Résumé. Une lutéolyse ayant été provoquée au moyen de prostaglandine $F_{2\alpha}$ chez la lapine portante, on peut faire apparaître des contractions utérines en administrant de l'ocytocine. Ces contractions sont plus faibles si l'on additionne 10 ou 20 m*M* de théophylline. Cela confirme l'hypothèse d'un rapport entre la sensibilité à l'ocytocine et la production de cyclic 3′,5′-AMP dans la cellule musculaire de l'uterus.

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Ultrastructure of the Neurohypophysial Glial Cells Following Stalk Transection in the Rat

Despite extensive information on the ultrastructure of neurohypophysial glial cells (pituicytes)[1–12] their exact functional significance is as yet unknown. The following findings on the ultrastructure of these cells under experimental conditions cast some light on their possible function.

Materials and methods. Fixation by perfusion with 5% glutaraldehyde of at least 3 rats at 1, 2, 3, 4, 5, 6, 8, 10, 15, 20 and 30 days after hypophysial stalk transection (post trans.) with a Halasz knife[13]. Postfixation in 1% OsO_4, embedding in araldite.

Results and discussion. Initially, the neurohypophysial glial cells react to the transection of the peptidergic neurosecretory axons by gradually surrounding these axons; at around 5 days post transection practically all axons have been engulfed totally[1–6,14]. Together with the engulfment of the neurosecretory axons an increase in the number of lipid inclusions, lysosomes and glycogen particles is found within the glial cells. The definite hypertrophy of the Golgi apparatus very likely reflects an increase in the synthesis of lysosomal enyzmes[15].

As early as 3 days post trans., crystalloid membrane bounded glial cell inclusions occur (Figure 1). In semithin sections[16] these inclusions are aldehydefuchsin positive which enabled us to trace back their origin to engulfed axons within which crystalloid inclusions are first observed when the neurosecretory granules have fused into a homogeneous substance (Figure 2), after disappearance of their bounding membranes. The latter, together with other axoplasmic constituents are incorporated into dense lamellar bodies (Figure 3). Crystalloid inclusions are found only exceptionally prior the engulfment of the degenerating axons by the glial cells. The formation of these inclusions very likely depends primarily upon lytic enzymes from the glial cells. Following the disappearance of the axolemma phagosomes of varying appearance and size are formed (Figure 3).

At around 8 to 10 days post transection, the disposal of the axons is practically terminated[14], and most of the glial cells are devoid of crystalloid inclusions; subsequently lysosomes and lipid inclusions gradually disappear. Concomitantly the glial cells shrink considerably and agglomerate into epitheloid clusters (Figure 4). Frequently they are interconnected by gap junctions (nexus). 30 days post transection, lipid inclusions are extremely rare and only occasional lysosomes and lipopigments remain (Figures 4 and 5). The mitochondria appear to be more numerous than in control animals. Many glycogen particles are present. The profiles of the rough ER are frequentyl slightly dilated and contain moderately dense material (Figure 5), the Golgi apparatus maintains an active appearance and granulated vesicles may be observed in its vicinity (Figure 6). The general appearance of the glial cells at this stage is reminiscent very much of that of the glial cells in the fetal neurohypophysis prior to the arrival of the neurosecretory axons[17]. The perivascular spaces are wider and contain more collagen fibrils than in control animals, they also have a tendency to invade the spaces previously occupied by the neurosecretory axons; pericytes and fibroblasts are present (Figure 4). A typical inflammatory reaction with occurrence of macrophages is lacking. This, together with the absence of glial scar formation is undoubtedly responsible for the ease with which the denervated neurohypophysis may be invaded again by the regenerating neurosecretory fibres[14].

Whenever neurohypophysial glial cells are not contacted by neurosecretory nerve fibres, they are characterized by the absence of lipid inclusions. This suggests that the latter are related to the process of neurosecretion. It has been proposed previously that they represent a transitory phase of lysosomal activity[15,18–20]. The catabolic activity

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of the pituicytes which is very obvious during the disposal of the degenerating axons is very likely operative under normal conditions on certain products released from the neurosecretory axon terminals[20]. However, it seems very unlikely that the release into the blood of the granular constitutents (hormones and neurophysins) require their previous passage through glial cells[21].

It is more likely that the principal normal activity of the pituicytes is participation in the regulation of ionic concentrations along the neurosecretory nerve fibres. DOUGLAS[22] has repeatedly emphasized their importance in the secretion of 'neurohypophysial' hormones. The

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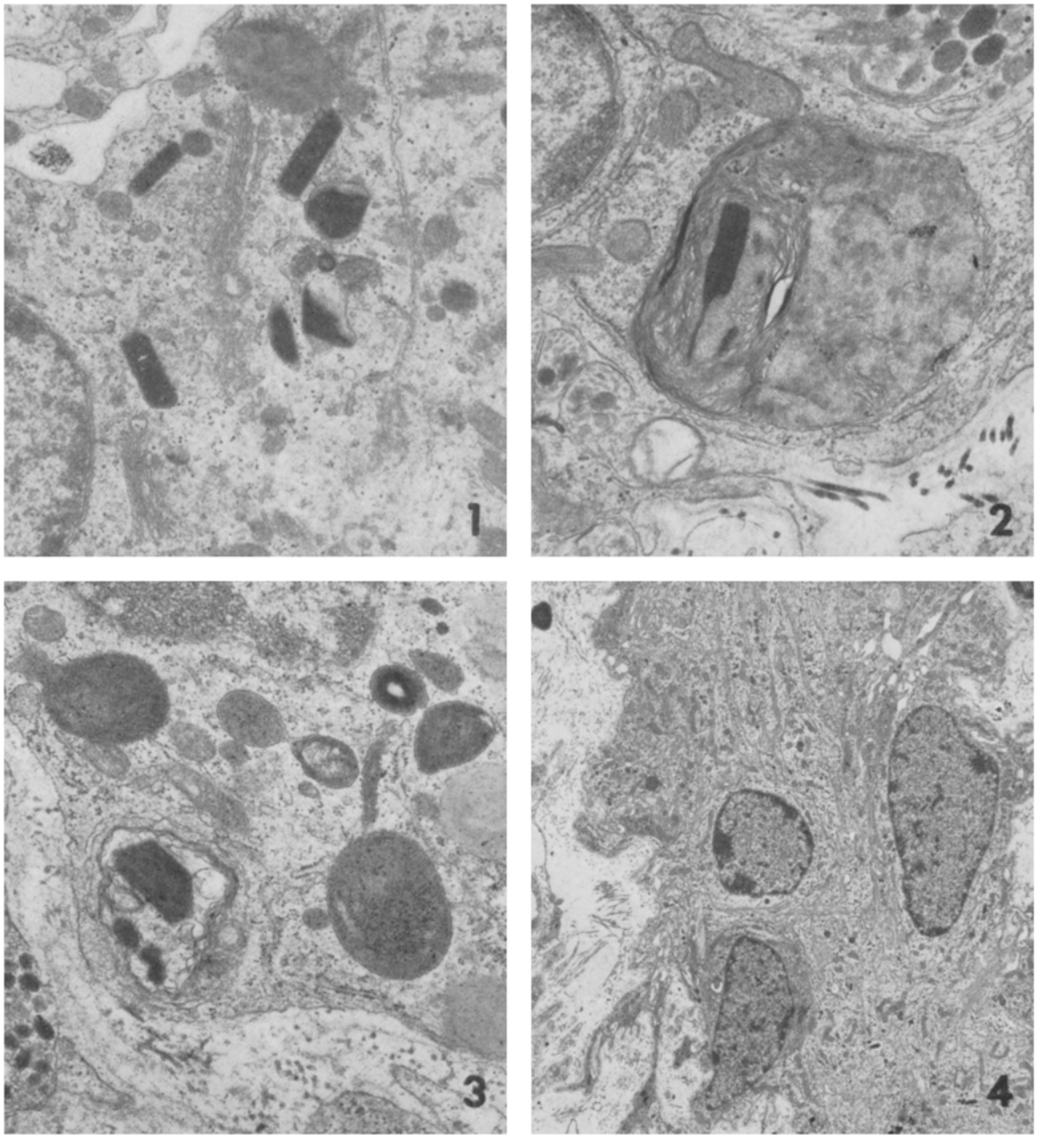
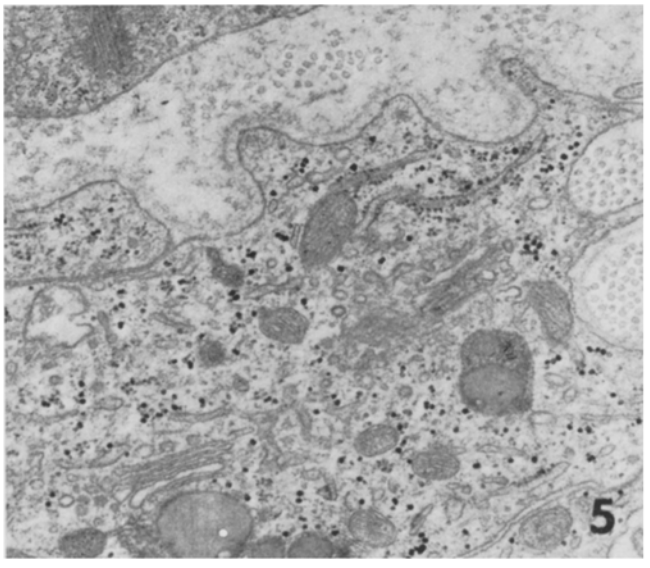


Fig. 1. Neurohypophysial glial cells containing several crystalloid inclusions; 3 days after stalk transection. ×20,000.
Fig. 2. Degenerated neurosecretory axon within a neurohypophysial glial cell 3 days after stalk transection; notice the beginning formation of a crystalloid inclusion. ×28,000.
Fig. 3. Lipid droplets, dense lamellar bodies and a crystalloid inclusion together with three enlarged neurosecretory granulated vesicles are seen in this neurohypophysial glial cell 4 days after stalk transection. ×19,170.
Fig. 4. 30 days after stalk transection the neurohypophysial glial cells have formed clusters and, with the exception of occasional lysosomes and/or lipopigments, are devoid of inclusions. ×3.250.



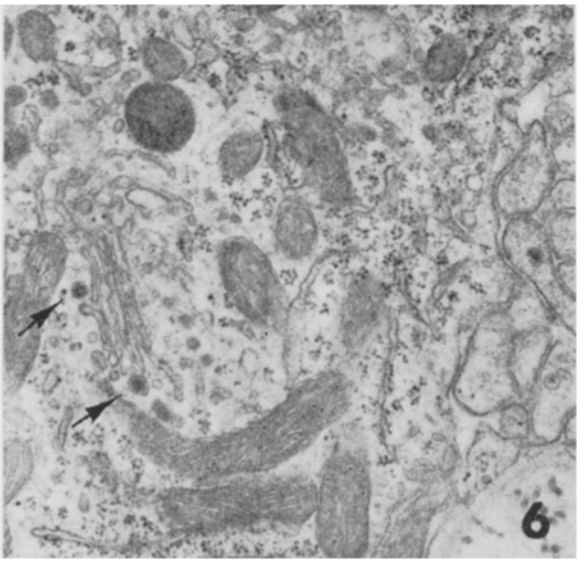


Fig. 5. Neurohypophysial glial cell 30 days after stalk transection. Notice lipopigments, glycogen particles and the slightly dilated cisternae of the rough endoplasmic reticulum. × 28,900.
Fig. 6. Neurohypophysial glial cell 30 days after stalk transection. Granulated vesicles (arrows) in the vicinity of the Golgi apparatus. × 26,920.

frequent occurrence of intercellular junctions between pituicytes — gap junctions-nexus — becomes especially evident after disappearance of the neurosecretory nerve fibres. These junctions are thought to be freely permeable to ions[23] and could facilitate the rapid and homogeneous diffusion of ions within the pituicyte network and consequently regulate their accurate concentration along the neurosecretory nerve fiber.

Résumé. Après section de tige les fibres neurosécrétoires disparaissent et les pituicytes reprennent un aspect et une organisation ultrastructurale de type embryonnaire. L'absence de réaction inflammatoire mésenchymateuse et de prolifération pituicytaire cicatricielle de type gliose expliquent les possibilités de régénération des fibres neurosécrétoires.

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Aromatization of Androgens to Estrogens by the Rat Pineal Gland

Increasing information has accumulated concerning the effects of sex steroids on pineal function. Estradiol[1] and testosterone[2] enhance pineal melatonin synthesis, estimated from the activity of the enzyme hydroxyindole-*O*-methyl transferase (HIOMT) in vitro as well as pineal protein synthesis in female and male rats. Castration, in turn, brings about decreases in pineal HIOMT in both sexes[1,2]. Other aspects of pineal function, e.g. nucleic acid and protein content[3], activation by catecholamines of adenylcyclase[4] and depolarization of cell membrane[5], were shown to be affected by estradiol treatment. We have recently described a high affinity binding, i.e. Kd $\sim 10^{-9}$ *M*, for estrogens[6] and androgens[7] in the rat pineal cytosol. In addition, testosterone was metabolized into 5α-reduced derivatives by the pinealocytes in vitro[7]. The present paper deals with the aromatization of testosterone into estrogens by the rat pineal gland. This matter may be of interest in view of recent reports on androgen aromatization in the hypothalamus and the limbic system[8]; it has been suggested that the effects of androgens on the brain are via estrogenic metabolites formed at the site of action[8].

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