SOME FINE STRUCTURAL FEATURES OF EPIDIDYMAL CELLS IN AN EDENTATE, *DASYPUS NOVEMCINCTUS MEXICANUS*

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Electron microscope studies of the vasa deferentia and epididymides of various animals have emphasized the endoplasmic reticulum of the epithelial cell to a greater or lesser degree (Nicander & Schantz, 1961; Horstmann, 1962; Leeson & Leeson, 1964; Schmidt, 1964; Holstein, 1964). Recent studies (Hamilton, Jones & Fawcett, 1969; Hamilton, 1971a, b) have stressed the morphological arrangement and the functional rôle played by the smooth endoplasmic reticulum. These studies have pointed out an abundant and characteristic accumulation of smooth reticulum in the mouse and rat. We would like to report an apparently unique accumulation of rough endoplasmic reticulum in the initial segment of the epididymis of an edentate, the nine-banded armadillo, *Dasypus novemcinctus mexicanus*.

Adult, sexually mature armadillos were anaesthetized with an intraperitoneal dose of Nembutal. The intra-abdominal testis, epididymis and ductus deferens were reached through the anterior abdominal wall, excised and immediately placed in a paraformaldehyde-glutaraldehyde fixative (Karnovsky, 1965) in phosphate buffer. The tissue was postfixed in 1% osmium tetroxide in a similar buffer, dehydrated in ethanol and embedded in Epon 812 (Finck, 1960) or Spurr low viscosity embedding media (Spurr, 1969). Using glass knives, thin sections (60 to 100 μm) were cut, stained with uranyl acetate and lead tartrate to enhance contrast and examined with an RCA-EMU-3E electron microscope at accelerating voltages of 50 and 100 kV.

The epithelial cells which make up the wall of the initial portion of the armadillo epididymis have many of the morphological characteristics that would be expected in cells of this type. They are tall, columnar, stereociliated cells with a prominent nucleus that resides approximately one-third of the distance between the base and the apex. The mitochondria are scattered throughout the cell. Populations of membrane-bound granules with an elaborate internal structure are found in accumulations in the basal area and in the supranuclear region. The Golgi apparatus is large and occupies a considerable portion of the region below the apical area. The apical area itself is replete with vesicles that appear to be part of the endoplasmic reticulum, some with seemingly attached ribosomes.

The unique feature of these cells is to be found in the basal cytoplasm where

large membranous sheets or lamellae studded with ribosomes occupy the greater portion of the basal area of the cell. In cross-section, these lamellae appear as elongated whorls which often surround a mitochondrion or granule. The cisternae are not continuous around the whorl but often end in a terminal dilatation, which may occur in regular fashion so that orderly arrays of studded vesicles appear to alternate with the rough cisternae. Rough membranous profiles may reach the apical end of the nucleus but rarely go beyond that point. Small amounts of rough reticulum are occasionally seen above the nucleus but do not seem to be directly connected to the elaborate formations seen in the basal area. Other areas of the epididymis contain various amounts of endoplasmic reticulum, both smooth and rough. Formations similar to those seen in the initial portion, however, have not been encountered in other segments of the excurrent duct system.

Although the cells of the epididymis of various species all appear to contain rough and smooth reticulum as well as a population of free ribosomes, functional emphasis has been placed on the smooth component. Information is being accumulated concerning the relation of the smooth membranes to the production and storage of cholesterol and other steroid products (Hamilton *et al.*, 1969; Hamilton, 1971a, b). In our own laboratory, attempts are now being made to localize and visualize these compounds in thin sections for electron microscopy in an effort to elaborate further the steroid secretory capacity of these epithelial cells.

The presence of such a large and complex system of rough endoplasmic reticulum suggests the possibility of a coexistent protein secretory mechanism. A similar suggestion has been made for other animals (Leeson & Leeson, 1964) based on a far less prominent accumulation of rough membranes. The vas deferens of the crayfish contains a large amount of rough reticulum and may also have a protein secretory function (Kessell, Panje & Decker, 1969). In addition, there is evidence (Edmonds, Nagy & Royce, 1971) that some of the vesicles located in the apical regions of the cell, and heretofore regarded as smooth reticulum, are morphologically identical to the terminal dilatations of the cisternae located in basal regions.

Although the turnover rate of epididymal cells is relatively slow (Clermont, 1961; Morehead & Piekot, 1971), the overall metabolic rate is apparently quite high (Elliott, 1965 a, b). These cells also exhibit absorptive properties (Nicander, 1965). The internal metabolic needs of active cells such as these may require large amounts of protein and may be the *raison d'être* for the large amount of rough endoplasmic reticulum. The true function of these collections of membranes or the significance of their structural configuration remains unclear.

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