functioned as one bridge, and an agar bridge into the solution bathing the exterior of the gland completed the circuit.

It is felt that this system is conducive to further work on the problems of Na^+ binding and sequestration, OH^- secretion, and HCO_3^- - Cl^- exchange.

We thank Mr. James H. Maren and Mr. Allen C. Myers for their cheerful assistance in these experiments.

The Structure Of The Nephron Of The Aglomerular Kidney Of The Goosefish (Lophius piscatorius am.).

Johannes A. G. Rhodin
New York University School of Medicine

A combined light and electron microscopic investigation of the aglomerular tubules of the goosefish kidney established several new facts concerning their structure and possibly gave some clues as to the functional interpretation of these findings in the light of earlier extensive studies of the fine structure of the mammalian glomerular nephron.

By serial sectioning for phase contrast microscopy, three main portions of the aglomerular terminal tubule were identified as having quite different structural appearances: the blind ending (or rather beginning of the tubule), the middle long portion, and the connecting portion which opens up into the collecting duct. Of the various parts of the tubule, the blind beginning and the middle portion were submitted to an electron microscopic analysis. The cells, characteristic of the middle long portion of the tubule, are of two categories: light and dark. In the light cells, the nucleus is easily seen together with basally located abundant mitochondria. A vacuole is usually present in the top part of the cell with a lipid granule inside. The dark cells are rather evenly distributed among the light ones, but there is a predominance for light ones over dark cells. The width of the dark cells varies considerably. In tangential sections, it can be seen that the dark cells are stellate shaped with long and narrow cytoplasmic extensions penetrating inbetween the light cells.

The surface of either cell type is provided with a primitive brush border consisting of short and widely scattered microvilli. The basal part of the cells of the middle portion of the tubule displays a seekingly rudimentary system of membranes, reminiscent of the multiple cell membrane infoldings of the mammalian kidney. The cells of the blind beginning of the tubule lack totally even the rudimentary membranes. From a functional point of view this seems to support the hypothesis that true brush border extensions and a well developed system of infolded basal plasma membranes are necessary requirements in nephrons concerned mainly with resorbtive and concentrating processes like in the glomerular ones, whereas the aglomerular nephrons, in which resorption does not occur, more or less lack both a true brush border and an infolded basal plasma membrane.

The dark cell type which was identified in the middle portion of the goosefish tubule is probably a true secretory cell. The fine structure of the dark cells is similar to what has been described in, for instance, mucous cells of the trachea or gastric glands of mammalian tissue.

The Structure Of The Gills Of The Fresh Water Catfish (Ameiurus Nebulosus).

Johannes A. G. Rhodin
New York University School of Medicine

A combined light and electron microscopic analysis of the gill filament of the fresh water catfish indicated that two quite different areas can be recognized. The larger of these areas is represented by the lamellae which generally are considered to serve as respiratory surfaces in the exchange of gases between blood and water. The second area is smaller and comprises mainly the lateral edges of the filament and the interlamellar surface.. The structure of this area seems to indicate that it is the secretory portion of the gill filament.

The blood-water barrier proved to be more complex than indicated by earlier studies. It consists of cuboidal epithelial cells in a surface layer inside of which is a basal squamous cell layer, a basement membrane and a continuous endothelial lining of the lacunar spaces in which the blood circulates freely. In addition, an intercellular space exists between the respiratory surface epithelium and the basal cell layer. This space communicates freely with the large lymph spaces present at the base of each lamella. Lymphocytes are frequently seen in these spaces.

The so-called pillar cells, which constitute the central framework of the lamellar lacunae, were identified to represent smooth muscle cells. This makes it probable that slow pulsations or temporary alterations of the width of the lacunae can take place in the respiratory lamellae of the gill filament.

It was discovered that a cell type, rich in mitochondria and smooth surfaced endoplasmic reticulum does exist in fresh water fish. This cell type is referred to in sea water fish as chloride secreting cell. Also another type of cell was identified which displayed an abundance of smooth surfaced endoplasmic reticulum but few mitochondria. This cell type was found only in the secretory part of the gill filament where mucous cells were abundant.

A protective mechanism of the fresh water gill epithelium was evidently discovered. The surface of the epithelial cells is provided with a thick cuticle which contains numerous small granules embedded in a dense cytoplasmic zone. The granules can be seen discharged at the surface of the cells. The cuticle itself may prevent an extensive loss of salts, and the micro-discharge of the small granules may be regarded as part of a protective mechanism against parasites and other small organisms.