endoplasmic reticulum or ribosomes. Figure 2.

The purpose of this report is to direct attention to these segmental bodies whose location on the renal arteries and association with peritubular capillaries raises questions of their role in the regulation of renal circulation or tubular function.

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1970 #6

CORRELATION OF FINE STRUCTURE WITH TRANSPORT CONDITIONS IN THE INTESTINE AND GILLS OF THE EEL, Anguilla rostrata AND THE DOGFISH, Squalus acanthias

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(Specimens prepared for electron microscopy during the summer 1969 were studied during the following year and the results are summarized below. Specimens prepared during 1970 will be reported subsequently.)

(1) An isolated preparation was made of the spiral valve of the dogfish using arterial and luminal perfusion with saline suitably adjusted to provide maximal and minimal rates of transport across the mucosa. The particular morphology of the spiral valve permits the application of hydrostatic pressure to the mucosa without the complications of effects of distension on the morphology. The preparation is viable for more than an hour and in these experiments the effects of the experimental conditions were examined after twenty to thirty minutes of perfusion. Preliminary studies during 1970 indicate that quantitative values for transport rates under these conditions should be readily obtainable for the isolated spiral valve.

In the spiral folds there is mucosal epithelium on both sides with only a delicate muscularis mucosa and the lamina propria at the basal surface. The epithelial cells are very tall columnar cells about 5 x 100 microns showing distinct zones of polarization of components especially with respect to the endoplasmic reticulum. The apical endoplasmic reticulum is particularly responsive to differences in transport conditions and is prominent at high transport rates. Below the level of the nuclei the endoplasmic reticulum is less vesicular and more obviously cisternal in arrangement. Lateral intercellular spaces are most evident (at high transport rates) in the subnuclear regions of the cell but cell membranes are closely approximated at the basal lamina. At minimal transport rates the lateral intercellular spaces disappear. When transport is blocked by ouabain (intra arterially) the lateral space is obliterated except for peculiar, localized symmetrical distensions. Lateral space remains prominent under high intraluminal hydrostatic pressure with cell dimensions (height) remaining unaltered.

Under high rates of transport there is hydration of the apical cytoplasm and in addition an increase of volume in the apical endoplasmic reticulum. This endoplasmic compartment provides an additional membrane bounded intracellular compartment whose role in transport requires further elucidation. The diminished volume of the endoplasmic reticulum at the subnuclear level, where lateral intercellular spaces are most prominent, suggests that the water of this compartment traverses the cytoplasm for elimination to the lateral intercellular space.

(2) The transfer of eels from fresh to salt water is accompanied by increased salt and water transport in the gills and gut. In collaboration with Franklin Epstein, Ralph Janicki and

William Mackay samples were obtained for electron microscopy of the gills and proximal gut to provide morphological correlates of the functional states observed by them. (See this Bulletin Volume 9.) The existence of elevated Na-K ATPase levels in gills of fresh water eels treated with cortisol provides opportunity to study cytological changes in chloride cells due to hormonal influences in the absence of changes due to transfer to saline waters. Under experimental conditions the branching tubular reticulum in the chloride cells varies from an open three dimensional network in a pale cytoplasm to a system so closely branched that the cytoplasm surrounding it is reduced to a continuum of similar dimensions. In the latter case the cytoplasm is dense. There is wide variation in the cytology of chloride cells among individual eels, especially in those from fresh water, and the variability is pronounced for eels in intermediate stages of adaptation or hormone treatment. Despite these variations and the difficulties of making adequate surveys at the electron microscopic level there appears to be a general progression in morphological elaboration of the tubular system corresponding to the duration of treatment with cortisol or adaptation to sea water. With cortisol treatment, especially at intermediate stages (3 and 7 days) there are many cells which appear to be differentiating. They show active nucleoli, increased perinuclear granular endoplasmic reticulum and patches of distended, closely branching tubular reticulum resembling fenestrated cisternae. Other reports have indicated an increased number of chloride cells several days after transfer from fresh to salt water and a similar increase may be expected in eels. Chloride cells require special procedures for recognition at the light microscopy level and such methods have not distinguished the differentiating cells reported here.

It would appear that the amount of tubular endoplasmic reticulum in the chloride cells of the eel gill and the number of chloride cells both increase during adaptation to sea water and as a result of treatment of fresh water eels with cortisol.

Our fresh water eels have varied considerably in size (age) and natural hormonal conditions (yellow to silver). We have the impression that the number of swollen and abnormal cells is greatest in fresh water eels taken late in the summer. Under the stimulus of adaptation to sea water or treatment with cortisol these cells are replaced by newly differentiated cells. Eels obtained in 1970 from mixed sources, kept for a while in brackish water and subsequently readapted to fresh water showed fewer swollen and deteriorating cells than those obtained from fresh water eels late in the season.

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OCCURRENCE OF A VIRUS IN ERYTHROCYTES OF THE EEL, *Anguilla*

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In electron microscopic sections of the gill and intestine of one specimen of the eel, *Anguilla rostrata*, it was observed that about twenty percent of the erythrocytes had clusters of virus particles in the cytoplasm of these nucleated, mitochondria-bearing blood cells. In sections the particles are hexagonal in outline with a diameter of about 0.16 microns. The circular core has a diameter of about 0.10 microns and is variable in intensity of staining with uranyl and lead. This occurrence seems sufficiently unusual to merit noting.