

Contributions to the biology and morphology of the *Acleris variegana* (DENIS & SCHIFFERMÜLLER 1775) species (Lepidoptera: Tortricidae)

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Contribuții la cunoașterea biologiei și morfologiei speciei *Acleris variegana* (DENIS & SCHIFFERMÜLLER 1775) (Lepidoptera: Tortricidae)

Rezumat

Autorul face o descriere generală a speciei *Acleris variegana* (DEN. & SCHIFF.) și discută aspectele morfologice ale stadiilor de dezvoltare (larvă, pupă, imago), subliniind aspectele tratate incomplet sau eronat în literatură. Descierile sunt însoțite de figuri originale.

Autorul demonstrează clar existența a două generații anuale în condițiile climatice oferite de Moldova mijlocie și o singură generație anuală în condițiile zonelor montane și submontane. Hibernarea are loc în stadiul de ou. Ponta este depusă pe suprafețele netede ale ramurilor.

Summary

The present paper performs a general description of the *Acleris variegana* (Den. & Schiff.) species, discussing the morphological aspects of the development stages (egg, larva, pupa and the adult) especially on the aspects incompletely or confusedly treated by the literature of the field. These descriptions are accompanied by original figures.

As to the biology of this species, the author has clearly demonstrated the existence of two yearly generations under the climatological conditions of the Middle Moldavia and a yearly generation in the mountainous and submountainous zones. The hibernation occurs on the egg stage, which is laid down on the smooth surface of the branches.

Keywords: *Acleris variegana* (DEN. & SCHIFF.), biology, development stages, morphological aspects.

Introduction

The *Acleris variegana* species belongs to the *Totricini* tribe from the *Tortricinae* subfamily. It is spread over the whole Europe, as far as North Scandinavia, as well as in North Africa, Middle Orient, Central and Eastern Asia as far as China, being introduced in North America, too. In Romania, it is present on the whole territory of the country.

Larvae feed themselves with leaves of some forestry and fruit trees and bush species belonging to the following genera: *Malus*, *Pyrus*, *Prunus*, *Crataegus*, *Rosa*, *Rubus*, *Ulmus*, *Carpinus*, *Corylus* and others.

Although the role played by this species in the polyphagous tortricides complex is restricted to the orchards, one should not exclude the possibility as, under certain biotop conditions, *Acleris variegana* be-

come a pest with economic consequences.

Material and method

With a view to studying the species biology and morphology and to describing all the development stages, attacked organs (such as buds, the extremity of the undergrowth or leaves) containing caterpillars of various ages were periodically collected, starting from spring until August - September between 1992 - 1997.

The caterpillars were individually grown-up in test tubes. The feed was constituted of fresh leaves of the fruit trees species on which they were collected.

The adults obtained in such conditions were introduced into a cylindrical glass vessel, 25 cm in diameter and 35 cm height, covered with a gauze. For the feed of the butterflies sugar syrup was used, and as a

support for the oviposition - apple leaves branches were used. For maintaining the tuger leaves, the branches were introduced into a vessel containing water.

Results and discussion

a) Description of the development stages

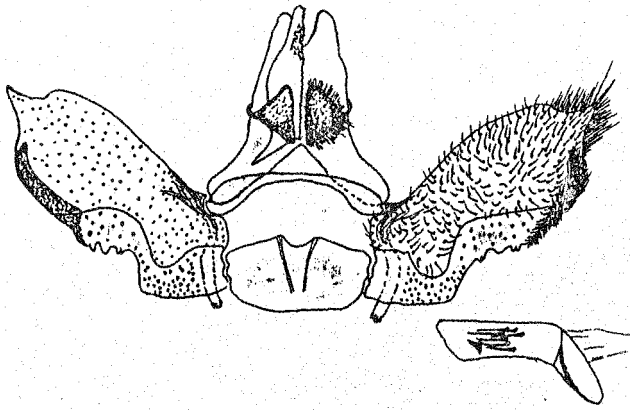


Fig. 1. Male genitalia of *Acleris variegana* (D. & S.)

The male genitalia (Fig. 1) was characterized by the following aspects: reduced uncus; the tegumen - uncus complex is apically bifide; the ventral part of the anal tube is sclerotized and fused with rests from gnatos forming subscaphium (longitudinal section); the latter is smooth and presents apically, on the medium-ventral part, a rhombical zone with short bristles; the socii are well developed, membraneous, triangular and abundantly hairy; the transtilla is well developed; the vinculum (median line section) is "U"- shaped; the saculus is well developed, on the ventral edge presenting a toothed groove valva; the distale (posterior) edge of the valves is sharp and their inner face is abundantly hairy; the aedeagus has 6-8 elongated cornuti, one being thicker, with three peaks.

Female genitalia (Fig. 2) has the following characteristics: corpus bursae is big and oval; the signum is flattened, toothed and rhombical; the sterigma presents two well developed lateral lobes oriented towards the anterior side; the posterior-median part of the sterigma is prolonged between the ventral lobes of the tergita VIII and covered with short hairs; on the latero-median parts of the sterigma there are two pairs of longer hairs; the distal part of the ductus bursae is sclerotized and it presents a characteristic pattern; the posterior edge and the ventral lobes of the tergita VIII present, to the external part, a reduced number of long hairs, among which there are several short ones; papilla anales are

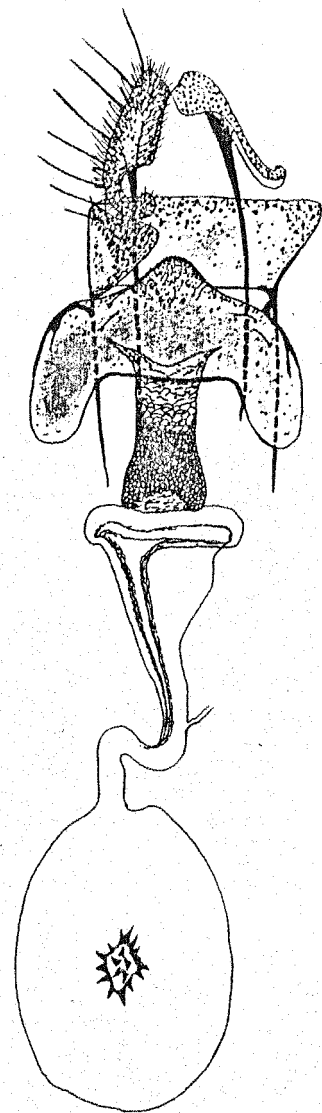


Fig. 2. Female genitalia of *A. variegana* densely haired, of which 8 pairs of hairs are longer and are inserted on the latero-dorsal part; the hind apophyses are longer than the anterior ones.

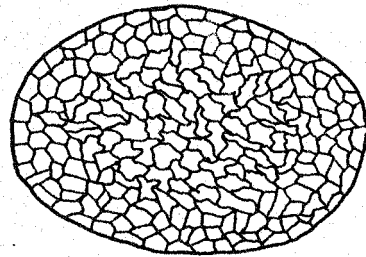


Fig. 3. Chorion reticulate of the *A. reticulana* egg

The egg (Fig. 3) is ovoidal, lenticular, with the median

length about 0.9 mm (from 0.87 mm up to 0.94 mm) spots on each hemisphere, one at the level of the eyes

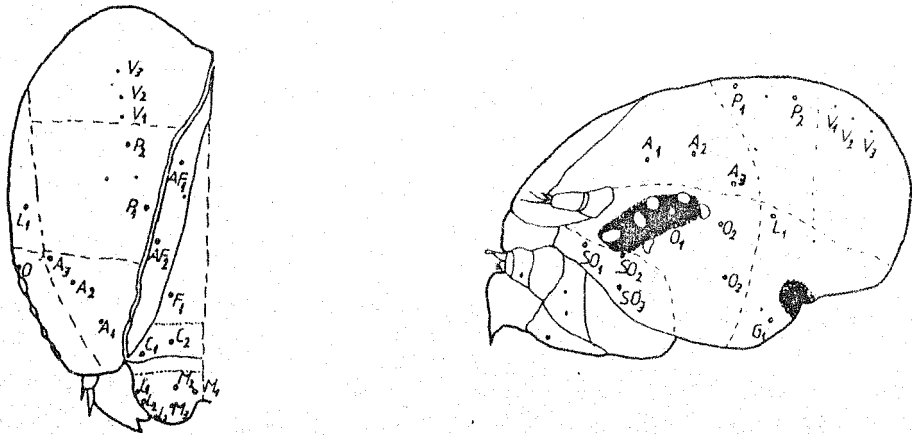


Fig. 4. Cephalic capsula of mature caterpillar of *A. variegana*. a = lateral view; b. = dorsal view

and the median width about 0.62 mm (from 0.58 up to the 0.65 mm). The corion is transparent and presents a reticular ornamentation. Towards the egg edge, the loops of the system are polygonal while, in the central zone, have waved edges. The egg is yellowish in colour in the first 3 - 4 days, after which it changes in red - brick.

The neonata caterpillar has the cephalic capsule dark brown - blackish coloured the rest of the body being yellow - greenish, with the digestive system redish in colour. The length of the body is about 1 mm, the

and the other at the genale zone. The maxillar palpa has the second segment about 1.5 times longer than the third one. The coronalis suture is longer, approximately two times than the width adphrontalia; the distance $F_1 - AF_1$ is shorter than $AF_1 - AF_2$ and the distances of the $A_1 - A_2$, $A_2 - A_3$ and $A_3 - L_1$ are approximately equal. The distance of ocelli I - II and ocelli II-III are approximately equal, too.

The dorsal plate of the prothorax is yellow - brownish with a dark brown- blackish spot on the latero-posterior edge. There are some caterpillars where the tho-

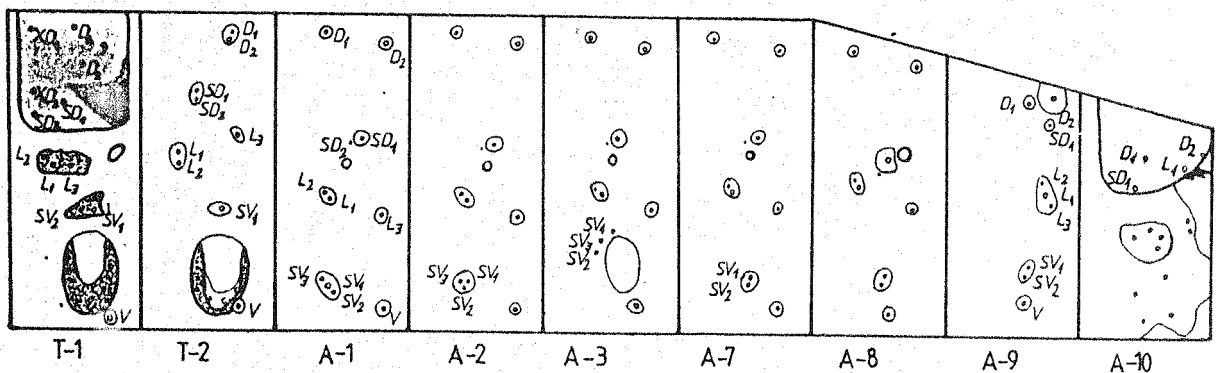


Fig. 5. Thorax and abdomen chaetotaxia of mature caterpillar of *A. variegana*

width is about 0.15 mm and the cephalic capsule is about 0.22 mm.

The mature caterpillar (Fig. 4-a,b; Fig. 5) is about 12 - 14 mm in length and the body is yellow - greenish.

The cephalic capsule is dark brown-yellowish with a width of about 1.3 mm presenting two dark-brown

racic shield does not present those spots. The $SD_1 - SD_2$ distance is longer, or at least equal with the $SD_2 - XD_2$ distance. The prothoracic spiracle is big and slightly elliptical in form.

On the mezothorax, SD_1 is vertically placed cursir the SD_2 while V is placed near the coxa.

On the abdomen, on all the segments, the length of L_2 is approximately half of L_1 . On the A_1 - A_8 segments, SD_2 is not on the same wart of SD_1 . The SV group of hairs on the $A_{1,2,7,8,9}$ has the following formula: 3:3:2:2:2; On the A segment, the spiracle is big and rounded, SD_1 is ventrocranial to the spiracle and the distance between the D_1 hairs is as long as the distance between the D_2 hairs. On the A_9 segment, the D_2 hairs are on the common wart, D and SD_1 are on the separated warts and while L_{1-3} hairs are placed on the same wart. The distance between the V hairs on the A_9 segment is longer than the distance between V hairs on the A_8 segment. On the A_{10} segment, the anale shield is yellow-brownish, the anale comb is well developed being formed of six bristles. The abdominal prolegs are not sclerotized on the lateral parts and have about 50 hooks which are placed in a double crown form. The anale prolegs have the semicrown formed of about 35 hooks, placed on two lines too.

the anale zone, being placed are follows: four on the ventral part, between the bristles of the cremaster and anteriorly oriented; one on each lateral part of the cremaster and antero-ventrally oriented; one on the dorsal part of each lateral bristle of the cremaster and ventrally oriented.

b) Biology

The scientific literature concerning the biology of this species is scarce and sometimes confusing, especially on the yearly cycle (the one or two generations) and the hibernation mode (egg or adult).

The results of the correlations made between the observations from the environment with those from laboratory conditions, have established that, in the climatic conditions of the Middle Moldavia (for example: Iasi), *Acleris variegana* has two generations, with flying of the adults in June - July and August - September. In the mountainous (for example: Făgărași - BV) and

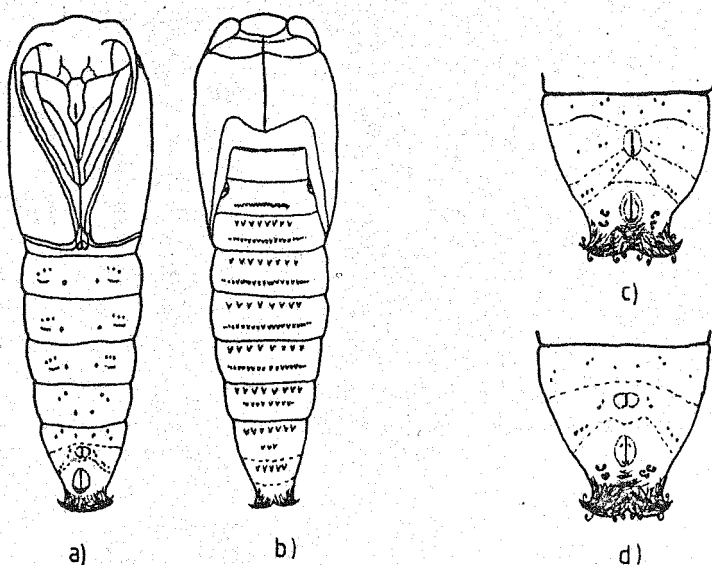


Fig. 6. Pupa of *A. variegana* a = male pupa - ventral view; b = male pupa - dorsal view; c = genito-anal area of female pupa; genito-anal area of male pupa

Pupa (Fig. 6-a,b,c,d) is red - dark brown coloured and has a length of about 8 - 9 mm. The maxillar palpa are missing. The front side is anterior, slightly rounded. Dorsally, on the A_2 segment, there is just one hind line, on the A_9 segment there is only an anterior line, and on the A_3 - A_8 segments there are both lines of the bristles. The cremaster is short, being formed of two lateral bristles which are curved antero-ventrally. On the anale area, there are two pairs of short hooks, big, strongly curved at the extremity and applied on the abdomen. On the cremaster there are eight hooks, longer and thicker, less curved at the extremity than those from

submountainous (for example: Crăcăoani - NT) zones, a yearly generation was observed, with the flying of the adults in August - September.

The hibernation occurs on the egg stage; this is red - brick, laid down on the smooth branches of the fruit or forestry trees and bushes (Fig. 7).

The caterpillars resulted from the hibernating eggs feed with the compounding parts of the foliar buds or flowering buds, and especially in the summertime, with leaves, sometimes with the pell of the fruits.

Pupation occurs in the feeding shelter of the caterpillars.

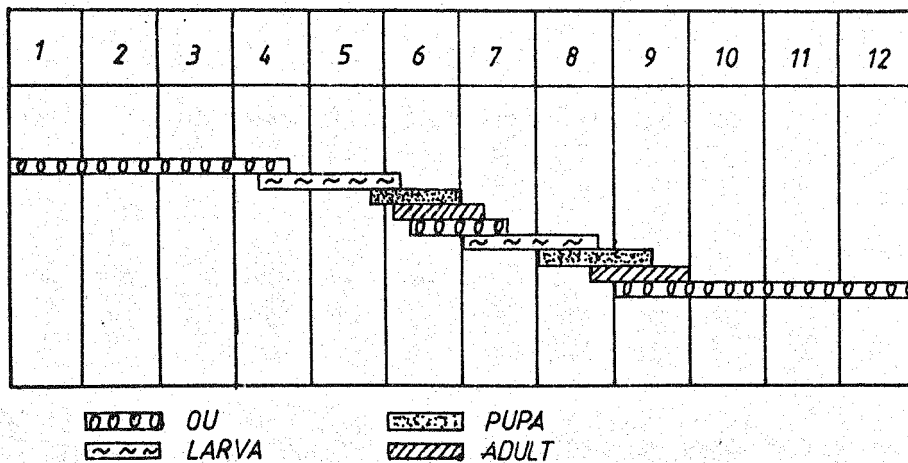


Fig. 7. Yearly biological cycle of *A. variegana*, in Iași

This tortricide species takes part in the foliofage tortricide complex on fruit trees (apple, pear and plum tree), but with a reduced dominance. Thus, after the non-selective collection of the above mentioned tortricide caterpillars, those of *Acleris variegana* have a medium dominance of 1-2%, the highest registered values reaching 9% (Iasi - The Botanical Gardens, Mai 10, of 1996).

Acknowledgements. For the determination of the first adults of *Acleris variegana* obtained in 1992, the author gratefully thanks to Dr. doc. Aurelian POPESCU-GORJ from the "Gr. Antipa" Museum - București.

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