dot just above dorsum as remnant of the borderline. Underside forewing with small area along borders paler than centre of wing.
**Male genitalia** (fig. 42) Valves moderately short, not broad, towards tip gradually and slightly tapering. Cuiller slender, in distal third distinctly bent outwards. Gnathos very narrowly oval. Anellus lobes resembling long folds in shape of a broad comma. Aedeagus rather small and straight.
**Female genitalia** (fig. 67) Segment 8 of average size. Ostium placed high, halfway segment, but according to our slides not as high as figured by Hannemann (1995). Ductus rather short, not broad, but already in antrum relatively broad. Bursa small, somewhat below average. Signum an elongated oval or flat indented disk, not small in relation to bursa.
**Biology** Caterpillar on *Carlina vulgaris*, first in a mine until a late instar, later in a rolled leaf, from April to June. Often several larvae on a single plant. Adult: July.
**Distribution** (Table 2) Very rare in the Netherlands. There is a specimen with an unclear label: 'Middenduin, Wb', dated 15.VIII.1862. The species is mentioned in Bouwstoffen Fauna Nederland (De Graaf & Snellen 1866): H. Weyenbergh caught two specimens in Haarlem den Hout (= Haarlemmerhout), that were identified by Stainton. Probably the specimen from 'Middenduin' was found in Overveen where this name is known and the collector 'Wb' may be Weyenbergh. Very recently the species has been rediscovered in our country. A. Wijker found the caterpillars on *Carlina vulgaris* in many places in the dunes between Castricum and Bergen aan Zee in the second half of May 2010 (Wijker, in prep.), and together with J. Roosmalen and L. Knijnsberg in Bergen aan Zee and Egmond aan Zee.

### *Agonopterix nervosa*
(fig. 19, 43, 68, 90, 110)

**Diagnosis** Easily recognizable by the dark cilia below the pointed apex. Besides, the white dots in the disc are frequently red-bordered. In the male genitalia the stout, clean-cut, regularly outward bent cuiller is a striking feature and in the female genitalia the sclerotised line below the ostium. Worn or faintly marked specimens are sometimes confused with other species such as *A. yeatiana*, the dark veined specimens with *A. umbellana*. A pointed apex is an important character. Nearly always a remainder of the dark cilia below the apex can be seen.
**Adult** (fig. 19) Wingspan 17-21 mm. Palp yellow; segment 2 on outer side mixed with yellowish brown and dark brown scales, segment 3 nearly always with black tip and the shade of one or two dark rings. Head and tegulae yellow, thorax mostly just slightly darker yellow. Forewing yellow or ochreous yellow, sparsely sprinkled with minute black dots, in outer half sometimes with a shade of red, eventually more cloudy brownish red. Veins often streaked reddish brown or dark

Table 2. *Agonopterix nanatella*, checked records from the Netherlands.
Tabel 2. *Agonopterix nanatella*, gecontroleerde waarnemingen uit Nederland.

| Locality | Stage | Date adult | Date larva | N⁰ | Collector | Collection |
|---|---|---|---|---|---|---|
| 'Middenduin' [Overveen] | adult | 15.VIII.[18]62 | | 1 | 'Wb' [Weyenbergh] | ZMA |
| Castricum | larva | . | 14.V.2010 | 5 | A. Wijker | T. Muus |
| Egmond aan Zee | larva | | 26.V.2010 | ? | A. Wijker / L. Knijnsberg | |
| Bergen aan Zee | larva | | 18.VI.2010 | ? | A. Wijker / J. van Roosmalen | |

brown. Oblique dots present, lower distinct. Blotch in disc dark brown, varying in size, sometimes elongated like a dark band. Below dark blotch two white, often red-bordered dots. This marking often clear; sometimes white dots or reddish bordering hardly visible. Apex pointed, even subfalcate. Cilia below apex dark brown for a short distance, sometimes more than halfway termen. Cilia in lower part yellowish grey. Basal area not distinct; type 1. Fore- and mid legs can be darkened; hindleg yellow.
**Male genitalia** (fig. 43) Valves long, stretched, relatively narrow, gradually tapering. Cuiller rather long, stout, slightly broadened at tip, regularly bent outward, with clear-cut margins. Gnathos nearly cylindrical. Anellus lobes knobby. Aedeagus rather large.
**Female genitalia** (fig. 68) Segment 8 rather narrow. Ostium at 1/3. Below ostium just above lower margin a long and strong sclerotised line, faintly curved, sometimes angulated or undulate medially. Ductus long and broad. Bursa rather large, more or less oval. Signum rather large, diamond-shaped.
**Biology** Caterpillar in May and June on *Cytisus scoparius*, *Genista* sp., *Ulex*, but also on L*aburnum anagyroides* (all Fabaceae). In the Netherlands reared from *Cytisus scoparius* and *Genista anglica* (leg. C. Doets). Adult end of June to October, only exceptionally seen after hibernation.
**Distribution** All over the country, preferring sandy soils in the east and the centre, along the dunes and in Limburg, but also found in other habitats, relatively common. On the isle of Flakkee, where *Cytisus* and *Genista* are entirely absent, the moth is regularly found. It is questionable whether the presence of *Laburnum anagyroides* or broom species in gardens could be the explanation, or whether these specimens are migrants.

### *Agonopterix ocellana*
(fig. 20, 44, 69, 91, 111)

**Diagnosis** A large species, generally recognizable by the yellowish grey ground colour and the dark marking in the disc, bordered with red. The male genitalia are characterized by the big, perpendicular cuiller. As to the female genitalia, one should notice the very large bursa and signum.
**Adult** (fig. 20) Wingspan 20-24 mm. Head, thorax and tegulae ochreous grey. Palp yellow, segment 2 on outer side strongly mixed with dark brown scales, segment 3 with small black tip and two dark brown or black rings, one at base and one above middle. These rings tend to extend; sometimes only part of palp just below tip yellow. Forewing grey, ochreous grey or light brownish grey. Dark sprinkling and cloudy scaling poorly developed. Oblique dots often connected, forming a line; this line can be elongated in the direction of dark blotch. Dark blotch rather pronounced, round or more triangular, dark brown, lower margin red bordered. Laterally and below dark blotch a white dot, red edged. In clearly marked specimens an angulated fascia in outer field can be seen, as well as dark spots along costa and around apex. Basal area type 1, clearly bordered.
**Male genitalia** (fig. 44) Valves rather long, stretched, not broad, sometimes relatively narrow. Cuiller stout, straight, practically perpendicular, sometimes clear-cut, sometimes with irregular margins, but never with teeth. Cuiller varying in width, sometimes very broad. Our figure (fig. 44) and that in Harper et al. (2002) show the narrower examples. Gnathos narrowly oval. Anellus lobes like somewhat flattened knobs. Aedeagus large.
**Female genitalia** (fig. 69) Segment 8 of moderate height. Ostium at 1/3, elongated oval. Ductus very long, broad.
Bursa strikingly large. Signum very large, resembling flattened globe with extension toward ductus.
**Biology** Caterpillar on a wide variety of *Salix* sp. in May and June. In the dunes of our country reared from *Salix repens* (pers. comm. J. Wolschrijn) and in other places from *Salix alba* (leg. C. Doets). According to the literature, the species is on the wing from August until early May. In fact there are no months in which the moth cannot be found. Most likely the moths fly chiefly

from late July until early June next year, with great activity in the spring.
**Distribution** Found throughout the whole country, rather common, but not very abundant.

## *Agonopterix oinochroa*

**New for the Netherlands**
(fig. 21, 45, 70, 112)

**Diagnosis** A small, uniformly coloured species with few markings, but with two more or less distinct white dots, edged by some red scales. Male genitalia characterized by the long cuiller, female genitalia by a sclerotised arc-like line, nearly overlapping the lower margin of the eighth segment. Evidently the species can be confused with other members of the genus. *Agonopterix capreolella* is paler and more vividly marked with a clear basal area and with white dots without red scales. Small dark specimens of *A. heracliana* also have a basal area, type 1 and white dots without red. The species can also been mistaken for a small specimen of *A. cnicella* (Nuss et al. 2004). The latter species has a basal area, type 2.
**Adult** (fig. 21) Wingspan 14-16 mm. Head and thorax dark brown. Palp brown, segment 3 with a faint dark ring. Forewing somewhat glossy dark brown, sometimes slightly paler, greyish brown. The moth has a smooth appearance without much marking. Basal area not or hardly separated, oblique dots only faintly visible, no dark blotch. Exceptionally between oblique dots some red scales. In typical specimens two clear white dots in disc, red-edged. In the Dutch series a remnant of white dots, as well as red bordering, can only be found by focussed examination.
**Male genitalia** (fig. 45) Valves short, of moderate width, gradually tapering. Cuiller long, more or less slender, straight or slightly bent outwards. Tip of cuiller just touching dorsal edge of valve. Gnathos cylindrical. Anellus lobes forming broad knobs.
**Female genitalia** (fig. 70) Segment 8 of average size or slightly less high. Ostium implanted at 1/3 or a fraction lower. Below ostium, on lower margin or just above it, a long, undulating sclerotised arc. Ductus of moderate length. Bursa relatively large with small round or oval signum.
**Biology** Unknown. Nuss et al. (2004) have reared the moth accidentally from a rearing with mixed plants: *Salvia pratensis*, *Genista tinctoria* and *Aster linosyris*. In our opinion *Genista tinctoria* seems to be the most likely hostplant amongst these.
**Distribution** (Table 3) There are six Dutch records, seven specimens from Wolfheze between 1868 and 1872 and two from Arnhem in 1873, all taken in February and March. *Agonopterix oinochroa* was generally considered a very local species from the borders of the Alps in Austria. Recently the moth has been caught in Baden-Württemberg (Nuss et al. 2004) and in retrospect there appeared to be older German records: from Mittelrhein in 1898 and subsequently

Table 3. *Agonopterix oinochroa*, checked records from the Netherlands.
Tabel 3. *Agonopterix oinochroa*, gecontroleerde waarnemingen uit Nederland.

| Locality | Stage | Date adult | Date larva | N⁰ | Collector | Collection |
|---|---|---|---|---|---|---|
| Wolfhezen | adult | 15.III.1868 | | 1 | v. Medenbach de Rooy | ZMA |
| Wolph[ezen] | adult | 5.III.[18]72 | | 4 | v. Medenbach de Rooy | ZMA |
| Wolfhezen | adult | 14.III.[18]72 | | 1 | ? | RMNH |
| Wolfhezen | adult | 25.III.1873 | | 1 | Heylaerts (?) | RMNH |
| Arnhem | adult | 25.III.1873 | | 1 | v. Medenbach de Rooy | ZMA |
| Arnhem | adult | 18.II. ? | | 1 | Backer | RMNH |

between 1967 and 2005 at three other localities (Biesenbaum 2005). The status of the species in our country is obscure. At this moment it has certainly disappeared from our country since the 19th century. However, it is uncertain whether it ever has been indigenous. If so and if *Genista tinctoria* is indeed the host, it follows the pattern of that plant (Van der Meijden et al. 2000) and of the other insects feeding on it. Ten Lepidoptera species feeding on *Genista* have disappeared from the Netherlands (Van Nieukerken et al. 2010).
**Remarks** Some specimens of a small, dark, unicolorous species of the genus were found between 1868 and 1873 near Arnhem, Wolfheze and perhaps Katwijk. Later four specimens were found near Venlo. The whole series at that time was identified as *A. capreolella* and under that name deposited in the collections. At about the middle of the last century a genitalia slide was made of one of these, a male (by C. Doets?) Why this has not resulted in a correction of the diagnosis, we only can guess. We have examined the whole series, as far as available. It appeared to consist of a mixture of species. Two of the specimens from Venlo were *A. heracliana*, the two others *Depressaria pimpinellae* Zeller, 1839. The bulk of the series, from Arnhem and Wolfheze, belongs to *A. oinochroa*. The specimen from Katwijk, that was mentioned by Snellen (1882), could not be found again, nor those from Friesland and Groningen as mentioned by Kuchlein & Donner (1993).

## *Agonopterix pallorella*
(fig. 22, 46, 71, 113)

**Diagnosis** A pale yellow species, differing from *A. kaekeritziana* by the absence of any red scales and the constant presence of a dark streak above the dorsum of the forewing. Male genitalia with a characteristic cuiller, broadened at the tip, female genitalia with a very elongated bursa and a large signum.
**Adult** (fig. 22) Wingspan 21-23 mm. Palp, head and thorax pale yellow, sometimes with ochreous shade. Segment 2 on outer side yellowish brown, segment 3 nearly without black scales. Forewings pale yellow, in some specimens more greyish yellow, sparsely sprinkled with minute black dots. In exceptional cases more black sprinkling.
In basal area a black dot, just above dorsum; two black dots in disc at 1/3 and 2/3. Above dorsum a dark brownish streak, parallel to margin, of varying length, from about 1/3 to 2/3. A dark patch between outer black dot and tornus, as seen in *A. kaekeritziana*, absent. Veins in outer third part of wing sometimes dark-streaked. Black terminal dots. Fore- and midlegs dark brown,not always clearly visible.
**Male genitalia** (fig. 46) Valves of moderate length, gradually narrowing and bent upward. Cuiller at base with narrow and almost straight stem, abruptly and greatly broadening just above the middle, axe-shaped, directed side- and upwards. Gnathos narrowly oval. Anellus lobes rather broad, oval knobs. Aedeagus of moderate length, rather slender.
**Female genitalia** (fig. 71) Segment 8 of moderate height. Ostium at 1/3 or 2/5. Ductus short. Bursa rather large, very much elongate and relatively narrow. Signum large, diamond-shaped, strongly dentate.
**Biology** Caterpillar in early summer on *Centaurea scabiosa* and *C. jacea*, also on *Serratula tinctoria*. Adult according to the literature from late August to May. From France I have records from early July.
**Distribution** (Table 4) In the Netherlands sporadically found in the 19th century. We have seen specimens from Arnhem and Wassenaar, and literature records from Meyendel (Wassenaar) and Velp (De Graaf, 1851, De Graaf & Snellen, 1866). At this moment the species has certainly disappeared from the Netherlands.

## *Agonopterix propinquella*
(fig. 23, 47, 72, 92, 114)

**Diagnosis** A species of medium size, greyish or brownish yellow, with pronounced dark blotch. Male genitalia with notably broad valves, a rather

Table 4. *Agonopterix pallorella*, checked records from the Netherlands.
Tabel 4. *Agonopterix pallorella*, gecontroleerde waarnemingen uit Nederland.

| Locality | Stage | Date adult | Date larva | N⁰ | Collector | Collection |
|---|---|---|---|---|---|---|
| Arnhem | larva | 28.VII.1873 | ? | 1 | v. Medenbach de Rooy | ZMA |
| Arnhem | larva | 29.VII.1873 | ? | 1 | [v. Medenbach de Rooy] | ZMA |
| Arnhem | larva | 27.VII.[18]73 | ? | 1 | [v. Medenbach de Rooy] | RMNH |
| Arnhem | ? | 23.VII.[18]75 | | 1 | v. Medenbach de Rooy | RMNH |
| Wassenaar | ? | 21.X. | | 1 | [H.W.] de Graaf | ZMA |

broad gnathos and elongated anellus lobes.
Female genitalia with two thin and short sclerotised lines, obliquely placed on the lower margin of segment 8. *Agonopterix propinquella* may be confused with poorly marked specimens of *A. heracliana*, with *A. scopariella* and *A. subpropinquella*. *Agonopterix propinquella* is on average the smallest species, without white dots, but with a basal area type 1 and a rounded apex of the forewing.
**Adult** (fig. 23) Wingspan 16-19 mm. Head, palp and thorax ochreous yellow. Palp segment 2 on outer side brownish yellow, segment 3 with some darkening at base, more or less cloudy dark ring at 2/3 and with small black tip. Forewings ochreous or sometimes more greyish or brownish yellow. Distinct and rounded dark blotch, usually clear-cut. Oblique dots less clear. Dark marginal dots present, but inconspicuous. Basal area type 1, not pronounced.
**Male genitalia** (fig. 47) Valves of moderate length, broad, only slightly narrowing to tip. Cuiller more or less straight, in second half often somewhat narrowed and slightly bent outward. Generally cuiller not stout, but specimens with a big one, sometimes even unilateral, are known. Gnathos oval, rather broad. Anellus lobes elongate, more resembling a folded edge than knobs. Aedeagus rather short.
**Female genitalia** (fig. 72) Segment 8 of moderate height. Ostium just above 1/3. Lower margin of segment 8 in middle more or less undulate and there slightly sclerotised, at both sides of ductus passage, a thin, short sclerotised line, directed upward and sideward. Lines nearly always present, but careful examination is necessary. Ductus rather short. Bursa and signum of average size. Signum diamond-shaped, moderately dentate. Papillae anales regularly covered with thin hairs.
**Biology** Caterpillar on various plants of the family Asteraceae. Main hostplants seem to be the thistles *Cirsium vulgare* and *C. arvensis*, but *Carduus*, *Arctium*, *Serratula* and *Centaurea* sp. are also mentioned (Harper et al. 2001, Lvovski 1981, Palm 1989). In the Netherlands reared from *Cirsium arvense* (pers. comm. J. Wolschrijn). Larva July to early August. Adult July to May next year, probably found throughout the year.
**Distribution** Records are spread over the whole country. The species is most common in Gelderland and Limburg.
**Remarks** In some areas of Great Britain populations are found without dark blotch (Harper et al. 2005). Up to now this form has not been observed in the Netherlands. Identification of that form will be quite difficult.

## *Agonopterix purpurea*
(fig. 24, 48, 73, 93, 115)

**Diagnosis** An easily recognizable species: small, purplish brown and rather vividly marked.
The male genitalia have narrow, pointed valves and a straight cuiller, the female genitalia a narrow segment 8, a small bursa and a small signum.
**Adult** (fig. 24) Wingspan 11-14 mm. Head and palp brown, mixed with paler scales. Palp segment 3 blackish with greyish yellow rings at 1/3

and just below tip. Thorax and tegulae purplish brown, in particular thorax, mixed with grey. Forewings purplish brown, more or less dark, in various amount sprinkled with tiny grey dots, especially along costa and in basal area. Greyish yellow maculae along costa fairly constantly present. Oblique dots connected to a black streak, above bordered white. More lateral two white dots, narrow black edged. In some pale specimens an angulated band is visible in the outer area. Basal area usually type 2.
**Male genitalia** (fig. 48) Valves narrow, short, strongly tapering to rounded tip. Cuiller practically straight, short, not big. Gnathos nearly cylindrical. Anellus lobes long, narrow folds. Aedeagus small.
**Female genitalia** (fig. 73) Segment 8 narrow. Ostium low implanted, below 1/3. Ductus rather short. Bursa small. Signum flattened hemisphere, small in relation to segment 8.
**Biology** Caterpillar on *Daucus carota*, also on other Apiaceae: *Anthriscus sylvestris*, *Torilis japonica*, *Chaerophyllum temulum*, May toJune. In the Netherlands reared from *Daucus carota* in the dunes near Egmond and Noordwijk (pers. comm. J. Wolschrijn). Adult August-June.
**Distribution** According to old records more or less regularly found in the dunes of the mainland of Noord- and Zuid-Holland, near Arnhem, and in Zuid-Limburg. After 1918 there was an unfavourable period, in which the moth was seen in Zuid-Limburg only. This has changed in the last 15 years. There are several recent records from the dunes, but also more inland from Zeeland and Gelderland.

### *Agonopterix scopariella*
(fig. 25, 49, 50, 74, 94, 116)

**Diagnosis** A brown, yellowish or reddish brown species, more or less recognizable by the smooth appearance and the angular apex, combined with the presence of white dots and a basal area, type 1. Male genitalia with some inconspicuous, yet specific features. The cuiller has a slightly aberrant form; even more characteristic are the anellus lobes, looking like a trunk. Female genitalia on the contrary very specific because of the broad lobe below the ostium. The species is often confused with other members of the genus, mostly with unicoloured specimens of *A. heracliana*, with *A. subpropinquella*, occasionally also with *A. atomella*. Forewing apex of *A. heracliana* is distinctly rounded, colour and markings without the smooth and uniform impression as in *A. scopariella*.
In *A. subpropinquella* the white dots and a defined basal area are absent. According to the literature, *A. atomella* is more yellowish ochreous, mixed rosy and the white dots are or absent or dirty white.
**Adult** (fig. 25) Wingspan 17-20 mm. Head, palp, thorax and tegulae brown. Palp segment 3 with broad dark ring above middle and with small black tip. Forewings usually brown, but varying from yellowish to reddish brown, always have with smooth, uniform, somewhat blurred appearance. Sometimes wings sprinkled with very tiny dark dots. Dark blotch and oblique black dots usually just visible. Two white dots in disc generally present, at least one, sometimes slightly red-edged. Apex of forewing rather square, costa straight. This is most easily seen in a series; in individual cases the appreciation can be difficult because of the varying nature of the character. Basal area type 1.
**Male genitalia** (fig. 49) Valves rather long, not broad, in distal fifth part gradually, or sometimes more abruptly tapering to narrow tip. Cuiller (fig. 50) straight, perpendicular; length about 2/3 ofvalve width. From base cuiller slowly and slightly broadening towards 1/3, then narrowing. In broadest part often one or two oblique thin lines, directed sideways and upward, most conspicuous on inner side. Gnathos cylindrical. Anellus lobes long, rather broad and directed inward, ending like a kind of trunk, sometimes touching each other.
**Female genitalia** (fig. 74) Segment 8 rather broad. Ostium at 2/5, with unusual shape: narrow and long, cup-shaped, at tip a kind of small roof. Below ostium a broad, lobe-like fold with undulate edges, crossing like bands lower margin of

segment. In the lobe, below ostium short, sclerotised arc. Ductus can be very long, but not always. Bursa rather large. Signum rather large, a flat box.
**Biology** Caterpillar in June and early July on broom (*Cytisus scoparius*). It is claimed that the caterpillars have also been found on *Genista* sp. or *Calicotome* (Lvovski 1981). It remains doubtful if this is based on confusion with other species. In the Netherlands only reared from *Cytisus scoparius*. Adult from July till the beginning of June.
**Distribution** Locally common in the dunes of the Delta region and in Gelderland. Less found in the northern parts of our country.

### *Agonopterix subpropinquella*
(fig. 26, 51, 75, 95, 117)

**Diagnosis** At first sight the species resembles *A. scopariella*, with the same faint markings and a colour with all shades between yellowish and reddish brown or brown, but without white dots and without the bordering of a basal area, and with a rounded apex. Male genitalia with cuiller in most cases bent inward, sometimes strongly. The anellus lobes are strikingly long and narrow. The female has a characteristic sclerotised line below the ostium, in the form of a flat W. *Agonopterix propinquella* has a more pronounced dark blotch and a basal area type 1.
**Adult** (fig. 26) Wingspan 17-21 mm. Head and segment 2 of palp brown, thorax and tegulae sometimes same colour, sometimes darker.
Palp segment 3 brownish yellow with two rather broad dark rings and very small black top. Forewings smooth yellowish brown, reddish brown or brown, more yellowish specimens uncommon. Reddish brown ones constitute, at least in our country, the majority. Dark blotch present, but not pronounced, oblique dots usually also present, equally not distinct. No white dots in disc, but in this genus no rule is without exception. The same can be said of basal area: usually of type 3, but in exceptional cases just above dorsum, on the place of borderline, a dark little dot is found, and sometimes above it yet another small one. Maculae along the costa absent or hardly visible.
**Male genitalia** (fig. 51) Valves of usual length, rather broad, exceptionally somewhat narrower. Valves hardly tapering towards tip, always more bent upwards than in *A. scopariella*. Cuiller of normal length and width, strongly bent inward, but not seldom more perpendicular, sometimes unilateral. Gnathos long, oval or nearly cylindrical. Anellus lobes long, very narrow, irregularly folded. Form of anellus lobes apparently the most constant feature. Aedeagus shorter than in *A. scopariella*.
**Female genitalia** (fig. 75) Segment 8 broad. Ostium low, at 1/5. In lamina antevaginalis two sclerotised lines: one just below ostium with undulate shape and with branches, rising beside ostium and another on or just above lower margin of segment with a flattened w-form. Bursa of average size, signum slightly smaller than usual in the genus, flattened or a hemisphere.
**Biology** Caterpillar in June and beginning of July on various thistles, particularly *Cirsium vulgare* and *C. arvensis*, but also on other plants such as *Arctium lappa*, *Centaurea nigra* and *C. jacea*.
In the Netherlands reared in Twello from *Cirsium arvense* (pers. comm. J. Wolschrijn); also found on *Onopordum acanthium* in Melissant (leg. K.J. Huisman). Adult from July to early June. Moths come rather readily to light.
**Distribution** Found throughout the country, in the western part rather common, in the eastern part more irregularly.

### *Agonopterix umbellana*
(fig. 27, 52, 76, 118)

**Diagnosis** An ochreous species with dark-lined veins, but without dark blotch. Male genitalia with valves strongly pointed and with an irregular outwards bent cuiller. Female genitalia with a sclerotised arc below the ostium. The species is fairly often confused with dark-lined specimens of *A. nervosa* and *A. yeatiana*. This mistake can be prevented by regarding the dark cilia below

the apex and the presence of red scales in *A. nervosa* and by the white dot in the disc, combined with a basal area, type 1 in *A. yeatiana*.
**Adult** (fig. 27) Wingspan 21-24 mm. Head, palp, thorax and tegulae ochreous yellow. Palp segment 2 on front- and outer side with many dark brown scales, segment 3 with faintly bordered dark ring above middle and black tip. Thorax sometimes mixed with darker scales; a single specimen with uniformly dark brown thorax. Forewings ochreous or ochreous brown. As a rule veins dark-lined, but this brownish fuscous lineation can vary. Oblique dots usually present, only lower conspicuous; sometimes a third black dot more laterally in disc. No dark blotch. Marginal dots present. There is hardly a trace of a basal area. Fore- and mid-legs often with dark tibia and tarsus.
**Male genitalia** (fig. 52) Valves of medium length, in last third strongly narrowing, abruptly or gradually, pointed, but with rounded tip. Cuiller of moderate length, slender, irregularly bent outward, more or less sinuate. Gnathos elongated oval. Transtilla in middle somewhat broadened. Anellus lobes broad, elongated knobs. Aedeagus stout.
**Female genitalia** (fig. 76) Segment 8 rather narrow. Ostium about 2/5. Below ostium rather short sclerotised arc. Ductus long. Bursa of medium size. Signum smaller than average, round or more flattened, poorly dentate.
**Biology** Caterpillar in June on gorse (*Ulex europaeus*). In some regions of Europe the caterpillar is said to live also on *Genista pilosa* and *G. anglica* (Palm 1989). In our country only reared from gorse. Adult August-April.
**Distribution** (Table 5) In our country a very rare species. There are a number of old records from Wolfheze, Velp, Arnhem and 's Gravenhage and a recent one from Oostkapelle (Huisman et al. 2001). Perhaps present only in the few places where *Ulex europaeus* can survive the Dutch winters.

### *Agonopterix yeatiana*
(fig. 28, 53, 77, 96, 119)

**Diagnosis** A pale yellow or greyish yellow species. Oblique dots and dark blotch distinct. Basal area well bordered, type 1. The male genitalia have a very typical angulated cuiller, the

Table 5. *Agonopterix umbellana*, checked records from the Netherlands.
Tabel 5. *Agonopterix umbellana*, gecontroleerde waarnemingen uit Nederland.

| Locality | Stage | Date adult | Date larva | N⁰ | Collector | Collection |
|---|---|---|---|---|---|---|
| 'Meerdervoort' [Den Haag] | larva | | .VI.[18]85 | 1 | F.W.Q. Kallenbach | RMNH |
| 's Gravenhage | larva | 15.VIII.1884 | | 1 | P.C.T. Snellen | ZMA |
| 's Gravenhage | larva | 30.VIII.1884 | | 1 | P.C.T. Snellen | ZMA |
| [Den] Haag | adult | .VIII. | | 4 | [H.W.] de Graaf | RMNH |
| Den Haag | larva | 24.VIII.[18]84 | .VII.[18]84 | 2 | P.C.T. Snellen | RMNH |
| Den Haag | larva | 29.VII.[18]85 (?!) | 6.VII.[18]84 | 1 | P.C.T. Snellen | RMNH |
| Den Haag | larva | 1.VIII.[18]85 (?!) | 6.VII.[18]85 | 1 | P.C.T. Snellen | RMNH |
| Velp | adult | 20.VIII.1886 | | 1 | [de Joncheere] | RMNH |
| Arnhem | adult | 8.VII.[18]68 | | 1 | [v. Medenbach de Rooy] | RMNH |
| Wolphezen | adult | 21.IX.[18]75 | | 2 | [v. Medenbach de Rooy] | ZMA |
| Wolfhezen | adult | 4.IV. | | 1 | [v. Medenbach de Rooy] | ZMA |
| Oostkapelle | adult | 6.IX.1999 | | 1 | A. Baaijens | A. Baaijens |

female a sclerotised line below the ostium in the shape of a flower pot, and a large bursa. Can be confused with *A. umbellana*. See that species. Confusion can also occur with faintly marked specimens of *A. arenella*. That species is more brightly coloured, yellow and a white dot is absent. *Agonopterix scopariella* is generally somewhat darker and more smoothly coloured and has two white dots.

**Adult** (fig. 28) Wingspan 18-21 mm. Head, palp, thorax and tegulae ochreous or yellowish brown. Palp segment 2 on outer side in upper part darkened, segment 3 with dark rings at base and at 2/3 and with tiny black tip. Forewings pale, ochreous or greyish yellow, sometimes more brownish yellow. Oblique dots and dark blotch in most cases distinct. In disc, lateral of blotch, a white dot, small, dark edged. Black terminal dots. Specimens with somewhat dark-lined veins are known, but extreme forms are rare. Basal area distinct, type 1. Fore- and midlegs usually yellowish, sometimes brown.

**Male genitalia** (fig. 53) Valves narrow, of moderate length or slightly shorter, last third strongly and in general abruptly tapering. Cuiller above 1/3 much broadened and with sharp angle bent inward. Gnathos long, narrow. Anellus lobes as long, broad folds. Transtilla in some cases broadened in middle.

**Female genitalia** (fig. 77) Segment 8 rather narrow. Ostium low, at 1/5. Below and besides ostium a sclerotised line, more or less shaped as flower pot. Bursa large. Signum size just above average, coarsely dentate, as a flattened box or a strongly flattened globe.

**Biology** Caterpillar in June, July on *Daucus carota* and on many other members of the family Apiaceae: *Oenanthe* sp. *Peucedanum palustre*, *Chaerophyllum temulum*, *Apium graveolens*. Perhaps also on *Sium* sp. and *Angelica* sp. (Hannemann 1995). Adult August to June; also found in other months.

**Distribution** Found in all provinces, in most places more or less common.

## DESCRIPTION OF EXCLUDED SPECIES

### *Agonopterix atomella*

(fig. 9, 33, 58)

**Diagnosis and remarks** The species can easily be confused with *A. assimilella* and *A. scopariella*. All Dutch specimens, hitherto identified as *A. atomella*, which we could examine, proved to be *A. assimilella*. Consequently it seems justified not to consider *A. atomella* as a Dutch species. Yet it is just possible that new discoveries in the Netherlands can be made. Therefore it is important to pay attention to the differences with related species. *Agonopterix atomella* is more ochreous or ochreous brown, darker, *A. assimilella* more yellow. Both species are sprinkled with dark dots, but the sprinkling of *A. assimilella* is more coarse. The dark blotch of *A. assimilella* is on the average more distinct; *A. atomella* never has an extension to the tornus. Admixture of red scales can be more prominent in *A. atomella* than in *A. assimilella*, the same is valid for the presence of a whitish dot. *Agonopterix atomella* lacks dark scales on the third segment of the palp. In the male genitalia the cuiller and the anellus lobes are good points of differentiation. As to *A. scopariella*, this species has a different shape of the wing, with a rather squared apex; it is on the average more brown, often more evenly coloured and the two white dots are in most cases visible. Differentiation on the genitalia will give no problems.

**Adult** (fig. 9) Wingspan 18-21 mm. Forewings: ground colour varying from greyish buff to ochreous brown, often with admixture of some tiny reddish or reddish brown scales. Forewings sprinkled with dark little dots, but less pronounced than in *A. assimilella*. Dark blotch in general faint or hardly visible, slightly more medially than in *A. assimilella*. In disc at 3/5 a vague whitish dot, usually not clearly visible; sometimes a second faint white dot medially. Oblique dots poorly developed. Basal area type 1, sometimes indistinct.

**Male genitalia** (fig. 33) Valves slightly shorter than in *A. assimilella*, gradually narrowing to tip. Cuiller long, slender, nearly reaching valve costa,

hardly bent; margins rather firm. Tip of cuiller slightly narrowing, not rounded and without teeth. Gnathos long. Anellus lobes long knobs as those of *A. assimilella*, but more trunk-like.
**Female genitalia** (fig. 58) Segment 8 of average height, ostium rather high placed. On either side of antrum a faint indication of lobes. Ductus beyond antrum rather broad. Ductus shorter than in *A. assimilella*. Signum comparable to that of *A. assimilella*, but a little less high. Our description of the female genitalia is based on a single foreign specimen.
**Biology** Caterpillar found on *Genista tinctoria*, May-June. Adult late July and August.
**Distribution** Found in all surrounding countries.

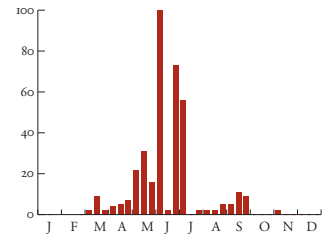
## *Agonopteris capreolella*

**Diagnosis and remarks** A small, rather dark species with basal area type 1 and white dots. The genitalia are characteristic. *Agonopterix oinochroa* is generally darker, more evenly coloured, with the two white dots bordered by some red scales, though sometimes inconspicuous; basal area hardly visible. Almost certainly this is not an indigenous species. After dissection, all supposed Dutch specimens proved to belong to other species. See *A. oinochroa*.

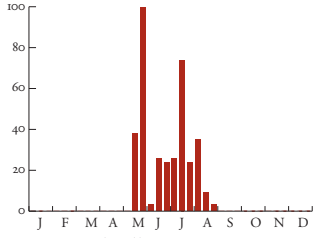
**Adult** Wingspan 14-16 mm. Forewing greyish brown or darker brown, with two white dots in disc at 1/2 and 2/3 and with basal area distinct, somewhat lighter paler, type 1. No dark blotch.
**Male genitalia** Easily recognizable because of narrow, pointed valves and typical club-shaped cuiller.
**Female genitalia** With rather narrow segment 8. Lower margin curved and sclerotised in the middle. Signum small.
**Biology** Caterpillar in May on *Pimpinella saxifraga*. Also on *Daucus carota* and *Sium latifolium* (Lvovsky 1990, Palm 1989)
**Distribution** Found in all neighbouring countries, so the occurrence in the Netherlands is not impossible. In the last stage of my investigations I found in the collection of NCB Naturalis between unset material a worn specimen bearing the label: 'Museum Leiden, St Pietersberg-exc[ursion], Slavante, 17.VIII.1950', that in the opinion of John Langmaid (pers. comm.) and of the author might be the real *A. capreolella*, but a small specimen of *A. heracliana* or even *A. alstromeriana* is also a possibility. Unfortunately this cannot be proved, as it is an old specimen without abdomen. W. van Laar prepared a genitalia slide of a true *A. capreolella* for his treatment of the Dutch species of *Agonopterix*, but this concerns an unlabelled specimen, that probably is foreign.

### PHENOLOGY CHARTS

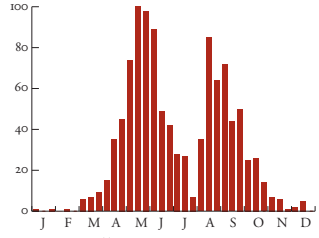
Figure 78-96. Phenology of the Dutch *Agonopteryx* species, in 10 day periods. The highest number is placed at 100%.
Figuur 78-96. Fenologie van de Nederlandse *Agonopteryx*-soorten, per decade. Het hoogste aantal is op 100% gesteld.



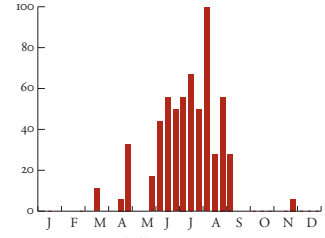
78. A. alstromeriana



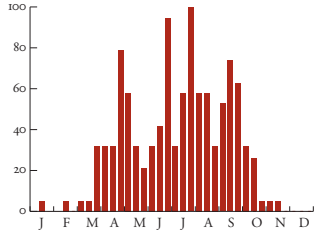
79. A. angelicella



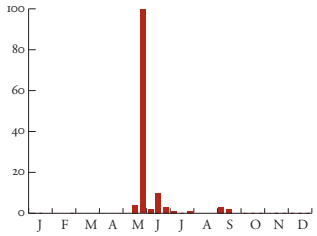
80. A. arenella



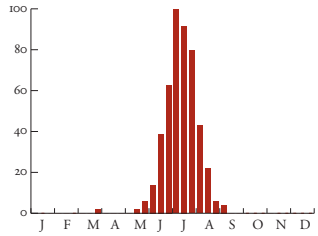
81. A. assimilella



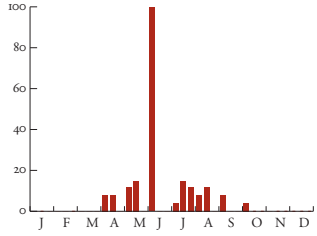
82. A. ciliella



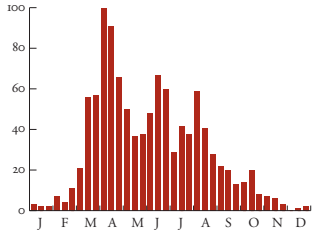
83. A. cnicella



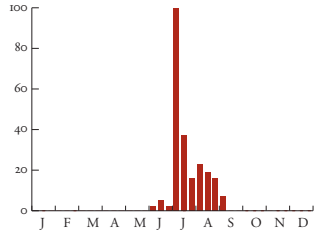
84. A. conterminella



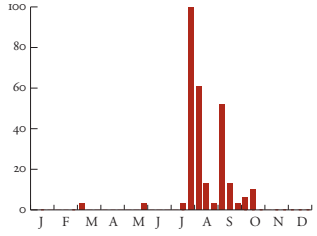
85. A. curvipunctosa



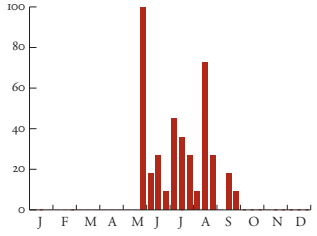
86. A. heracliana



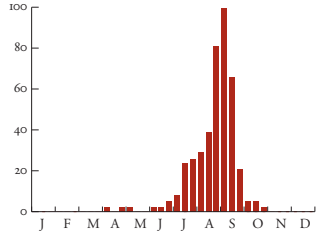
87. A. kaekeritziana



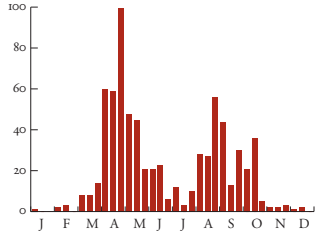
88. A. laterella



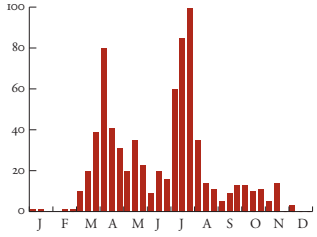
89. A. liturosa



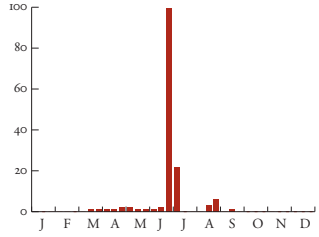
90. A. nervosa



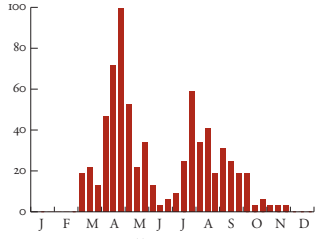
91. A. ocellana



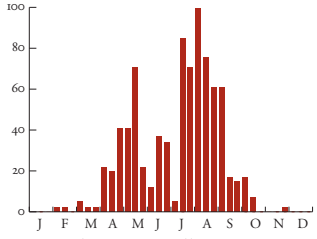
92. A. propinquella



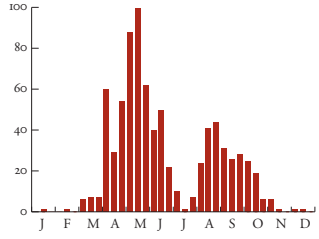
93. A. purpurea



94. A. scopariella

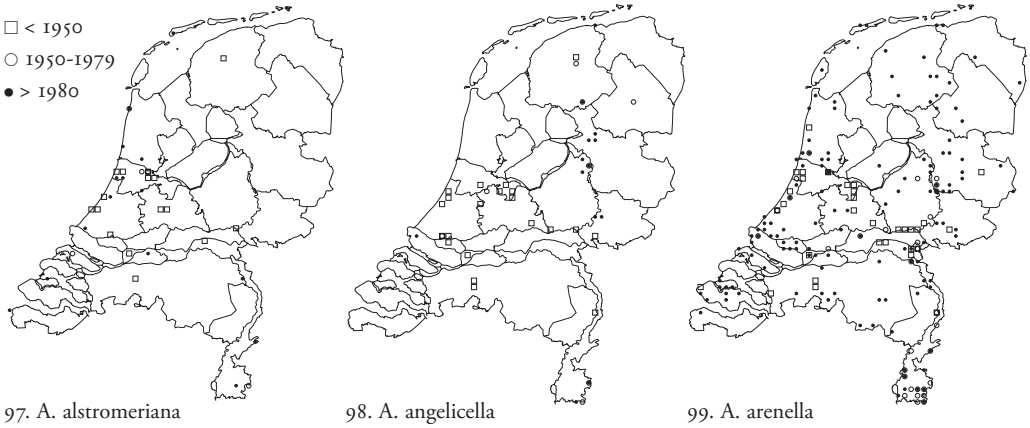


95. A. subpropinquella

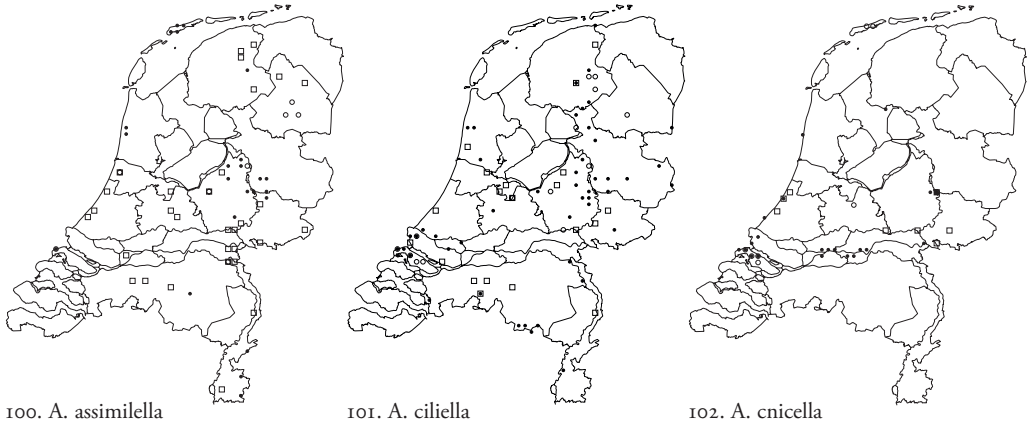


96. A. yeatiana

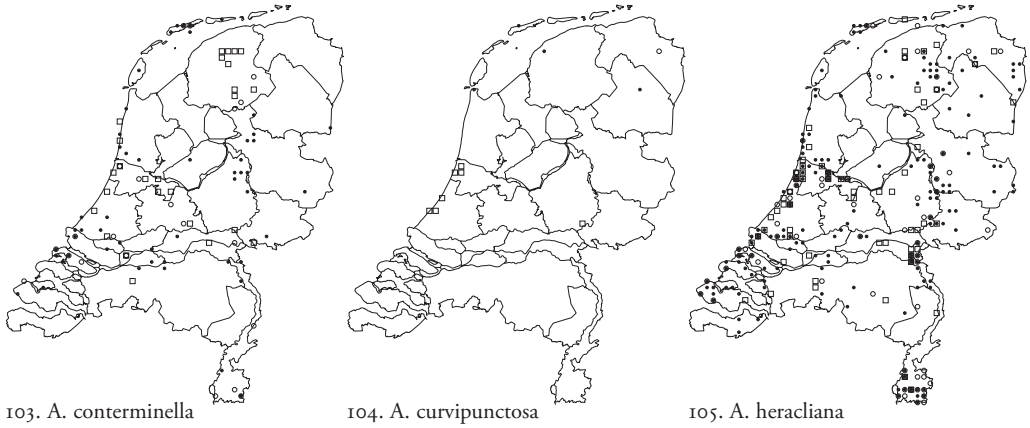
Figure 97-119. Distribution of the Dutch *Agonopteryx* species.
Figuur 97-119. Verspreiding van de Nederlandse *Agonopteryx*-soorten.




97. A. alstromeriana 98. A. angelicella 99. A. arenella



100. A. assimilella 101. A. ciliella 102. A. cnicella



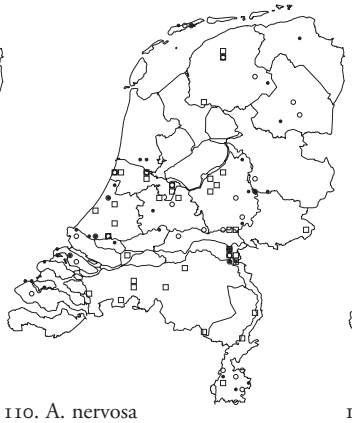
103. A. conterminella 104. A. curvipunctosa 105. A. heracliana

106. A. kaekeritziana

107. A. laterella

108. A. liturosa

109. A. nanatella



110. A. nervosa

111. A. ocellana

112. A. oinochroa

113. A. pallorella

114. A. propinquella

115. A. purpurea

116. A. scopariella

117. A. subpropinquella

118. A. umbellana

119. A. yeatiana

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**SAMENVATTING**

**Het genus *Agonopterix* in Nederland (Lepidoptera: Elachistidae: Depressariinae)**

Na een beknopte inleiding over bouw en biologie van het genus worden alle in Nederland voorkomende soorten kort beschreven, zowel naar uiterlijk als op genitalia, vooral gericht op diagnostische kenmerken. Een deel van de soorten is lastig te onderscheiden. Er worden determinatietabellen gegeven op uiterlijk en op de mannelijke en vrouwelijke genitalia. Een groot deel van de in Nederland gevangen exemplaren is door de auteur gezien; de gegevens zijn opgeslagen in de databank Noctua. Daarmee zijn verspreidingskaartjes, vliegtijddiagrammen en een abundantietabel gemaakt. De meeste soorten in het genus tonen een duidelijke achteruitgang. *Agonopterix laterella* en *A. pallorella* lijken in ons land uitgestorven. Alle exemplaren van *A. atomella* bleken bij onderzoek tot *A. assimilella* te horen. Wat *A. capreolella* werd genoemd bleek een mengsel van andere soorten te zijn. Een deel ervan behoort tot *A. oinochroa*, een nieuwe soort voor onze fauna. *Agonopterix atomella* en *A. capreolella* moeten van de Nederlandse lijst worden geschrapt, *A. oinochroa* toegevoegd. In totaal zijn nu 23 soorten uit ons land bekend.

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