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# ELACHISTID MOTHS OF THE COLLECTION ANTONIO CURÓ AND THE PRE-IMAGINAL STAGES OF *ELACHISTA ADSCITELLA* STAINTON AND *E. POLLINARIELLA* ZELLER

**SUMMARY** - In the Antonio Curó collection of Lepidoptera, of the Museo Civico di Scienze naturali "E. Caffi" in Bergamo, Italy, some species have been assigned to Elachistidae that are presently included in different families. Among the latter there are Coleophoridae, Scythrididae, Momphidae, Cosmopterigidae, and also Heliozelidae. The Elachistids, as they are currently considered, are represented by seven species, all of the genus *Elachista.* Data on the pre-imaginal stages are given for two of them, *E. adscitella* Stainton and *E. pollinariella* Zeller.

**RIASSUNTO** - I lepidotteri Elachistidi della collezione Antonio Curó e gli stadi preimmaginali di *Elachista adscitella* Stainton ed *E. pollinariella* Zeller

Nella collezione di Lepidotteri di Antonio Curó del Museo Civico di Scienze naturali "E. Caffi" di Bergamo agli Elachistidae sono attribuite specie che attualmente vengono assegnate a famiglie diverse. Sono comprese, tra le altre, Coleophoridae, Scythrididae, Momphidae, Cosmopterigidae e anche Heliozelidae. Gli Elachistidi, come sono ora intesi, sono rapprentati da sette specie, tutte del genere *Elachista*. Di due di queste, *E. adscitella* Stainton e *E. pollinariella* Zeller, vengono forniti dati sugli stadi preimmaginali.

**KEY WORDS:** Lepidoptera Elachistidae, Curó Collection, Bergamo, biologia, Italy

## ELACHISTID MOTHS OF THE COLLECTION ANTONIO CURÓ

P. Trematerra (1993) dealt exhaustively with Antonio Curó's life (1828-1906), his intense activity as a naturalist, his relations with the most relevant entomologists of his time, the consistency of his important collection of Lepidoptera, and its final collocation in the Museum of Bergamo. The specimens of the family Elachistidae present in this collection are eight, belonging to seven species and, except for one of them, they were received in exchange (or purchased?) from O. Staudinger.

In the revision of this material the sistematic placement proposed by Parenti (1996) was followed. For each species the notes written on the original cards of each specimen are given hereunder.

**1.** *Elachista adscitella* ( Stainton, 1851 ) - *E. adscitella*, Germania, da Stg. [Staudinger] (1♀); *adscitella*, est. 82 – (♂♀) (1♂) (321.).

**2.** *Elachista albifrontella* ( Hübner, [l 817] ) - *E. albifrontella*, Germania, da Stg. (1♂) (319.).

**3.** *Elachista argentella* ( Clerck, 1759 ) - *E. argentella*, Germania, da Stg. (l♂) (324.).

**4.** *Elachista dispilella* Zeller, 1839 - *E. dispilella*, Germania, da Stg. (1♂) (323.).

* Research carried out within the programme "Byosistematics of Lepidoptera Elachistidae" (Funds M.U.R.S.T. 60%).

***5.*** *Elachista luticomella* Zeller, 1839 - *E. luticomella*, Germania, da Stg. (1♀) (320.).
***6.*** *Elachista nobilella* Zeller, 1839 - *E. nobilella*, Germania, da Stg. (1♂) (318.).
**7.** *Elachista pollinariella* Zeller, 1839 - *E. pollinariella*, Germania, da Stg. (1♂) (322.).

## THE PRE-IMAGINAL STAGES OF: *ELACHISTA ADSCITELLA, E. POLLINARIELLA*

### Materials and Methods

The leaf fragment holding the just laid eggs is inserted in a 2 ml Eppendorf micropipette having a flat cap. All of this is transferred into a freezer at a temperature of at least -15 °C before successive analyses or the treatments necessary for photography at the scanning electron microscope.
The larvae, whatever is their developmental stage, are killed by means of ethyl acetate vapours and preserved dry in gelatin capsules (mm 15 of length; mm 5 of diameter) that are usually employed to contain medicines in powder or granules. Dry preservation is fundamental for the treatment they must undergo to point out the prothoracic and anal sclerified plates. For this purpose, in fact, the larvae are dipped for two-three hours in a solution of 10% KOH and distilled water. At a half-time, using a microlancet (the point of an insuline syringe needle Pic indolor U-40 Insulina serves perfectly) the larva is divided into three parts with two cuts: one between the first and second abdominal segment, the second between the sixth and the seventh ones. The cuts favour the penetration of the KOH solution and the demolition of proteins. Everything gets more difficult if the larvae were preserved in alcohol or, as it sometimes happens, in a mixture of alcohol and glycerin. After the maceration, the larval fragments are dipped for few seconds in a solution of 10% glacial acetic acid and distilled water to neutralize the effect of KOH. Then everything is transferred into alcohol 70°C. Here, after having detached delicately the head of the larva with the microlancet, the portion comprising the three thoracic segments and the first abdominal segment with the legs is directed towards the operator. At this point the right borders of the four segments are cut without compromising the prothoracic sclerified plates, so that the segments can be opened like a book. Using two micropins, one straight and the other one bent at the point, all debris are accurately eliminated as well as the various impurities inside and outside the different parts of the larva. Three cover glasses protect respectively: a) the first four segments opened bookwise and always with the thoracic legs directed towards the operator, b) the abdominal segments with the prolegs directed towards the observer, c) the head and the last abdominal segments, including the anal one, with the back upwards. On one side of the glass, a tiny rectangle of paper keeps the cover glass lifted so to prevent a complete squashing of the anal segment.

### *Elachista adscitella* Stainton

*E. adscitella* is spread and common in all Europe where it lives expecially on Gramineae (Parenti & Varalda, 1994) (*Brachypodium sylvaticum*, *Calamagrostis arundinacea*, *Descampsia cespitosa*, *D. flexuosa*, *Elimus caninus*, *Festuca altissima*, *F. drymeia*, *F. gigantea*, *Melica nutans*, *M. uniflora*, *Millium effusum*, *Poa caixii*, *P. remota*, *Sesleria albicans*, *S. argentea*, *S. caerulea*, *S. sadlerana*). Among the Cyperaceae only *Carex elata* is reported.
Its biology, already described by Stainton (1858) with a certain precision, was carefully analyzed by Steuer (1976) and Bland (1996). Steuer supplied the drawings of the larval sclerified plates. Some schematic drawings and clear photographs of the latter were made (Parenti, 1984) using

the last larval exuvia.
A set of rearings carried out starting from couples collected in the field and using *Sesleria caerulea* as a host plant, permitted to study the pre-imaginal stages. The rearings, always made in the laboratory, but starting from infested plants collected in the field, never gave good results, because of a very high number of larvae parasitized by microhymenoptera (Parenti et al., 1995), above all *Apanteles viminetorum* Wesmael (Braconidae, Microgasterinae).
The egg is generally laid singly on the lower leaf page, in a fold between two veins. The shape is that of *Elachista metella* (Kaila & Junnilainen, 2002) characterized by long longitudinal carinae that make it look like a cocoon of *Bucculatrix* (Parenti, 1991).
The larva, having a dark olive colour, reaches 7-8 mm at the end of its development. On the back of the first thoracic segment one can see, on the sides of the tergal plates (fig. l), two circular areas that are light, because not involved by the thick mosaic of sclerified granules and rods that occupies the surrounding parts (fig. 4). Some light areas, but elongated and irregularly oval, are present transversally on the other thoracic segments. A similar situation is obvious on the ventral side.
The two tergal plates (fig. l), each having the shape of a stumpy symmetrical L, appear strongly sclerified, except in their proximal part. Their surface, covered with obvious longitudinal reliefs, is interrupted by light areas that seem craters. The sternal plate, having the shape of a stumpy sand-glass (fig. 2) has the greater sclerifications at its poles. The obvious anal plate (fig. 3) occupies practically the whole segment. The thin and elongated microplates of the prolegs of the anal segment cannot be always easily seen.
In the Graminaee with broad leaves, two to three mines may stay on the same leaf. The larva overwinters inside its mine and in spring, before pupating, it feeds on a newly developed leaf. Pupation takes place on the leaf or at the base of the host plant. *E. adscitella* generally accomplishes in north Italy two generations a year and the adults are on the wing from May to mid or end August. The pupa (fig. 8), here drawn for the first time, has an average length of 5 mm. The anterior lobe of the pronotum has the external border slightly wavy. On the surface of the mesonotum one can see two long sinuous longitudinal crests made of a succession of minute round or more or less elongated oval structures. On the sides there are two shorter but wider crests, made of three or four irregular oval lobes. The lateral edges have two minute anterior prominences that a rounded expansion on a lower level divides from a more obvious posterior one. The couple of anterior prominences is accompanied towards the inner part of the mesonotum by two tiny reliefs. The fracture line is complete. The pterothecae have wavy edges and are clearly obvious from a dorsal view until the end of the 2$^{nd}$ abdominal segment. As far as the abdomen is concerned, the longitudinal crest develops from the mesonotum to the last segment, interrupted only in correspondence with two sutures between the 4$^{th}$ -5$^{th}$ and 5$^{th}$ -6$^{th}$ segments. The cremaster is made of thin two tufts of hooks on as many obvious prominences of the ventral part of the 10$^{th}$ segment and of seven-eight hooks spread on the ventral and dorsal parts of the same segment. The pupa is exposed attached only by the anal end and a single girdle which passes over the abdomen, lying in the suture between the fourth and fifth abdominal segments.

***Elachista pollinariella* Zeller**
This species is widespread in Europe. It is not recorded in the British Isles, Norway and southeastern regions, from Yugoslavia to Greece.

The larvae live on Gramineae (Parenti & Varalda, 1994) (*Brachypodium sylvaticum*, *Elymus repens*, *Festuca arvernensis*, *F. longifolia*, *F. ovina*, *F. rubra*, *Poa pratensis*, *P. trivialis*, *Trisetum flavescens*).
Its biology was described by Steuer (1987) who depicted the larval sclerites, but not the pupa. Some details of the latter are supplied instead by Patocka (1999).
The larva, of a dirty white colour, reaches the length of 5-6 mm at the end of its development. The prothoracic tergal plates (fig. 5) are two long structures that broaden clubwise at the distal ends. The sternal plate (fig. 6) has the shape of a thin sand-glass that narrows at two thirds of its length. The drawing by Steuer showing this plate as a coarse Y is due probably to some difficulty to observe the preparation. The anal plate (fig. 7) is a tiny suboval structure having the edges indented. Above the plate, on the sides and in the lower part, there are pairs or isolated long and thin setae.
The larva pupates generally at the base of a leaf or in the lower part of the stalk. *E. pollinariella* in north Italy seems to be univoltine, with adults on the wing from end May to the beginning of July.
The pupa (fig. 9) has an average length of 5 mm. The anterior edge of the pronotum is smooth. The mesonotum shows a poor ornamentation, two short longitudinal and poorly prominent crests and on the sides two minute and poorly obvious reliefs. The external profile has two or three small teeth in the anterior part, followed by a wide hollow in the middle, having a marked conical structure on a lower level. The fracture line is complete with the edges showing some short and poorly incised grooves in the central part. The pterothecae are smooth. Concerning the abdomen, the longitudinal crest is complete and involves also the metanotum. $9^{th}$ and $l0^{th}$ segments are fused in a semi-oval complex. In the observed pupae, the cremaster was absent.

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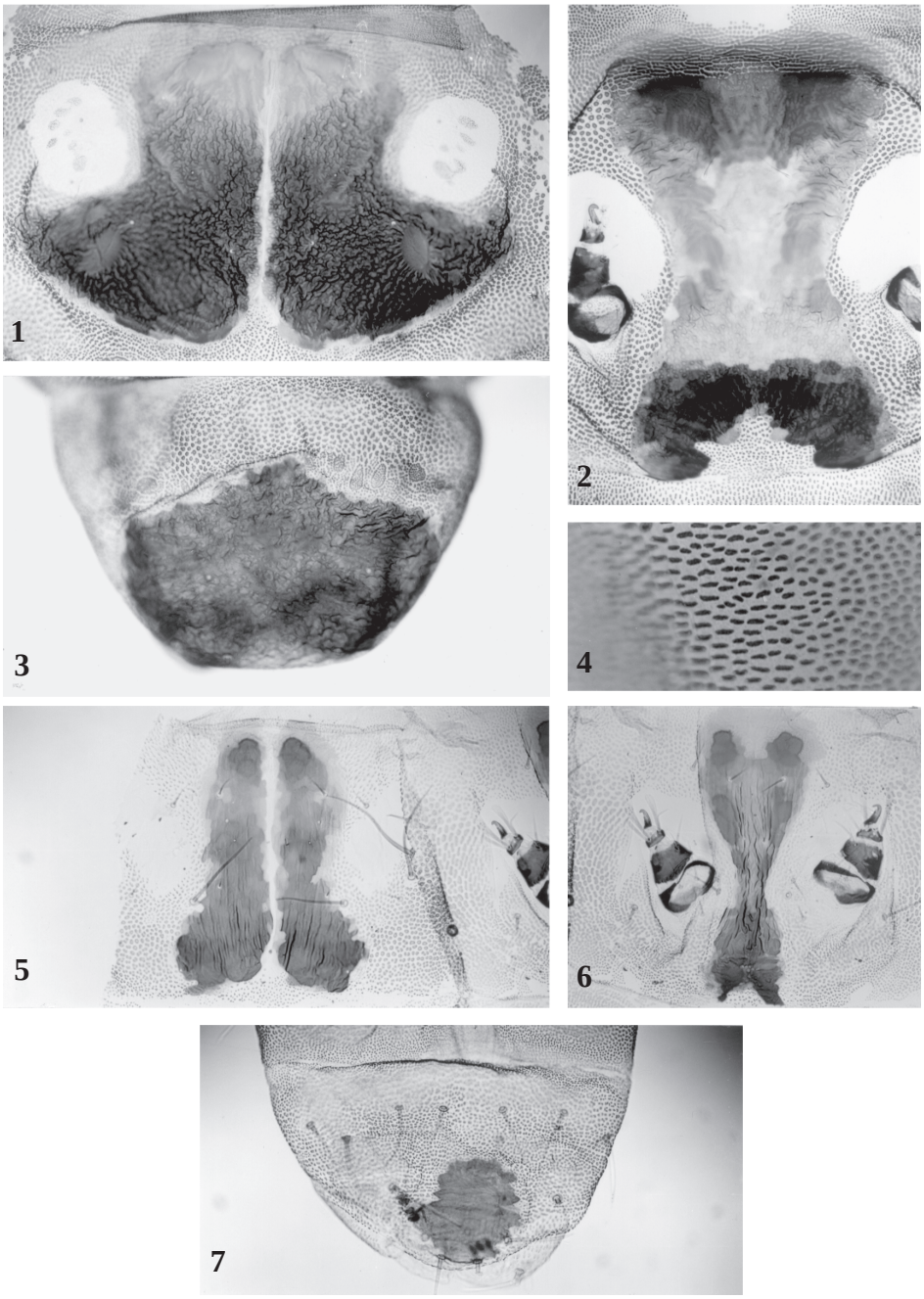
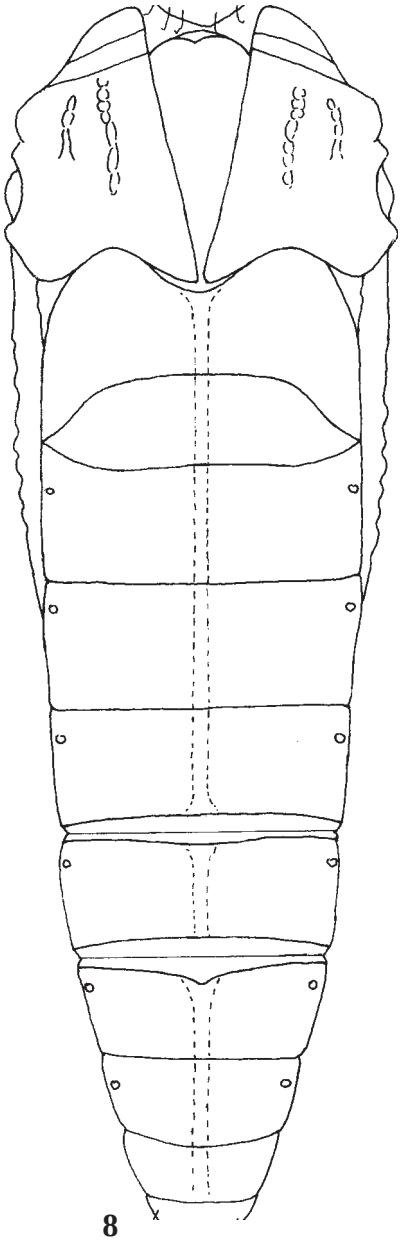



Figs. 1-7. Tergal plates of *E. adscitella* (fig. 1); sternal plate (fig.2); anal plate (fig.3); cuticolar with sclerified granules and rods of *adscitella* (fig.4); tergal plates of *E. pollinariella* (fig.5); sternal plate (fig.6); anal plate (fig.7).



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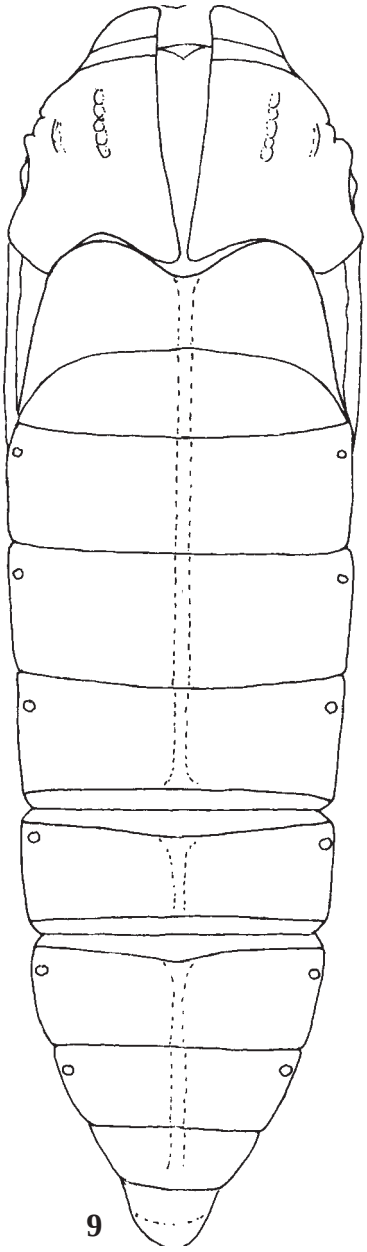

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Figs. 8-9. Pupa of *E. adscitella* (lenght mm 5) (fig.8); Pupa of *E. pollinariella* (lenght mm *5)* (fig.9).

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