

Ultrastructure of the Compound Eye of Wingless Stonefly, *Scopura montana* (Insecta, Plecoptera)

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Scopura is the only genus of the family Scopuridae, which is endemic to Japan and Korea. It comprises peculiar wingless stoneflies considered to be relic and with many primitive morphological features (Illies, 1962; Zwick, 1973). Scopuran insects are found under fallen leaves, stones and decayed woods in pools or running waters near the river head, hiding in their shelters in the daytime (Imai, 1977).

The gross structure of the ommatidium of *Scopura montana* is of photopic eye type with a fused rhabdom and resembles those of other orthopteroid insects except that of the Dermaptera (McLean and Horridge, 1977). An ommatidium contains eight retinula cells, which vary in arrangement and in the size at the level of retina. Four retinula cells extend most distally and surround the proximal part of the crystalline cone. Near the proximal tip of the cone, three small cells appear among the former four cells, and the configuration of the retinal cells exhibits a quadrangle in transverse section through the proximal tip of the cone. The former four cells attenuate toward proximal end, and latter three cells thicken approaching the proximal end (Fig. 1). In the proximal part, the proximal (eighth) retinula cell appears. The crystalline cone sheaths separate each other and become four thin extensions among retinula cells and run down almost to the basement membrane along outside of the rhabdom. These extensions are filled with many microtubules.

As a whole, these organization of the ommatidium of *S. montana* closely resembles that of *Oyamia* (Gokan and Nagashima, 1979). However, the cytoplasmic process as a result of developed endocytotic vesicle is the characteristic

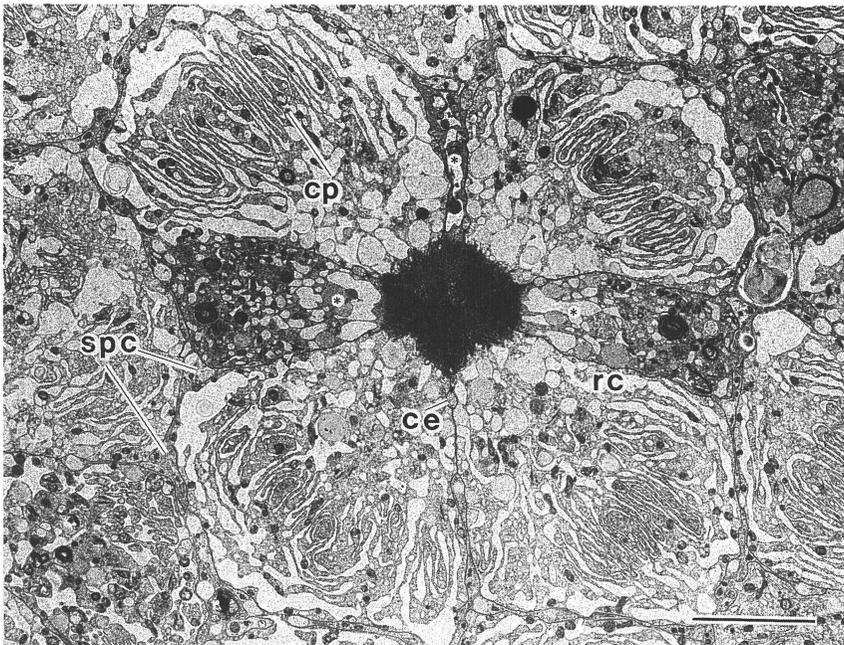


Fig. 1 A transverse section of the distal part of retinula cells. At this level there are seven retinula cells among which three cells (*) are markedly smaller than the others, and they are arranged as a quadrangle in transverse plane. Scale = 50 μ m. ce: cone extension, cp: cytoplasmic process, rc: retinula cell, spc: secondary pigment cell.

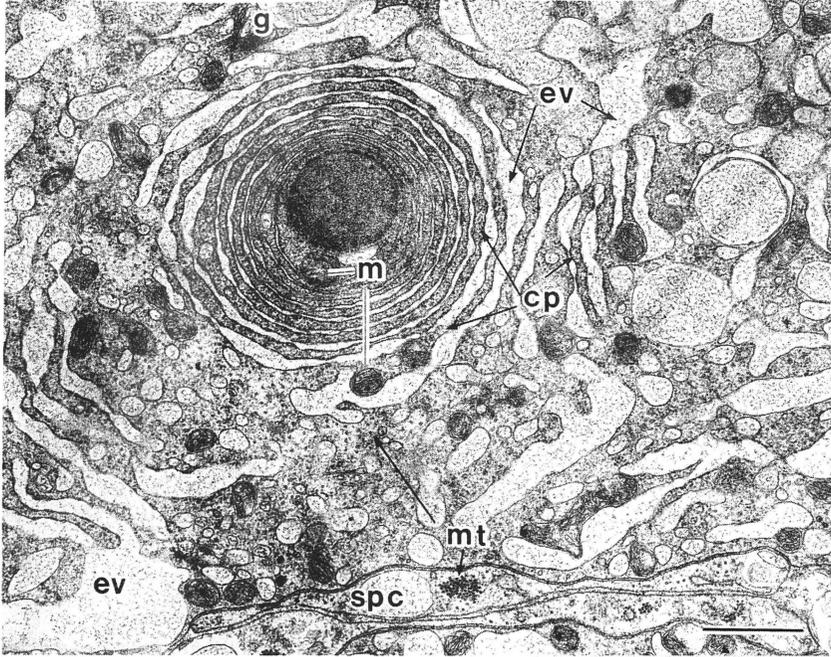


Fig. 2 A transverse section of a retinula cell, showing the characteristic cytoplasmic process (cp) and endocytotic vesicle (ev). Scale=10 μ m. g: Golgi vesicle, m: mitochondria, mt: microtubule, spc: secondary pigment cell.

feature of the present species (Figs. 1, 2).

The influence of light-dark adaptation states of *S. montana* was investigated. The most remarkable influence is the change in the rhabdom cross sectional area. The rhabdomic diameter increases in dark adapted eye and decreases in light adapted eye. The obvious multivesicular bodies, multilamellate bodies and lysosomes as a result of cytolysis of rhabdom, which may be an indication of the metabolic activity of retinula cells, are observed in both light and dark adapted eyes.

References

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