"Morphogenetic Death" in Embryonic Development

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Cellular death during active growth and morphogenesis is a neglected aspect of the study of embryonic development. Investigations on the chick embryo, however, have shown that the distribution of necrotic cells in the appendages is correlated with, and possibly causally related to, morphogenetic changes which result in the emergence of the definitive limb contours.

It has been of some interest, therefore, to determine whether cellular deaths may be likewise correlated with morphogenetic events in the differentiation of the fish embryo. Accordingly, eggs of the minnow, *Fundulus heteroclitus* were obtained and studied with respect to their suitability for further pursuit of this problem.

For one phase of the analysis, the de-chorionated embryos were treated with 1:10000 solutions of Nile Blue in sea water. This dye selectively stains, among others, degenerating cells. Extensive zones of deeply stained cells, presumably necrotic, were found associated with various embryonic foldings; e.g., the limb buds, junction of body wall and yolk sac, otic vesicles, etc. The distribution of these cells was recorded by means of color photographs for further study.

For more detailed analysis and confirmation of the nature of the cells distinguished by the dye, embryos of various developmental stages were preserved for sectioning and histological study.

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Urea Excretion and Diving in the Seal (*Phoca vitulina* L.)

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Experiments on the effects of feeding and diving upon the renal function of the seal were carried out. It was found that the large increase in urea excretion which occurs in seals 3-5 hours after feeding is not due to renal tubular regulation of the urea excretion but can be accounted for by the increases in plasma urea concentration, glomerular filtration rate and urine flow. The urea/inulin clearance ratio in the seal decreases markedly with increasing tubular reabsorption of water. A maximum urea U/P

ratio of 50-60 is reached at an inulin U/P ratio of 150-200. Thus, the concentrating ability for urea is rather poor in the seal. A possible interpretation is that active transport of urea is not very pronounced in the renal tissue of the seal. The effect of apnea upon the renal function and upon the heart was found to depend upon the degree of struggling with which artifical "diving" was accompanied. Apnea not accompanied by struggle caused a slowing of the heart rate but each heart cycle was normal. In apnea accompanied by struggling the T-waves were inverted or isoelectric. When the animal was struggling, (with or without apnea), the maximum urea U/P ratio was decreased. It is not clear to what extent quiet diving affects the glomerular filtration rate.

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Extra-Renal Salt Excretion in Marine Birds

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The finding (summer 1956) that the nasal gland, or salt gland, of the head is the major organ of excretion for sodium chloride in cormorants was extended to a number of other species of marine birds. The composition of the secretion was determined in greater detail. The innervation of the gland, and its response to various stimuli were established. A detailed study of the anatomy and histology of the gland was commenced.

The results indicate that the salt gland is universally present and of functional importance in all marine birds. The gland is under parasympathetic control, and is stimulated by osmotic loads, mainly sodium chloride, as it is ingested with food or by drinking of sea water. It is assumed that this stimulus acts via central osmoreceptors. The gland functions only after an osmotic load, and does not secrete in the absence of such load.

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Fetal Thyroid of the Spiny Dogfish, Squalus acanthias

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Activity of fetal and maternal thyroids was studied by injection of I^{131} into pregnant females ("candle" and late fetal stages), nonpregnant