

## **On the Function of the Rectal Gland in the Spiny Dogfish (*Squalus acanthias*)**

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The conspicuous rectal or digitiform gland of the dogfish and of other Elasmobranchs has been observed by thousands of students, but its function seems unknown. Surgical catheterization of the duct of the gland resulted in fluid for analysis and data on rate of flow. Analysis showed the secretion to be a watery colorless fluid, nearly neutral, isosmotic with plasma, containing relatively little urea, potassium, magnesium, calcium, bicarbonate, and sulphate, but containing sodium chloride concentrated to about twice the plasma level. Observed flows ranged from 0-1.9 ml/kg/hr for single hour periods. In two fish of nine studied, sustained flows of 1.3 ml/kg/hr for twelve hours, and 0.77 ml/kg/hr for forty-eight hours occurred. Composition and rate of flow indicate that the rectal gland can eliminate from the blood significant amounts of sodium chloride, and presumably this is its function. Data from one fish showed that the combined rectal gland and urine output of sodium and water is approximately that of sea water.

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## **Further Data On the Secretion of the Rectal Gland in the Dogfish, *Squalus acanthias***

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Exploratory experiments were performed on parameters which define the secretion of the rectal gland (cf. Science, 131: 670-1, 1960 for previous data). The following injected agents provoke an increased secretion: NaCl, 10ml of 4, 6, 8% solution; urea, 10 ml equivalent osmotically to 4, 6, 8% NaCl; sucrose, 10 ml equivalent to 4, 8% NaCl; urea-saline equivalent to dogfish blood, 20 ml.; distilled water, 20, 35 ml. One ml NaCl or 2 ml water gave no response. There is always a delay of about 1/2 - 1 1/2 hours after injection before response. Repeated injections of the same dose of NaCl into the same fish gave highly reproducible responses. With NaCl the response gave maximum values when measured over full hours, of 1.6-1.8 ml/kg/hr, from baselines of 0-0.3 ml/kg/hr.

Response to the above agents was not equal. Sodium chloride was peculiarly effective. Sucrose equivalent to NaCl osmotically always resulted in a weaker response: maximum 1.0 ml/kg/hr for 10 ml equivalent to 10 ml, 4% NaCl; 1.4 ml/kg/hr for 20 ml equivalent osmotically to 20 ml,