

other extracts reported as affecting specifically the genital mechanism. Much of the work on this subject has been based on incomplete studies, and an insufficient knowledge of the genital functions, and as such it cannot be considered as decidedly conclusive.

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The mechanism of feeding in the oyster.

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The food of the oyster consists of minute plants, plant detritus, and animals filtered from the water passing through the gills. In turbid waters much sand and other inorganic matter is accumulated along with the food particles. Bivalve molluscs which live in muddy waters possess highly complicated systems of ciliary tracts with the aid of which some separation of food from dirt does occur.¹ In the oyster this mechanism consists partly in the gills, but mainly in the palps. Water borne particles on striking the gills are entangled in mucus and carried by the cilia of the gill epithelium: (a) ventrad to the groove formed by the ventral margins of the gill lamellae; or, (b) dorsad to the dorsal groove which passes along the bases of the gill filaments.

In these grooves the mucus covered particles are whipped into slime strings which are then carried anteriorly to the posterior margins of the palps. At this point the material may either pass between the deeply grooved and heavily ciliated faces of the palps, and thence toward the mouth, or failing this is pushed off onto the mantle ventrad the edges of the palps. At intervals the material accumulated here is expelled from the mantle chamber by water forced out by quick contractions of the adductor muscle.

When relatively large masses of collected particles are brought to the palps most of these are rejected and pass off onto the

¹ Nelson, T. C., *J. Morph.*, 1918, xxxi, 53.

mantle as Kellogg² has shown. A larger proportion of the material brought to the palps by the dorsal groove is accepted than that which arrives via the ventral groove. Observation shows that the larger particles, chiefly sand grains, are consigned mainly to the ventral groove. In their passage over the gills they evoke a relatively copious secretion of mucus which renders them bulky and consequently less likely to enter between the palps. The majority of food particles, which stimulate a somewhat less secretion of slime while passing over the gills, enter between the palps and are passed toward the mouth. The separation is by no means perfect as some food materials are rejected and much dirt and sand may at times be taken into the stomach.

As the slime strings are passed between the opposed faces of each pair of palps still further rejection of materials is effected. This is accomplished partly as Allen³ has shown through reflex erection of the ridges of the palps which brings into play groups of cilia which beat away from the mouth. Further separation is accomplished through the medium of the grooves between the ridges and the short transverse loops in these grooves which occur progressively more abundantly from about the middle of the palp toward the mouth. Small particles picked out of the slime strings by the cilia, pass down into the grooves, the cilia of which, in the anterior part of the palp, beat dorsad. Particles carried dorsad by these ciliary currents, when they encounter a transverse loop of the groove, pass across the ridge at the base of the loop and enter the groove next anterior. In this manner particles while being carried dorsad are progressively moved toward the mouth. Nannoplankton forms (those less than about 25 μ in length) which may form as high as 80-90 of the food of the oyster,⁴ are chiefly separated from dirt and carried to the mouth by this means.

Young oyster "spat" less than 3 mm. long, attached to glass slides were used for study of the part played by the filament of the gills and palps during feeding, and also for testing the effect of magnesium sulfate upon the reflex movements of the palps. The animals were studied whole under the microscope, the trans-

² Kellogg, J. L., *J. Morph.*, 1915, xxvi, 625.

³ Allen, W. R., *Biol. Bull.*, 1914, xxvii, 127.

⁴ Martin, W., *Bot. Gazette*, 1923, lxxv, 143.

parency of the shell permitting uninterrupted observation of the process. The gills and palps of the oyster at this stage consist of isolated filaments which are capable of independent movement.

In normal feeding the filaments of the palp are extended ventrad in the mantle chamber, their ends in close proximity to the outgoing ciliary tracts of the mantle. Particles reaching the palps via the dorsal groove were in the main accepted as were nearly all particles which succeeded in getting across the third filament from the posterior end.

In 1/20 sat. magnesium sulfate in water the filaments of the palps lost the power to erect, resulting in large masses of materials passing over the filaments to the mouth, eventually blocking it.

Feeding in the oyster is accomplished therefore through the delicate coordination of nervous, muscular, ciliary, and mucus secreting elements in which mechanical sorting of the materials plays the most important part.

The complete paper with the preceding one will appear in a zoological journal.