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## A few characters of the adult compound eye and its peripheral area in some Tortricidae (Insecta: Lepidoptera)

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ABSTRACT. Surface of the compound eye and chaetosema and paraocular area of  
12 species of Tortricidae are discussed and illustrated.

Key words: entomology, external morphology, compound eye, chaetosema, paraocular  
area, Lepidoptera, Tortricidae.

### INTRODUCTION

Some data on the morphological structures of the compound eye in adult Tortricidae are presented. YAGI & KOYAMA (1963) in their monograph used three species of this family. For the present study we examined 12 species representing two subfamilies and eight tribes listed as follows. Tortricinae. Tortricini: *Tortrix viridana* LINNAEUS; Cochylini: *Aethes hartmanniana* (CLERCK); Cnephasiini: *Cnephasia incertana* (TREITSCHKE); Euliini: *Eulia ministrana* (LINNAEUS); Archipini: *Pandemis heparana* (DENIS & SCHIFFERMÜLLER), *P. cerasana* (HÜBNER), *Archips crataeganus* (HÜBNER). Olethreutinae. Bactrini: *Bactra furfurana* (HAWORTH); Olethreutini: *Hedya salicella* (LINNAEUS); Eucosmini: *Epiblema sticticanum* (FABRICIUS); Grapholitini: *Cydia pomonella* (LINNAEUS), *Grapholita caecana* (SCHLÄGER).

Photographs of morphological structures were taken by means of scanning electron microscope JEOL JSM-5410 in the Scanning Microscopy Laboratory of the Biological and Geological Sciences of the Jagiellonian University.

## RESULTS

**Compound eye. Facets.** Outer surfaces of ommatidia (the facets) are similarly shaped and sized within the particular species. Small differences may be seen in their regularity on the periphery of the eye. The convexity of cornea is somewhat variable from species to species. The facets are hexagonal, convex, touching one another except for their corners. In those areas or near them in the intervening lines originate the **interfacetal hairs** (YAGI & KOYAMA 1963) which in the, KOYAMA 1971), examined species are sparse and short, for example in *incretana* (Figs 1, 2), *crataegana* (Fig. 3), and *sticticanum*.

**Outer surface of cornea** was always illustrated as being a smooth, variably convex product of a corneagen cell. Under a higher magnification this surface is seen as an agglomeration of convexities or processes (Fig. 2) e.g. 25 processes by one square micrometer in *crataeganus*. They are arranged in dense, rather regular more or less long rows forming altogether a kind of a brush. Their length has not been measured and a longitudinal section through entire cornea would be needed. The function of the brush-shaped structures remains unknown.

The **paraocular area** consists of two parts, the distal portion of which was called by YAGI & KOYAMA (1963) the stair-shaped part characterized by the presence of stout scales (Fig. 5). In the examined species at least two irregular rows of scales are seen. In other species several irregular rows of these scales are found (Fig. 6). The proximal area is free of scales (Figs 6, 7) and was characterized by the mentioned authors as smooth except in Hesperidae in which it had a „smooth texture”. Under SEM the „smooth” portion of the area in question reveals its dense sculpture. It is formed by minute cuticular, thin and sharp spinulae, shorter in the vicinity of the eye, longer more distally. The spinulae are directed towards the organs (eye, ocellus, chaetosema) or reversely; their orientation between the organs is variable (Fig. 8). The breadth of this part varies from species to species and depending on the part of the area. This sculptured area extends towards chaetosema and ocellus and the base of antenna (Fig. 6). The scales of vertex and front are broad and the sculpture of integument between them is rather indistinct. The function of spinulate area is not clear enough but we suppose it may protect the organs against dirt particles. The sculpture of the head capsule at the border of the two parts consists of almost parallel ribs. In *crataeganus* on the ribs numerous mushroom-shaped prominences are observed. They probably are a form of cuticular processes comparable with the spinulae.

The **chaetosema** in the majority of tortricines is rounded or elongate-ovate. In two tribes, viz. Schoenotenini and Euliini (only in the genus *Orthocomotis* DOGNIN, cf. BROWN 1989 it is elongate, arranged transversely). In the examined specimens the sensilla are slender, moderately long (in *caecana* 50-140 micrometers, Fig. 6), sharp terminally (Fig. 9); some anterior setae are occasionally twice longer than the median setae. The chaetosema is edged by a few rows of moderately sized, broad scales. They constitute a continuation of the scales of the stair-shaped part of the paraocular area. Some of them originate also in the convexity of chaetosema. These scales are followed by large scales of various size and shape (bipectinate or tripectinate with shallow terminal incisures) forming the vestiture of vertex.

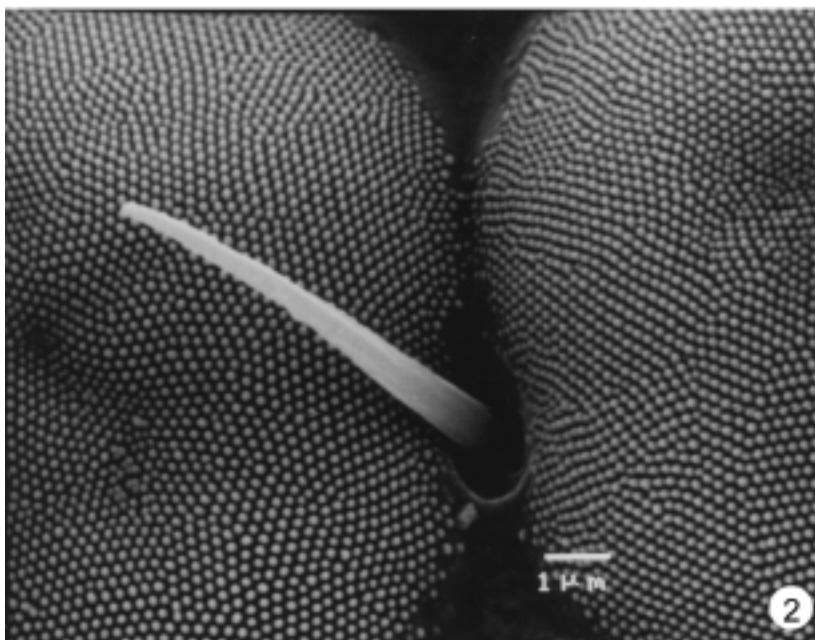
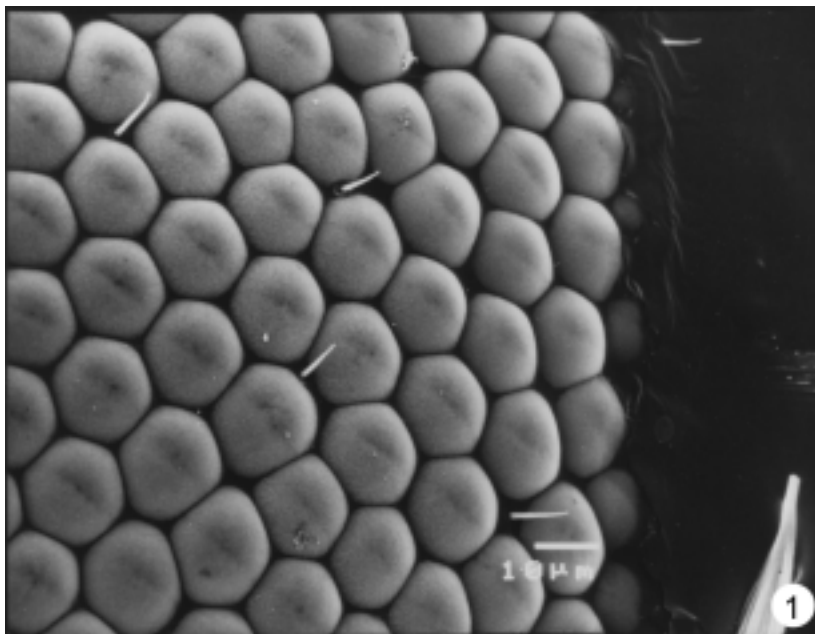
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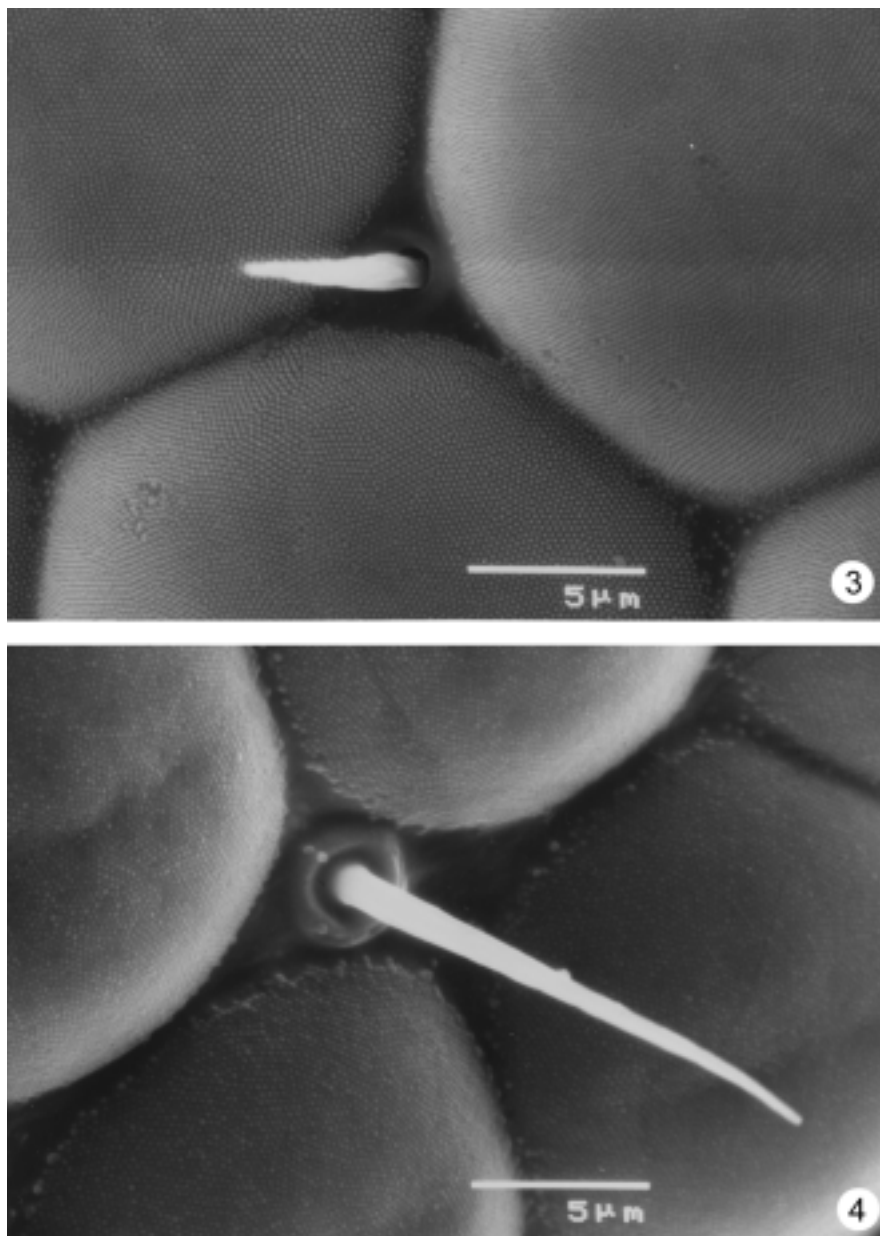
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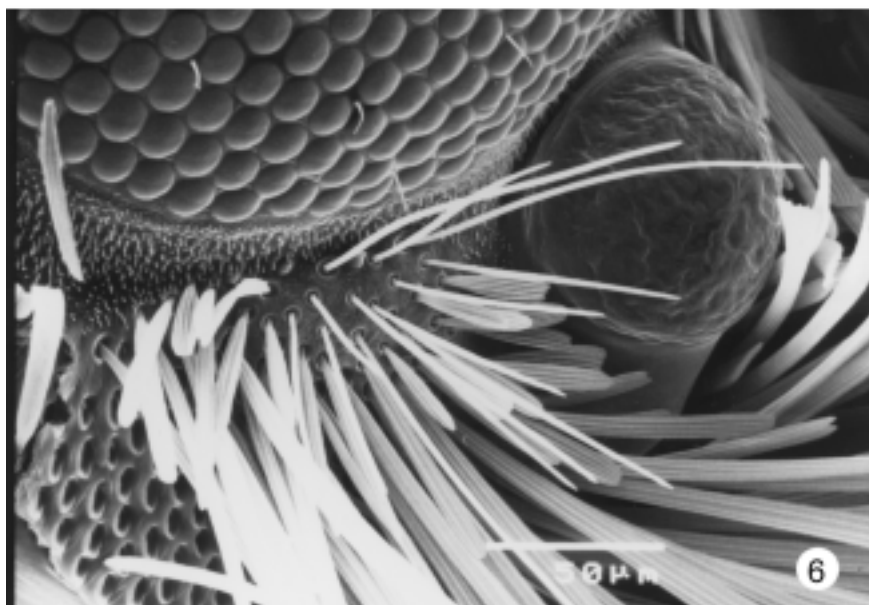
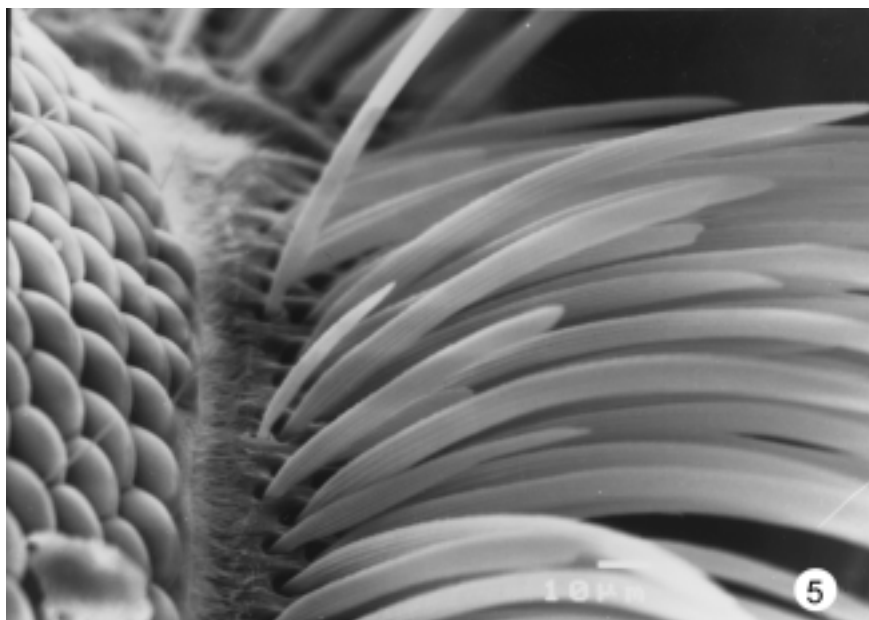
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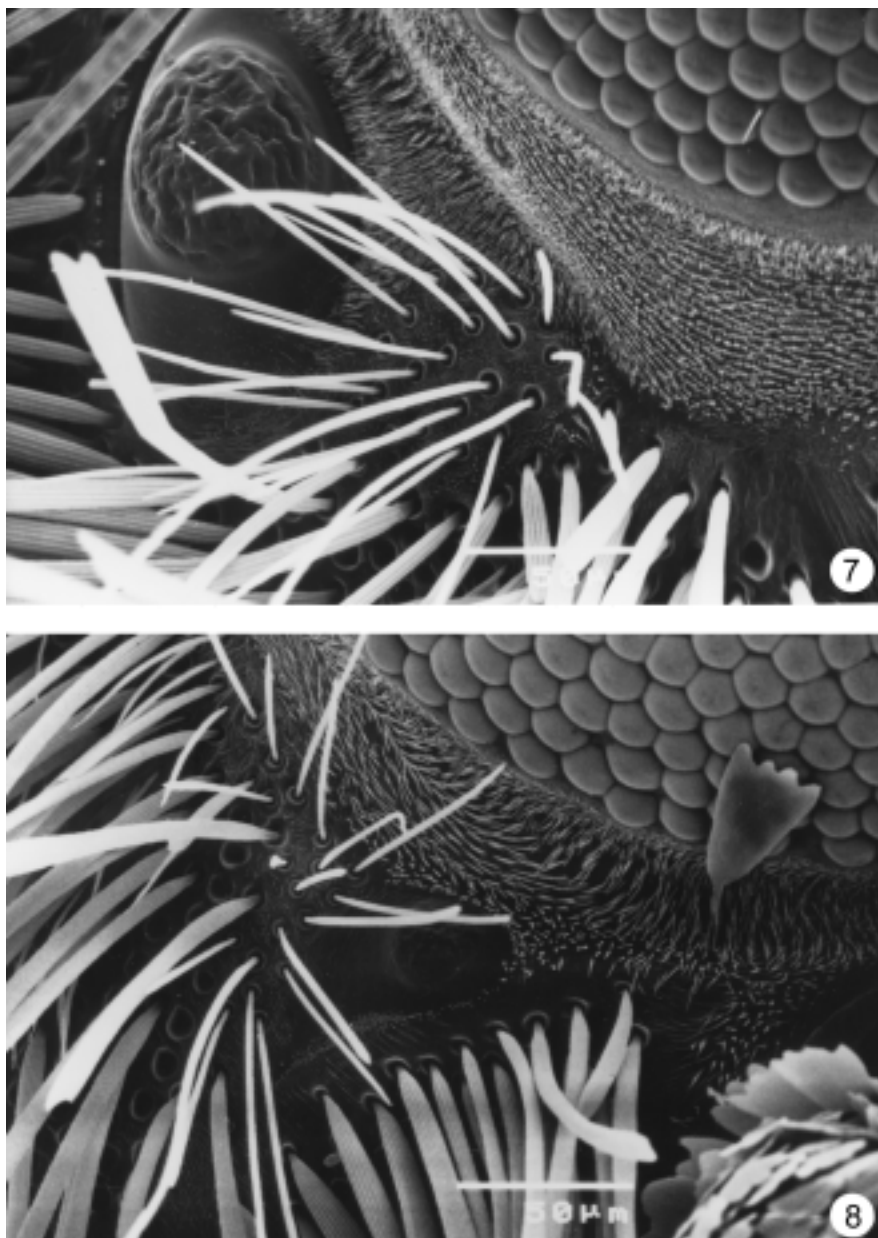
1-2. Outer surface of the compound eye in *Cnephasia incertana* (TREITSCHKE): 1 - situation of an interfacetal hairs, 2 - outer surface of cornea and situation of an interfacetal hair in the intervening line



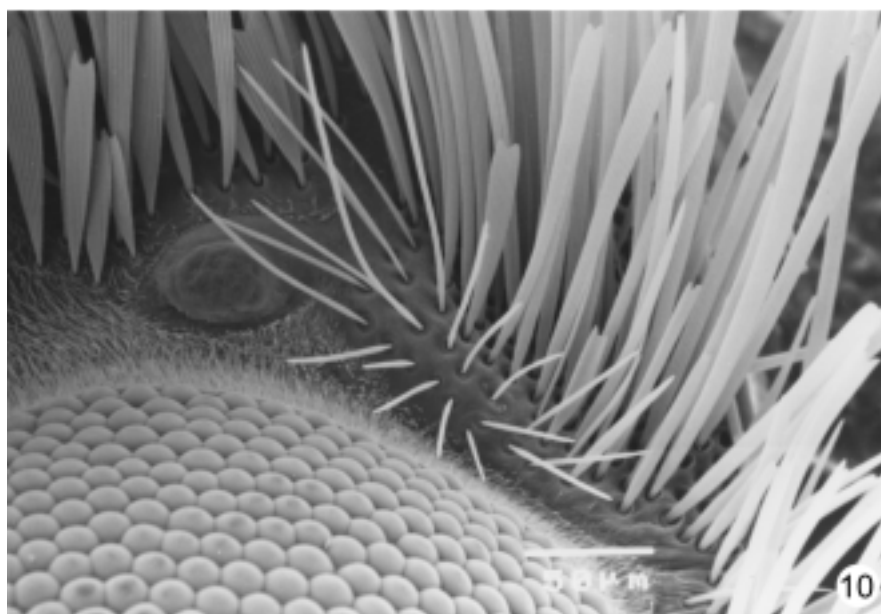
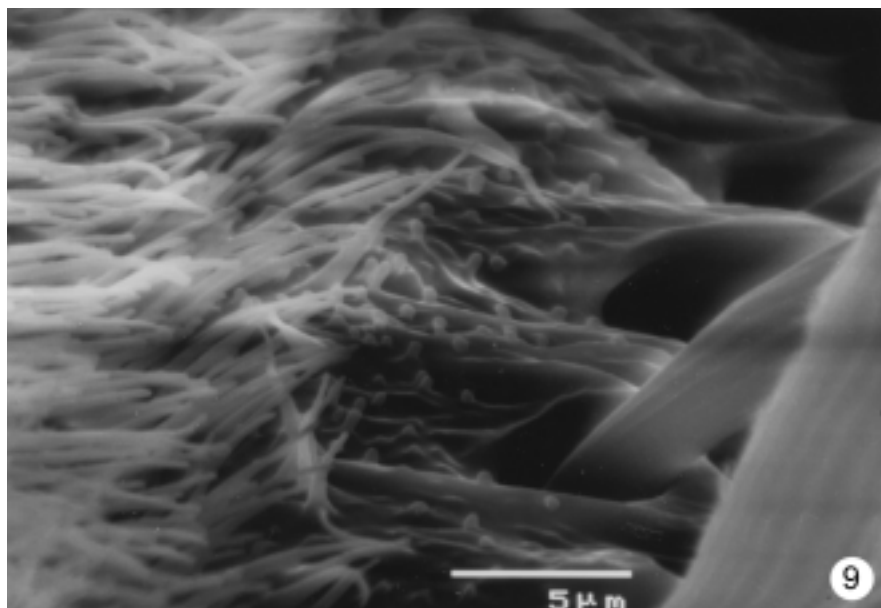
3-4. Position of interfacetal hairs: 3 – position of an interfacetal hair between corners of facets in *Archips crataeganus* (SCOPOLI), 4 - position of an interfacetal hair in the intervening line between facets, with annulus of *Epiblema sticticanum* (FABRICIUS)



5-6. Paraocular area: 5 - stair-shaped part of paraocular area with scales in *Archips crataeganus* (SCOPOLI), 6 - paraocular area with spinulate and stair-shaped parts, ocellus and chaetosema in *Grapholita caecana* (SCHLÄGER)



7-8. Paraocular area: 7 - spinulate part of paraocular area of *Epiblema sticticanum* (FABRICIUS), 8 - arrangement of setulae in paraocular area in *Tortrix viridana* (LINNAEUS)



9-10. Paraocular area: 9 - sculpture of sclerotized ribs between the two parts of paraocular area in *Archips crataeganus* (SCOPOLI), 10 - chaetosema and adjacent scales in *Pandemis cerasana* (HÜBNER)