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Water Filtration by the Oyster and a New Hormone Effect upon the Rate of Flow.

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Estimates of water passing through an oyster based on: (1) amount of sediment deposited; (2) number of food organisms collected; and, (3) direct measurement of flow through a tube in the cloacal chamber, vary from 333 cc. per hour to 200 quarts per day. Galtsoff¹ with method (3) obtains maximum pumpage of 7 liters per hour. This method is defective since tube in the cloacal chamber prevents normal operation of the first and second zones of control; the shell and the reflected mantle borders, and interferes with blood supply to the gills from the accessory hearts, Hopkins.² In *Ostrea virginica* much of the water entering the right gill anterior to the adductor muscle leaves through an asymmetric excurrent aperture on the right side hence never enters the cloacal chamber. The small tube, 6 mm. creates high ratio of friction to hydraulic head developed.

A superior method, Nelson,³ measuring all water passed while the oyster functions normally, is attachment of the rubber apron of Moore⁴ to a large (23 mm.) tube into the exhaust chamber of the constant level tank of Galtsoff.¹ Using this method a head of 7 mm. of water was developed by an oyster 11.8 x 7.8 cm. at 25.5°C., as compared with 4 mm. previously obtained. Little water passes below 10°C. but above this temperature pumpage rises rapidly to maximum of 26 liters per hour in an *O. virginica* 11.5 x 8.9 cm. A total of 111 liters was filtered in 7 hours at 24-27°C. Above 30° flow decreases sharply from partial closure of shell and reflected mantle borders. Hopkins² shows similar effects in *O. gigas* above 20°.

¹ Galtsoff, P. S., *Science*, 1926, **63**, 233; *J. Gen. Physiol.*, 1928, **11**, 415; *Bull. U. S. Bur. Fish.*, 1928, **44**, 1; 1935, **47**, 143; *Proc. Nat. Acad. Sci.*, 1930, **16**, 555; *Am. J. Pub. Health*, 1936 (in press).

² Hopkins, A. E., *J. Exp. Zool.*, 1933, **64**, 469; *Science*, 1934, **80**, 411; *Biol. Bull.*, 1934, **67**, 346; *J. Exp. Zool.*, 1935, **71**, 195.

³ Nelson, T. C., *Anat. Rec.*, 1935, Supl. 68; *Bull. 351, N. J. Agr. Exp. Sta.*, 1921, 11; *Rpt. N. J. Agr. Exp. Sta.*, 1922, 296; *Proc. Soc. Exp. Biol. and Med.*, 1923, **21**, 90.

⁴ Moore, H. F., *Bull. U. S. Bur. Fish.*, 1908, **27**, 1297.

Marked fluctuations in rate occur independent of temperature, (Nelson,³ Hopkins²). Flow is increased during active shell secretion and by addition of fresh oyster sperm to incurrent water of the male oyster. Sperm is effective in less than one minute, causing ostia to enlarge, permitting more rapid flow. A typical increase is from average flow of 5.9 liters per hour to 11. Initial rise in rate is followed quickly by marked decrease, succeeded by secondary rise to new high level, the duration of which depends on amount of sperm introduced. No response occurs in female oyster unless induced to spawn, in which case flow is markedly reduced owing to reversal of water passage through the ostia associated with expulsion of the eggs. Elsey⁴, Galtsoff (unpublished observations).

Since spawning in the oyster is a group response, (Nelson,⁵ Galtsoff¹), increased rate of water flow in the males permits wider and more rapid dissemination of sperm. With its power to stimulate spawning in both females and males, (Galtsoff¹), the group reaction is more definitely assured, especially where the animals are scattered. Reduced filtration by females during spawning greatly decreases capture of eggs by gills of the parent.

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Effect of Deuterium Oxide on Action of Some Enzymes.

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Since the discovery of heavy water much speculation of very diverse character has been advanced in regard to its possible effects on life. The most extreme views are presented by those who claim, without adequate experimental proof, that deuterium oxide is a most powerful destructive physiological agent and those who, basing their conclusions on experiments made with deuterium oxide in dilute concentrations, state that its pharmacological effects are of negligible character.^{1, 2, 3} The authors have recently dis-

⁵ Elsey, C. R., *Trans. Roy. Soc. Can.*, 1935, Sec. V, 131, 142.

¹ Meyer, J. *Tenn. Acad. Science*, 1934, 9, 225.

² Meyer, J. *Tenn. Acad. Science*, 1935, 10, 111.

³ Macht and Davis, *J. Am. Chem. Soc.*, 1934, 56, 246.