

THE ROLES OF THE RECTAL GLAND AND THE KIDNEYS IN OSMOREGULATION AND ELECTROLYTE REGULATION IN THE SPINY DOGFISH, Squalus acanthias

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Dogfish without rectal glands when compared with controls on periods up to twenty-one days, stabilize plasma osmolarity and chloride, this latter at slightly higher levels than initial values. There was an increase in urinary excretion of chloride. Sodium chloride when injected into rectal glandless fish remained in the animals longer than when the gland was present. While urine chloride rose, there seemed to be no specific elimination of chloride by the kidneys in the sense of a prompt adjustment of plasma chloride. Heavy forced feeding of herring which was completely digested in the observation period caused no rise in plasma osmolarity. Food apparently is not massively converted into urea as might be suspected from the natural high plasma urea.

Dogfish with or without a rectal gland when placed in dilute sea water showed an increased hydration and became diuretic. Despite the influx of water and falling plasma osmolarity and chloride, the rectal gland remained very active. This indicates as previously suggested that increased fluid volume is a stimulus to rectal gland activity. In the absence of the gland, urine flow increases apparently to compensate for the large volume of water and salt loss effected by the rectal gland. On return to full sea water, the rectal gland continues to function, but urine flow falls sharply.

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ELECTRICAL METHOD OF COLLECTING GAMETES FROM Echinarachnius parma

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The electrical method of Harvey (Biol. Bull., 103:284, 1952) for collecting gametes from sea urchins has been modified for the sand dollar so as to employ minimal current. E. parma is inverted over a Stender dish in a fingerbowl, and the fingerbowl filled with sea water until the oral surface of the animal is submerged 1 or 2 mm. Lead electrodes, attached to a Variac, are placed about 3 cm apart on either side of the mouth. A shock of 24 volts lasting five seconds is applied, and the animal is allowed to rest one minute. Thereafter, gametes may be collected ad libitum with voltages as low as 3-5 V. Gametes so collected are indistinguishable from those collected by the KCl method in the extent of fertilization, time of first four cleavages, or appearance of plutei.