Pattern of label distribution over the nuclei of late previtellogenic oocytes of *Creophilus* (Figure 9) is similar to that obtained in the case of oocytes of *Chrysopa perla* after ^{3}H-uridine administration[12]. In *Chrysopa* as in *Creophilus*, the oocyte nucleus activity in RNA-synthesis is to be ascribed, for the most part, to the extrachromosomal DNA, the chromosomes themselves being relatively inactive in this process. It seems, therefore, that in cases of gene amplification the rule of restricted RNA-synthesis in oocyte nuclei in the polytrophic and telotrophic ovary holds true so far as the oocyte chromosomes alone are taken into consideration.

It is invariably observed that, as the time of incubation is prolonged, the label over the germinal vesicle gradually disappears, and at the same time its density over the cytoplasm increases (Figure 10). It seems evident, therefore, that RNA after being synthesized in the nucleus is subsequently transported into the cytoplasm. Independently of this process, an anterio-posterior gradient of RNA concentration appears in the cytoplasm (Figure 10). This gradient, like in oocytes of other insects with meroistic-telotrophic ovaries[17–20], develops as a result of supplying the growing oocytes with RNA produced by trophocytes and transported to each of them by a trophic cord entering the oocyte at its anterior end. Detailed results of cytochemical studies on the extrachromosomal DNA in oogenesis of *Creophilus* will be published elsewhere.

[15] A. Lima-de-Faria, M. Birnstiel and H. Jaworska, Genetics *61*, Suppl., 145 (1969).
[16] J. G. Gall, H. C. Macgregor and M. E. Kidston, Chromosoma *26*, 169 (1969).
[17] H. C. Macgregor and H. Stebbings, J. Cell Sci. *6*, 431 (1970).
[18] U. Mays, Z. Zellforsch. *123*, 395 (1972).
[19] J. Büning, Z. Zellforsch. *128*, 241 (1972).
[20] S. L. Ullmann, J. Embryol. exp. Morph. *30*, 179 (1973).

The Distribution of Endocrine-Like Cells in the Human Male and Female Urethral Epithelium

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Summary. Histochemical and electron microscopic techniques have been used to study the nature and distribution of fluorescent, endocrine-like cells in the urethra of the human male and female. The confinement of such cells to specific regions of the urethra is discussed in relation to the embryological development of this part of the urinary tract.

Histochemical and electron microscopic techniques have recently been used to demonstrate fluorescent, amine-containing, endocrine-like cells in the epithelium of the urethra in a variety of laboratory animals[1–3]. Similar cells have also been described in the human urethra although these electron microscopic observations were confined to biopsy samples obtained solely from male specimens[4]. In the present study, our purpose has been to establish the occurrence and distribution of these cells in the human urethra using material from both sexes. In addition, preliminary observations on the fine structure of such cells in the female have been sought using electron microscopy.

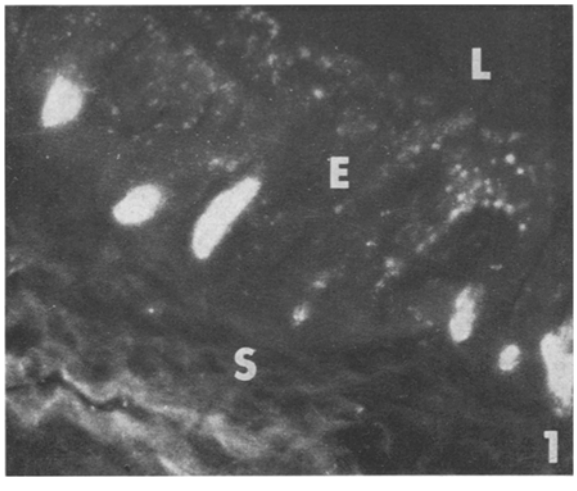

Fig. 1. Fluorescence photomicrograph of human female urethra. Numerous brightly-fluorescent cells occur at the base of the epithelium (E); urethral lumen (L); submucosa (S). ×600.

Materials and methods. Post-mortem tissue removed within 8 h of death occurring from non-urological causes was obtained from male and female specimens and processed for light and electron microscopy. The majority of samples were placed in iso-pentane cooled in liquid nitrogen, serially sectioned in a cryostat and processed for tissue catecholamines using a histochemical method[5]. In addition, small samples of female urethral epithelium were fixed in glutaraldehyde, post-fixed in osmium tetroxide and embedded in epoxy resin prior to thin sectioning for electron microscopy.

Results and discussion. Using fluorescence microscopy, large numbers of yellow brightly-fluorescing cells were observed in the proximal urethra of both male and female specimens (Figure 1). These cells were situated at the base of the urethral epithelium and appeared either elongated or flask-shaped, often with one or more processes extending towards the urethral lumen. They appeared randomly distributed around the circumference of the urethra, the majority occurring immediately below the internal meatus of the bladder. Similar cells were not observed in the bladder epithelium. In the female, fluorescent cells were numerous along the proximal

[1] C. H. Owman, T. Owman and N.-O. Sjöberg, Experientia *27*, 313 (1971).
[2] J. S. Dixon, J. A. Gosling and D. R. Ramsdale, Z. Zellforsch. *138*, 397 (1973).
[3] R. Håkanson, L.-I. Larsson, N.-O. Sjöberg and F. Sundler, Histochemistry *38*, 259 (1974).
[4] S. Casanova, F. Corrado and G. Vignoli, J. Submicrosc. Cytol. *6*, 435 (1974).
[5] T. L. B. Spriggs, J. D. Lever, P. M. Rees and J. D. P. Graham, Stain Tech. *41*, 323 (1966).

2/3rds of the urethra although none was observed in the distal portion below the level of the sphincter urethrae muscle. In the male, fluorescent cells occurred in that region of the prostatic urethra extending from just below the internal urethral meatus to the point of entry of the ejaculatory ducts. In all specimens examined no fluorescent cells were observed in distal parts of the urethra.

Electron microscopy of female urethral epithelium revealed numerous cells which could be distinguished by their content of dense, cytoplasmic granules (Figure 2). The granules varied in diameter from 80 nm to 100 nm and each was bound by a membrane and contained a central electron dense core. Thus cells similar to those described in the male urethra[4] have now been defined electron microscopically in the human female. However, further study is required to establish whether two types of granule-containing cell (as described by CASANOVA et al.[4]) also occur in the female.

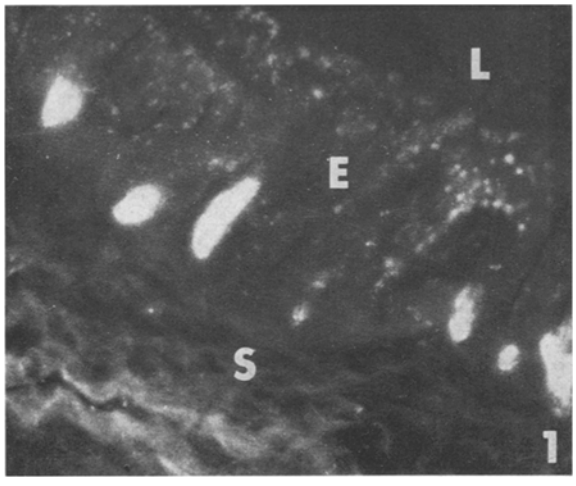

Fig. 2. Electron micrograph of an endocrine-like cell in human female urethral epithelium. The cell is characterized by the presence of numerous electron dense cytoplasmic granules (80–100 nm diameter). ×36,000.

Collectively, the present observations have confirmed endocrine-like 'APUD' cells[6] in the human urethral epithelium and have also established the distribution of these cells in both male and female specimens. Their similarity to enterochromaffin cells of the alimentary tract raises the possibility that the embryological development of the region may explain the presence of this cell type in the urethral epithelium. On the assumption that the epithelium of the cloaca normally includes enterochromaffin cell precursors, septation of the cloaca by the urorectal septum would, therefore, result in the inclusion of this type of cell in the epithelium of the primitive urogenital sinus. Thus, the distribution of such cells in the adult might indicate those parts of the urinary tract to which the cloaca directly contributes. Interestingly, most embryologists consider as developmentally analogous those parts of the male and female urethra which have now been shown to possess endocrine-like cells. Clearly more work is required to verify this hypothesis and further study using foetal material is currently in progress in this laboratory.

Finally, the occurrence of this type of cell in normal urethral epithelium should be borne in mind when examining the cytology of urethral tumours. The possibility exists that these endocrine-like cells might undergo neoplastic change similar to that known to occur in carcinoid and related conditions of the alimentary tract.

[6] A. G. E. PEARSE, J. Histochem. Cytochem. *17*, 303 (1969).

Differentiation in Renal Homografts of Isolated Parts of Rat Embryonic Ectoderm[1]

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Summary. The central and the peripheral areas of the head-fold stage rat embryo ectoderm develop into both the neural tissue and the epidermis when grafted under the kidney capsule of adult rats.

During gastrulation, the primitive or primary ectoderm of the rat embryo undergoes a restriction of developmental potentialities. At the pre-primitive streak, and at the early primitive streak stages, it contains presumptive cells of all three definitive germ layers. At the head-fold stage, however, it contains only the definitive ectodermal and the presumptive mesodermal cells[2,3].

The purpose of the present pilot experiment has been to show whether the central and the peripheral parts of the head-fold stage rat embryonic ectoderm differ in their capacity to differentiate into two major ectodermal derivatives: the neural tissue and the epidermis. We have previously shown that at this developmental stage the endoderm + mesoderm combination already displays a regionally restricted capacity to differentiate into different segments of the primitive gut, when transplanted under the kidney capsule of adult animals[4].

Pregnant females of the inbred Fischer strain albino rat were anaesthesized with ether on the gestation day 9 (at 08.00 h on the 10th day). Whole embryos (embryonic shield + extra-embryonic membranes + ectoplacental cone) were isolated from the uteri. They belonged to the

[1] This investigation was supported by the grant No. IV/3 from the Research Foundation of S.R. Croatia, and in part by NIH PL 480 Agreement No. 02-038-1.

[2] B. LEVAK-ŠVAJGER and A. ŠVAJGER, Experientia *27*, 683 (1971).

[3] B. LEVAK-ŠVAJGER and A. ŠVAJGER, J. Embryol. exp. Morph. *32*, 445 (1974).

[4] A. ŠVAJGER and B. LEVAK-ŠVAJGER, J. Embryol. exp. Morph. *32*, 461 (1974).