

Ultrastructural studies which have examined the effect of 6-OHDA on the intestine of the guinea-pig have led to the view that noradrenergic synapses are entirely absent in the myenteric plexus^{16, 17} even though the fluorescence histochemical study of COSTA and GABELLA¹⁰ showed that the submucous and myenteric ganglionated plexuses in the intestine of the guinea-pig are richly innervated with noradrenergic fibres.

The results of the present study show that in the submucous ganglia of the rat duodenum there is correspondence in frequency and distribution between axons containing small granular vesicles in untreated rats and the degenerating axons in animals treated with 6-OHDA. It seems reasonable to suppose that, although noradrenaline-containing axons form only a small proportion of the total nerve terminal population within submucous ganglia, noradrenaline-containing axons do occasionally innervate submucous ganglion cells.

The present study has also shown that noradrenergic nerve terminals in the submucous ganglia of the rat duodenum, like noradrenergic nerve terminals elsewhere in the autonomic nervous system, are able to accumulate sufficient 6-OHDA to initiate nerve terminal degeneration.

Zusammenfassung. Nachweis adrenerger Synapsen an Zellkörpern der duodenalen submukösen Ganglien von Ratten nach 6-Hydroxydopamin-Behandlung.

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25 June 1973.

¹⁶ H. G. BAUMGARTEN, A. F. HOLSTEIN and C. H. OWMAN, *Z. Zellforsch.* 106, 376 (1970).

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¹⁸ Part of this work was done while I was on sabbatical leave in the Department of Anatomy, Monash University, in 1972, and I thank Professor G. C. SCHOFIELD for his kindness and encouragement during my stay there. Mr. H. L. CHAN rendered invaluable technical assistance.

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An Initial Report on Interstitial Cells of Testicular Type (Leydig Cells) in the Ovary of *Camelus dromedarius*

BERGER¹ was the first to note the presence of particular cells in the ovary of the human species. Initially, this author maintained that they were 'neurotropic' cells. Later, however, they were likened by KOHN² to the interstitial Leydig-type cells of the testicle. This appears to be the opinion generally accepted today, also according to other research-workers³⁻⁸, and seems to be chiefly based on the presence of lipoids and Reinke crystals in the cytoplasm. These crystals, as is known, are characteristic of the Leydig cells of the human species.

Further arguments in favour of this analogy have been offered by later authors⁹⁻¹², who have established a whole series of extremely significant facts. Among these, we may mention the virilization of women suffering from hyperplasia of these cells, the presence of ketosteroids in the

same cases, and their hyperplasia following administration of gonadotrophins.

According to certain authors^{13, 14}, the Leydig-type interstitial cells are also present in the ovary of the cat, the dog, the wolf and *Pithecus fascicularis mordax*. Among domestic animals of economic importance, they are found only in the female of *Sus scrofa*¹⁵.

In the course of observations that we carried out on the structure of the ovary of *Camelus dromedarius*, we ascertained the presence of Leydig-type interstitial cells in 4 cases out of 5 examined. The animals were sexually mature, between the ages of 7 and 11 years old. The ovaries were fixed in buffered 10% formalin and in Bouin Hollande and were embedded in paraffin. They were obtained from the public slaughter-house in Mogadiscio, in the course of a period of teaching in which one of us was engaged at the Agricultural Faculty of the National University of Somalia.

The cells in question occupy different sites, from one case to another. In fact they can be found in the hilus among the large blood vessels, in the connective tissue

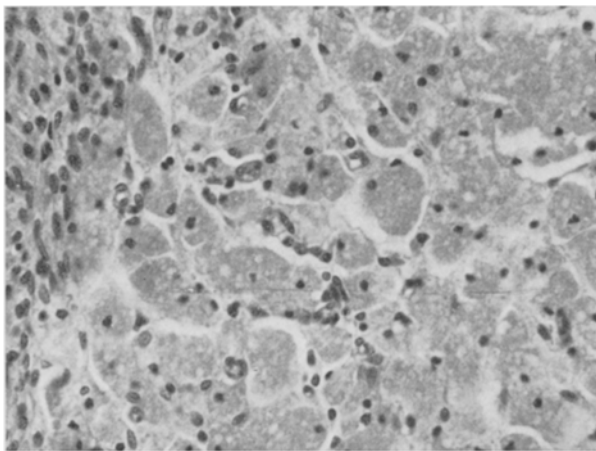


Fig. 1. Group of very large Leydig cells, vacuolized and lacking in granulations. On the left may be seen the ovarian stroma. Hematoxylin. $\times 300$.

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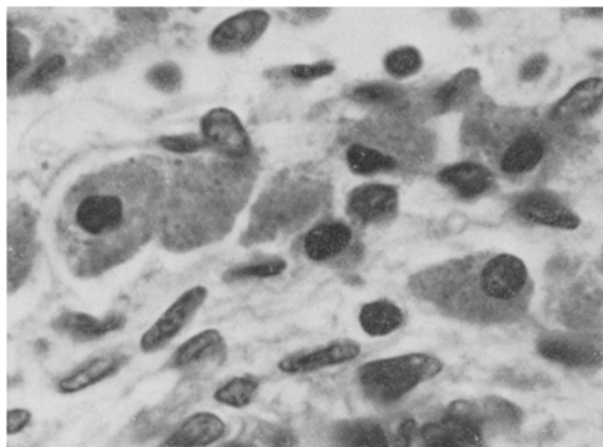


Fig. 2. Group of Leydig cells containing fine granulations. The shape is oval; the nucleus eccentric and rounded, nucleolate, with very thick nuclear membrane and indistinct chromatinic reticulum. Hematoxylin. $\times 1,200$.

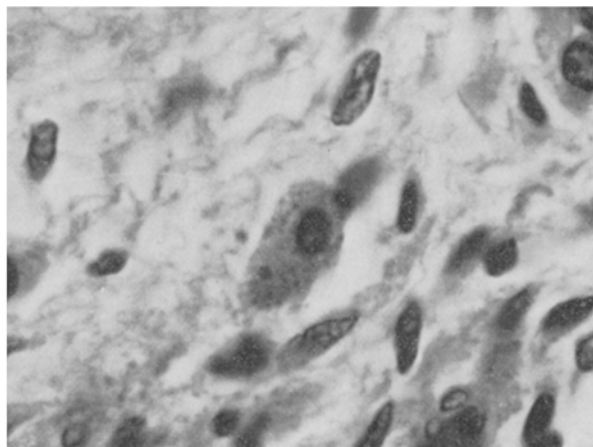


Fig. 3. Another specimen of a Leydig cell with large cytoplasmic granules. In this case the cell has an elliptical shape. Hematoxylin. $\times 1,200$.

of the ovarian medulla, and in the cortex, just below the surface epithelium.

They are usually joined in a more or less voluminous mass. A few cells may be seen to be isolated, but they are always near the main mass.

It must be noted that these cells, in the ordinary histological preparations, appear to be contained in the connective tissues of the hilus or in the ovarian stroma. In actual fact, with more specific techniques (Gomori's silver method), each cell always appears sharply outlined and circumscribed by a very fine network of argentophil fibres. Their form is mostly elliptical, more rarely oval, and still more rarely polygonal. The average dimensions, for a total of 60 cells measured, were found to be $19.3 \times 13.6 \mu\text{m}$, the greatest length being 45 and the greatest breadth $31 \mu\text{m}$.

The cytoplasm is distinguished not only by its considerable dimensions but also by a variable number of granulations having an intrinsically yellow colouring, with shades tending to brownish yellow or to light yellow. These shades are probably related to the volume of the granules, which is also variable but often fairly large. The staining proper to the granulations was determined both on sections prepared in various ways (hematoxylineosin-orange; Van Gieson; Masson) and on unstained sections.

One of the more important characteristics of the above granulations, together with that of the intrinsic colouring and their non-solubility in the ordinary solvents of fats, is that they reveal some of the fundamental histochemical properties of lipochromes. These properties, which we ascertained, are first of all represented by their affinity for silver with the Gomori method. With this method, as also with Sudan black B, the granulations assume an intensely black colouring. In addition, they are intensely PAS-positive. They react with toluidine blue, giving a colouring that may range from blue to a definite green.

Also the fundamental substance of the cytoplasm possesses the same characteristics of intrinsic colouring. In this fundamental substance, a certain number of vacuoles may be found; these are very small and their number differs from case to case.

The nucleus is always found to be small, or even very small, in relation to the cell surface. Usually it occupies a more or less markedly peripheral position, though in some cases it may be found almost at the centre. Its outlines

always appear very marked, showing the thickness of the nuclear membrane, and follow a very irregular course. For this reason the general form of the nucleus, which is often elliptical, may appear more or less deformed. It does not display an obvious chromatinic reticulum; indeed, it is found to have a dark, almost homogeneous appearance, such as to suggest a pre-picnosis in some cases. In other cases it appears slightly larger and lighter in colour, with a fairly voluminous central nucleolus. Neither in these cases, however, is it possible to note an obvious chromatinic reticulum.

The abundance and volume of the cytoplasmic granulations, as also the number of nuclei – either elliptical and dark or rounded and light – are probably related to the functional (secretory) conditions of the cells. In fact, these characteristics vary considerably from individual to individual.

Conclusions. The displacement of the cell elements described and their general morphology are in themselves sufficient to differentiate them from the cells commonly defined as interstitial, which are present in the ovary of certain domestic and non-domestic species (cat, rabbit, rat, etc.). Their content in lipid pigments insoluble in the solvents of fats, which show the described histochemical characteristics, enables them to be likened, with a greater degree of certainty, to the Leydig-type interstitial cells.

Riassunto. Viene descritta per la prima volta l'esistenza di cellule interstiziali di tipo Leydig, nell'ovaio di *Camelus dromedarius*.

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30 July 1973.*