PARTICIPANTS IN THE 6th ANNUAL MORTALITY CONFERENCE

RUTGERS-THE STATE UNIVERSITY

NEW BRUNSWICK, NEW JERSEY

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Summary of Oyster Mortality Studies - 1963

Oyster Research Laboratory

N. J. Agricultural Experiment Station
and Department of Zoology

Rutgers - The State University of New Jersey

(Prepared for 6th Annual Mortality Conference, Jan. 20-21, 1964)

I. Mortalities in Delaware Bay Oyster Stocks, 1963

Harold H. Haskin

A year ago I reported on the declining death rates due to disease for oyster populations on the planted grounds of Delaware Bay. In contrast to monthly mortalities of 15-20% in 1959, by 1962 monthly mortalities did not exceed 5%. Even at these greatly reduced rates however, the basic pattern of peaks in late winter and late summer still persisted. Over this past year no additional plantings have been made in the lower Delaware Bay so the mortality rates are based on continued study of stocks planted earlier, for the most part in 1961 and 1962. Seven grounds were sampled each month and the recent mortality, based on fresh box counts is averaged for the grounds. In comparison with 1962, an increase in mortality rate is evident - with an April peak at 15.6% and a secondary September peak at 5.9%. One experimental planting of James River stock imported to the Seed Beds Area in May 1962, shows a similar mortality pattern but with the April peak at 38.5% and an October peak at 3.9%.

II. "MSX" Infection Levels in Delaware Bay Oyster Stocks

John Myhre

From September through most of January of this year, the MSX incidence level in Delaware Bay ranged from 0-5% on Arnold's Bed to 25-45% on lower bay leased grounds. These minimum levels indicate a significant incrsase in MSX incidence over the previous two years. These figures are based on examination of fresh tissue fluids and are minimal. They will be higher when tissue sections are examined.

Microscopic examinations of stomach contents of oysters from September through January of this year reveal apparently normal "MSX" in high concentrations in the gut of many oysters.

After two years in Delaware Bay, a planting of James River oysters shows a 60% level of "MSX" compared to a 25% level in Native Delaware Bay oysters on the same ground.

III. Mortalities and "MSX" levels in Tray Stocks of Oysters, Cape Shore, Delaware Bay

Walter J. Canzonier

Mortality levels in the older tray stocks were, in general, low; not exceeding 5% monthly for most of the year, with slight increases in late winter and fall. The pattern for 1962 spring imports repeated that for 1961 spring imports. After low

mortality in the first summer and winter it jumped to about 20% monthly for 2 months in the second summer. Some of the '62 imports were mixed with old infected tray stocks to determine proximity effects on transmission of infection.

"MSX" incidence was maintained at about the 20% level in old tray stocks up to November '62. In 1963 levels appear to be down considerably (5%). Mortalities observed cannot account for this drop.

1961 imports maintained about a 20% level of infection up to September '63.

1962 imports remained negative until summer of 1963 at which time 30% infection was found. This incidence is identical in two lots, one mixed with old infected stocks and a second held in a separate tray. This suggests that proximity has minimal influence on infection rates.

Gaper incidence indicates that little of the first summer mortality is due to "MSX." Possibly as much as 80% of the July-August mortality of the second summer can be attributed to "MSX."

High Dermocystitium levels in the tray stocks complicate the interpretation of mortalities. On the basis of gaper incidence, a large fraction of the late summer mortality can be attributed to this agent. The mixed tray studies indicate that a Long Island hatchery-reared stock is considerabky more susceptible to Dermocystitium than either Navesink River or James River stocks. After several years selection by this parasite, old tray stocks attain relatively high incidence levels without appreciable mortalities.

IV. Mantle "Organisms"

John Myhre

Many Delaware Bay oysters fixed in Davidson's and stained with iron hemotoxylin show two distinct types of cell inclusions in outer mantle epithelium. Goblet cells in many instances contain from 1 to about 12 disc shaped objects. These objects take an intense iron hemotoxylin stain and many appear to be extruded into the shell cavity.

Similar objects are found (one per cell) in other epithelial cells suggesting that their origin may have been the goblet cells. The position of these epithelial cell inclusions suggests that they migrate to the inner side of the epithelial cell nucleus. During the migration they increase in size and become hairpin-shaped.

The incidence level of both cell inclusions is highest during the oyster's hibernation period.

The "disc" shaped inclusion has also been observed frequently during winter months in intestinal epithelium and on one occasion in digestive gland and gill epithelium.

The apparent invasion of epithelial cells and the development of this inclusion suggests that it may be an organism.

Many times, when the epithelial cells contain these inclusions the epithelium appears to be disintegrating, suggesting that it may also be a pathogen.

V. The Recovery of Intracardially Injected Virus from Oyster Tissues

Jean S. Feng

The functions of oyster leucocytes have already been explored by intracardial injection of various foreign particles; India ink, avian blood cells, chloroplasts, yeast, bacteria, protozoan, and protein solutions. It was shown that phagocytosis, pinocytosis, intracellular digestion and diapedesis of particle-laden leucocytes played important roles in disposing of the injected particles (Stauber, Tripp, & Feng). It was further noted that the ambient temperature at which the experiment was performed could influence the fate of the particles (Feng.)

The use of Staphylococcus aureus phage 80 as an inoculum in the present study appears to be a logical extension of the above series of experiments. Three groups of the oyster, Crassostrea virginica, were kept at 4°, 17°, and 24° respectively and each oyster received 0.2 ml of the phage with a titer of 1.3×10^{10} per ml. Oysters sacrificed 5 min., 1 hr., 4 hrs., 1 day, 2 days, and 5 days after the injection were assayed for the phage.

The result showed that the phage disappeared rapidly from the oyster-homogenate. Thirty to 60% and 90% of the inoculum were lost in 5 to 10 min. and 4 hours respectively whereas the titer of the phage in the controls, both nutrient broth and oyster homogenate, showed little decrease in 4 hours. It was thus observed that recovery of the phage or/and the infectivity of the phage for its host, Staphylococcus aureus J433, were adversely affected in the oyster tissues but the function of temperature appeared to be non-appreciable during the period examined.