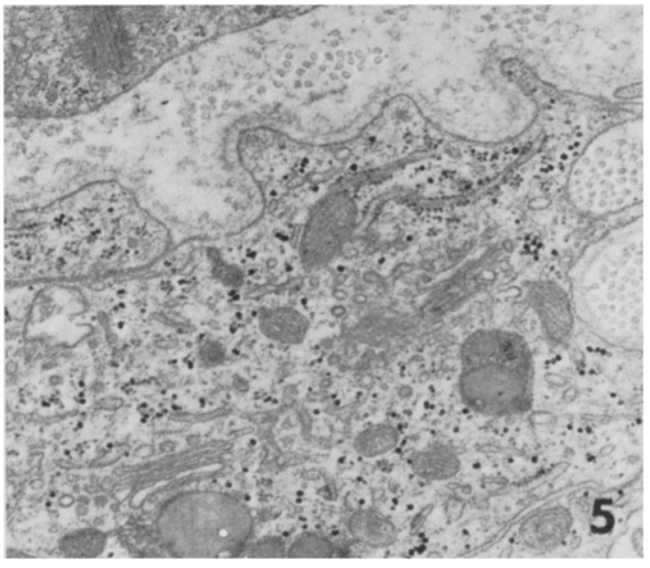

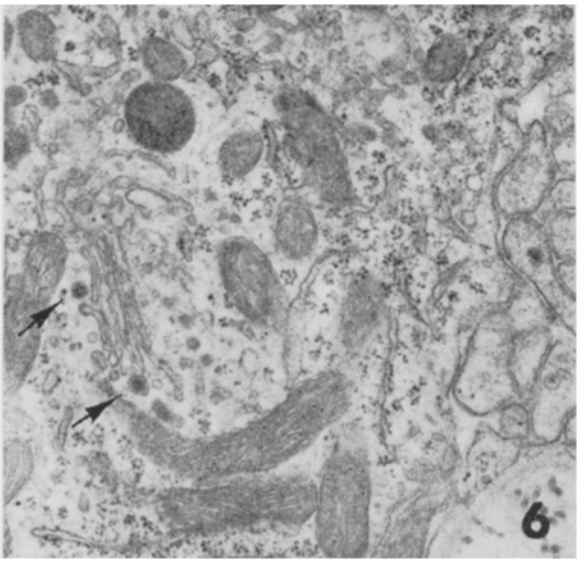

Fig. 5. Neurohypophysial glial cell 30 days after stalk transection. Notice lipopigments, glycogen particles and the slightly dilated cisternae of the rough endoplasmic reticulum. × 28,900.
Fig. 6. Neurohypophysial glial cell 30 days after stalk transection. Granulated vesicles (arrows) in the vicinity 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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Recrystallization to constant specific activity of estradiol-^{14}C synthesized in vitro from testosterone-^{14}C by the rat pineal gland

Crystallization	Solvent system	Specific activity (cpm/mg) Estradiol	Estrone [a]
Initial		218	197
1	Chloroform-ethyl acetate (1:1)	204	201
2	Chloroform	215	200
3	Chloroform-ethyl acetate (2:1)	209	204
Final mother liquor	—	207	196

[a] Estradiol-like material was oxidized to estrone before crystallization.

Material and methods. Adult Wistar male rats were killed by decapitation and groups of 20 pineals were homogenized in 1 ml of Krebs-Ringer bicarbonate buffer pH 7.4 containing a NADPH-generating system[9]. The homogenate was incubated for 2 h with 0.5 μCi of testosterone-4-^{14}C (sp. act. 56 Ci/mole) at 37 °C under a 95% oxygen- 5% carbon dioxide atmosphere. Incubations were stopped by freezing on dry ice and the steroids were extracted into diethylether after adding 100 μg each of estradiol and estrone as carriers. The extracts were evaporated and the residue was partitioned between 1 *M* NaOH and toluene to yield a crude phenolic fraction. Phenolic extracts were chromatographed in the following thin layer chromatography systems: a) chloroform-ethyl acetate, 75:25; b) chloroform-ethanol, 90:10; c) benzene-ethanol, 80:20. The radioactive material behaving like estradiol was recrystallized to constant specific activity after adding 10 mg of the authentic steroid. In one experiment this material was subjected to a mild oxidation with 0.5% chromium trioxide in 95% acetic acid[9] and was recrystallized to constant specific activity after adding 10 mg of estrone.

Results and discussion. Phenolic extracts of rat pineal homogenates previously incubated with testosterone-^{14}C and subjected to thin-layer chromatography exhibited two peaks of radioactivity with the chromatographic behavior of estradiol and estrone (Rf = 0.25 and 0.46 in system *a*, 0.52 and 0.67 in system *b*, and 0.41 and 0.54 in system *c*). In 3 different experiments, the conversion of testosterone into phenolic steroids ranged from 0.19 to 0.27% for estradiol and from 0.02 to 0.04% for estrone; no corrections for losses were made. Estradiol-like material was recrystallized to constant specific activity as unmodified estradiol or after oxidation to estrone (Table); the radioactivity recovered from chromatograms as endogenously formed estrone (less than 350 cpm) did not allow further identification.

There is scanty knowledge concerning the metabolism of testosterone in pineal cells. ^{3}H-Testosterone administered in vivo[2] or added in vitro to the incubation medium[7] becomes concentrated within the pinealocytes, in which it is metabolized by 5α-reductase into 5α-dihydrotestosterone and 5α-androstanediol; in addition 17β-reductase is present in pineal cells since androstenedione and 5α-androstanedione were detected in the incubates[7]. Data presented herein indicate that aromatization of androgens also occurs in the rat pineal gland. The conversion of testosterone into 5α-reduced metabolites and into estrogens by brain structures involved in gonadotropic regulation has been reported[10]. Therefore the pineal gland resembles these areas as far as the metabolism of testosterone is concerned. Moreover, the present results offer additional support to the hypothesis[2,7] that the pineal is an androgen target tissue in brain.

Résumé. Des homogénats de glande pineale de rat mâle métabolisèrent de la testostérone-C^{14} in vitro en œstradiol-C^{14} et en œstrone-C^{14}. Les métabolites furent identifiés chromatographiquement et dans le cas de l'œstradiol par recristallisation à activité spécifique constante. La conversion de la testostérone en œstradiol fut de 0.19–0.27% et en œstrone de 0.02–0.04%. Ces résultats-ci indiquent que la pinéale ressemble à d'autres régions du cerveau soumises au contrôle de la sécrétion de gonadotropines.

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Changes in Serum Levels of Gonadotropins and Testosterone in the Male Rat in Response to Fasting, Surgery and Ether

It has recently become apparent that some of the procedures commonly used in endocrine studies on animals, such as ether anesthesia, fasting and surgery, may affect the hormone levels being studied. Surgery or frequent blood sampling has been reported to depress serum luteinizing hormone (LH) levels in rats[1,2] and stress factors associated with restraint appear to depress serum testosterone levels[3]. Stress of a more acute nature resulting from exposure to ether appears to elevate serum gonadotropin levels in rats[4,5] and may lead to reduced testosterone secretion[6]. Short periods of fasting have been found to depress serum levels of gonadotropins