

membrane. The cones extend sclerally to the same extent as do the rods in the light adapted eye. (Figure 2).

Tangential sections reveal that the single and twin cones form a regular mosaic pattern (Figure 3). The single and twin cones are arranged in alternate rows: single cones forming straight lines, twin cones forming zig-zag lines. Moreover, sections through the outer segments show that in the zig-zag lines a segment of the twin cone staining pink always lies opposite a blue staining one. The mosaic unit of twin cones/single cones is shown (Figures 3 and 4). The rods occupy at random all the spaces between the cones.

Discussion. *Pomatoschistus microps* is a bottom-dwelling fish; behavioural observations suggest that the perceptual world of gobies is essentially one of visual and vibrational ('distant-touch') stimuli⁶. It is evident that the retina of *Pomatoschistus microps* is of a pronounced diurnal type. The cones are dominant in number. The pigment epithelium amounts to roughly 1/5 of the entire thickness of the retina; the outer nuclear layer is thin; the inner nuclear layer is relatively thick and the ganglion cell layer compact – all these features are characteristic of a 'cone retina'.

The tiered arrangement of cones, such as observed here, has previously been described for *Lebistes reticulatus* and *Phoxinus laevis*, both diurnal fish⁷. A functional explanation for this arrangement of cones has not as yet been found. It has been suggested, but not confirmed, that the tiered arrangement of the *Lebistes* cones minimizes, or even completely corrects, the chromatic aberration, thereby resulting in a greatly increased acuity⁸. It is interesting to note that in *Pomatoschistus microps*, as well as in *Lebistes reticulatus*, the twin cones form the most scleral tier. Twin cones are, according to WALLS², clearly associated with exposure to bright light.

Regular cone mosaics are a typical phenomenon of the teleost retina. Aside from the teleost retina, regular cone arrangements have been described in a species of bird⁹. Only the cones have been considered to form a regular pattern, with the rods occupying the remaining space, until the studies of DUNN¹⁰. He shows that in the pure rod retina of the gecko (*Coleonyx variegatus*) single, twin and

triplet rods form a regular rectilinear mosaic. The functional significance of the photoreceptor mosaic is obscure. It has been suggested that in teleosts it is advantageous for the perception of fast-moving prey¹¹. There is also in *Pomatoschistus microps* a regular spatial arrangement in regard to the blue and pink staining outer segments of the cones. These may reflect functional differences. It has been shown by microspectrophotometry of single goldfish cones that there are 3 cone types each containing 1 of 3 photopigments which is maximally sensitive in a particular region of the spectrum¹². Since photoreceptors and pigment epithelium constitute a functional system¹³, it would be interesting to investigate, by electron microscopy, if a corresponding mosaic arrangement of organelles within the pigment epithelium exists. This is currently being done in this Department.

Zusammenfassung. Der histologische Bau der Netzhaut von *Pomatoschistus microps*, insbesondere der Sehzellen in Hell- und Dunkelstellung, wurde untersucht. Die Zapfen sind gestaffelt und bilden ein regelmässiges Mosaik: Reihen von Zwillingzapfen alternieren mit Reihen von Einzelzapfen. Die Aussenglieder der Zwillingzapfen unterscheiden sich färbereichs voneinander und sind ihrerseits regelmässig in das Mosaik eingeordnet.

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Cycloheximide-Induced Ultrastructural Changes in the Corpus Luteum of Rats

Cycloheximide, a potent inhibitor of protein synthesis at the translation level¹, produces fine structural alterations (mitochondrial abnormalities, nucleolar segregation, as well as formation of intracytoplasmic myelin figures and large laminated whorls) in the rat adrenal cortex^{2,3}. To determine whether these changes also occur in other tissues, primarily in steroid-secreting cells, we studied the ultrastructure of the corpus luteum in rats treated with this drug.

Twelve female ARS/Sprague-Dawley rats, with a mean body weight of 200 g, were given 10 mg of cycloheximide (Upjohn), dissolved in 1 ml isotonic NaCl, through the jugular vein under light ether anesthesia. These animals were killed 2, 4 or 6 h later, without anesthesia, by dislocation of the cervical spine. 6 untreated rats were used as controls.

Immediately after the animals were killed, specimens were taken from the corpus luteum, fixed in a 2.5% glutaraldehyde solution, postfixed in Caulfield's buffered osmium tetroxide, dehydrated in graded ethanol, and embedded in Epon resin. Ultrathin sections were cut from selected areas in a Porter-Blum MT-2 ultramicrotome, stained with uranyl acetate and lead citrate, and examined with a Philips 300 electron microscope. The ultra-

structure of the corpus luteum of the normal rat ovary has been described sufficiently elsewhere⁴. Hence, it would be redundant to report our findings here.

Two h after cycloheximide treatment, several large laminated intracytoplasmic dense bodies and compact aggregates of agranular membranes were detected in the corpus luteum cells (Figure 1). At 4 h, these aggregates seemed to have increased in number. Some of them displayed a crystalloid pattern; others were transformed into smooth fingerprint-like structures. The number of laminated dense bodies was still significant at this stage (Figure 2). 6 h after cycloheximide treatment, only a few dense bodies were visible in the corpus luteum cells; however, many of them lay free in the extracellular space

¹ A. KORNER, in *The Symposia on Interaction of Drugs and Sub-cellular Components in Animal Cells* (Ed. P. N. CAMPBELL; J. & A. Churchill Ltd., London 1968), p. 335.

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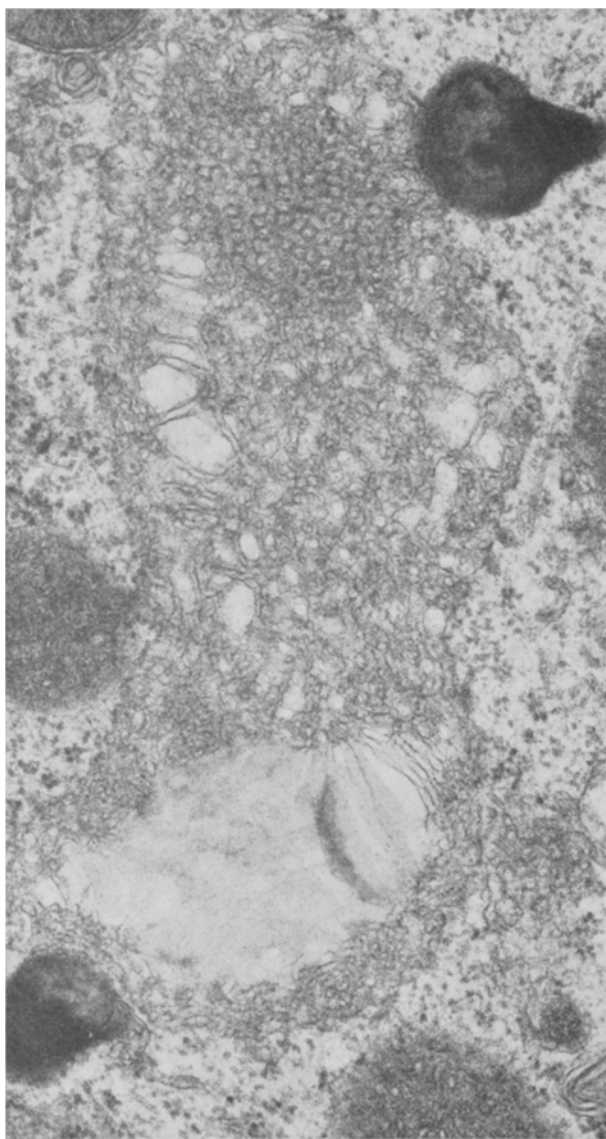


Fig. 1. Corpus luteum cell of rat 2 h after cycloheximide treatment. Part of the tubular smooth-walled membrane aggregate shows a crystalloid pattern, $\times 37,480$.

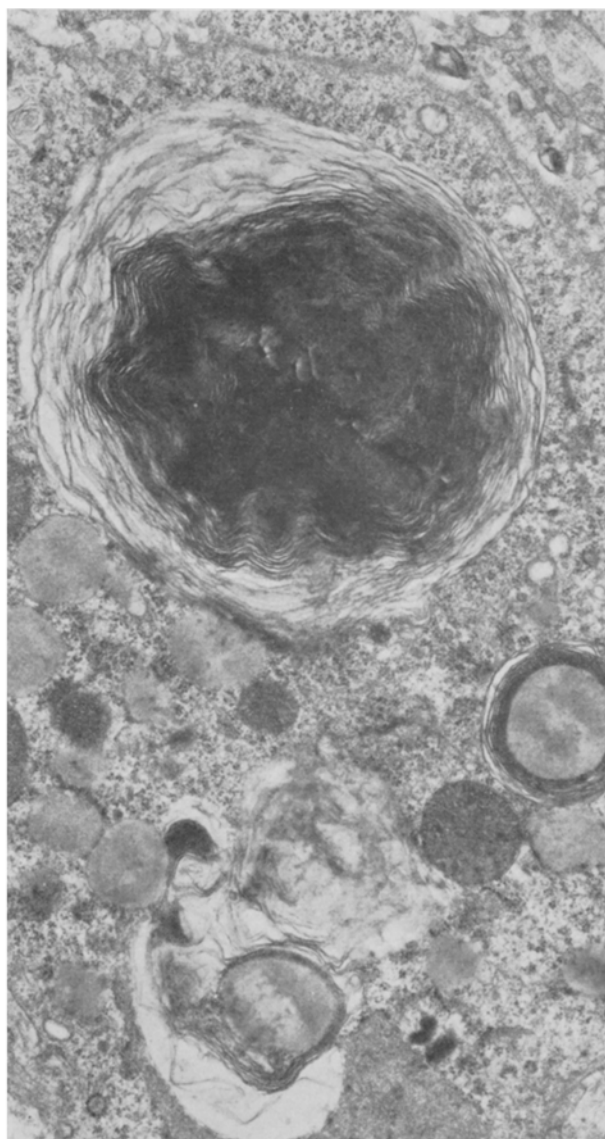


Fig. 2. Dense laminated body in corpus luteum cell of rat 4 h after cycloheximide treatment, $\times 17,000$.

and in the vascular lumina. Smooth fingerprint-like figures were abundant in the cytoplasm. The laminated dense bodies, the membrane aggregates and the fingerprint-like structures lay close to or were connected with the endoplasmic reticulum. In addition, several nucleoli showed fibrillar and granular segregation.

We have not found any literature describing these ultrastructural changes in the corpora lutea of rats. Hence, it remains to be determined whether they are due to inhibition of protein synthesis. In the adrenal cortex, cycloheximide influences the basal secretion of corticosteroids and the response to ACTH^{5,6}. Further experiments are needed to establish whether the ultrastructural alterations in the corpus luteum cells are associated with a functional defect⁷.

Résumé. Le cycloheximide administré à des rats par voie i.v. modifie l'ultrastructure des cellules du corps jaune: ségrégation du nucléole, formation dans le cytoplasme de gros corps laminés et denses et aggrégation des

membranes lisses. On n'a pas encore établi si les modifications induites par le cycloheximide relèvent de l'inhibition de la synthèse des protéines ou d'une anomalie fonctionnelle.

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⁵ G. N. BURROW, *Proc. Soc. exp. Biol. Med.* 134, 870 (1970).

⁶ L. D. GARREN, R. L. NEY and W. W. DAVIS, *Proc. natn. Acad. Sci. USA* 53, 1443 (1965).

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