Fine Structure of Secretory Epithelia

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1). Fine structure of the chief cells of the salt glands of sea gulls. In collaboration with Dr. Knut Schmidt-Nielsen a series of young black-backed gulls were experimentally prepared, fixed and embedded for electron microscopy. Intravenous and intralumenal injections of particulate suspensions were made for use in exploring cellular boundaries in active and resting glands.

2). The fine structure of the gills of Fundulus is of interest in relation to their reputed role in salt excretion. Accordingly, gills of suitably conditioned fish were fixed and embedded for subsequent electron microscopy.

Competitive Inhibition Involving the Secretion of PAH and Diodrast by the Aglomerular Kidney of Lophius

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Although it is commonly accepted that p-aminohuppuric acid (PAH) and 3, 5-diiodo-4-pyridone-N-acetic acid (Diodrast) compete with one another for active transport by the proximal segment of various vertebrate renal tubules, the precise nature of their reciprocal competition is not well established. The purpose of this investigation is, therefore, to elucidate some of the quantitative characteristics of this competitive inhibition expressed on a molar basis.

Lophii (14 in total) were exclusively used in this study. The fish were injected with a large dose of either PAH or Diodrast (i.m.) to attain plasma levels high enough (0.5 μM per ml) to insure maximal transfer rates (Tm). After the control transfer maximum for the corresponding substance had been determined for two periods, a dose of the competitor was administered i.m. (i.e. Diodrast or PAH) to give plasma concentrations either equal to or 1/5 the molar concentration of the substance previously administered. Then, after a period of equilibration, the secretory rates of both substances were determined for 3 subsequent periods.

When the tubules were supplied with either PAH or Diodrast alone, the transfer maxima averaged 23.1 and 5.7 μM/hr/Kg respectively for PAH and Diodrast. However, after equimolar concentration of the competitor substance was achieved in plasma, the transfer maximum of PAH dropped to 0.9 μM/hr/Kg while that of Diodrast fell to 4.3, indicat-

ing that Diodrast inhibited the PAH secretion rather strongly whereas PAH inhibited Diodrast transport only slightly. The combined transfer rate when PAH was administered following Diodrast was approximately the same as that of Diodrast alone (5.7 μM/hr/Kg), but in the reciprocal situation with Diodrast following PAH the combined transfer rate (5.7 μM/hr/Kg) was only a small fraction of that noted for PAH alone (23.1 μM/hr/Kg). As one would expect, the degree of this inhibition was a function of the concentration of the competing substance, and thus, when the plasma concentration of the competitor was only 1/5 of the other, the inhibition was much less, although the basic pattern of competition was still the same.

On the basis of these observations it is tentatively concluded that, although PAH and Diodrast share the same transport system, the affinity of each substance for intracellular or membrane carrier may be quite different. Furthermore, indications are that Diodrast has a much greater affinity for carrier, and once it is associated with the carrier, it dissociates much more slowly than PAH.

Studies on Maintenance in Captivity and Behavior of Two Species of Albatrosses

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The two species of Albatrosses (Black-footed Albatross, *Diomedea nigripes* and Laysan Albatross, *D. immutabilis*) found in the North Pacific Ocean have, in the past, survived for very short times in captivity. The recent discoveries of Schmidt-Nielsen and coworkers on the activities of the nasal gland of marine birds suggested that one of the difficulties encountered in maintaining these birds in captivity was an excessive loss of NaCl through the action of this gland. Five Albatrosses (three *D. nigripes*, two *D. immutabilis*) were kept in a large outdoor cage at the laboratory in apparently normal health by supplementing their diet of fish with salt tablets imbedded in the fish and by furnishing sea water for drinking. The results show that NaCl balance is of great importance in the maintenance of marine birds in captivity. Observations were made on the behavior of these birds in captivity. Their common name, Gooney Birds, if this is taken, as it usually is, to imply a lack of ability to learn, is grossly wrong. These birds quickly learned to recognize feeding times, persons and utensils, and they adapted in many ways to the strange environment.