Third Annual Oyster Mortality Conference

Summary of Oyster Mortality Work -- 1960*

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Mortality work of this laboratory in 1960 has been essentially a continuation of studies by the groups at Bivalve, the Cape Shore and New Brunswick, as previously reported. These include field studies on the seed beds and leased grounds, experimental plantings on the leased grounds, tray experiments at the Cape Shore and laboratory studies on life cycle of MSX, histopathology, transmission and inoculation of suspected agents.

A. Delaware Bay Seed Beds and Leased Grounds - D. Kunkle, W. A. Richards and J. H. Myhre

Mortalities on the Natural Seed Beds after the heavy disease kills of the fall and winter 1958-59 have been comparatively light -- not exceeding 5% monthly except for a 10-15% mortality in May, 1960.

There have been no commercial plantings since the spring of 1958. Total mortality (disease and predation) on these '58 plants approximated 80% by October, 1959. Monthly mortality rates on survivors of these plantings in the past year have ranged between 1½ and 5%.

B. Experimental Plantings

Three pairs of sections were planted with native Delaware Bay seed oysters from two natural beds in November 1959. Monthly samples on all grounds to November 1960 show total mortalities of 40-60% with non-predation mortalities 25-40%. Comparison with a similar planting made one year earlier indicates that the disease kill in 1960 is roughly half that in 1959.

C. Tray Studies - H. Haskin and W. Canzonier

Survivors of the original tray stocks established in 1958 were carried through their third mortality year along with the additional introductions of 1959 and 1960. Stocks from selected coastal areas ranging from New Haven harbor to the James River are included. Of

* Portions of this are included in the annual summary report to the U.S. Bureau of Commercial Fisheries, June, 1960, and other portions are included in reports for the last half of 1960.

particular interest is the observation that while disease mortality rates on the leased grounds declined sharply, they remained as high in the Cape Shore trays as in the summers of 1958 and 1959. Seasonal patterns of kill were essentially similar to those previously reported with major peaks in 1) late winter-early spring, 2) June, 3) late summer-fall. In an introduced susceptible stock the onset of first major kill is a function of time of introduction.

Stocks introduced into the lower Bay from March to June show low (less than 3%) monthly mortalities through the summer until the late summer peak kills when the monthly rate climbs to 25-50%. Stocks introduced in late summer and early fall show a late winter-spring kill, followed by a lower summer rate, though consistently higher (10-20% monthly) than that for stocks introduced in spring. Stocks previously exposed in the lower Bay that have passed through one or more years of heavy mortality show comparatively a uniform death rate throughout the year, with summer monthly rates from 3-10%, and spring and fall peaks grouped around 10-18%.

Included in the trays now are four year classes (1957-60) of lower Bay set. These are providing the first evidence for an increased level of resistance in the offspring of stocks surviving heavy MSX mortalities.

The trays are also our most important source of infected stocks for histological study and for laboratory experiments in transmission of disease agents.

D. Forms of MSX and their Relative Abundance through the Year- J. H. Myhre

For two years it has been known that MSX appears in a variety of forms. The forms have been described. Their relative abundance in monthly collections of living oysters from Delaware Bay leased grounds has been studied with counts of 400-500 parasites each month. There is evidence for characteristic winter forms and summer forms and some evidence for a succession of stages.

E. Attempted Laboratory Transmission of MSX - W. J. Canzonier

A variety of procedures were used in an attempt to transmit MSX in the laboratory. Among these were feeding with and proximity to infected material under various tank conditions. Several types of inoculation experiments were attempted using gaper homogenates and tissue implants via various routes. As many as 100 to 800 oysters were used in each proximity and feeding experiment. Determination of the fate of introduced MSX was considered in the design of these experiments. Many of the results are yet incomplete with regard to histological examination.

There is some evidence of at least occasional transmission of MSX though no significant mortality differential occurred between experimentals and controls and tissue examination indicates inconsistent transmission or failure to persistaafter entry. Some histological material suggests the possible fate of MSX in oysters used in some of these experiments.

F. A Technique to Determine the Distribution of MSX in the Oyster Tissue Section - Sung Yen Feng

A procedure is developed to give detailed quantitative data concerning the distribution of MSX in situ, especially in the epithelium and subepithelial regions of digestive tract, palps and mantles, as well as to furnish qualitative information of MSX in tissues other than the aforementioned in the oyster.

G. Experimental Hexamitiasis in the Oyster - S. Y. Feng and L. A. Stauber

Experimental hexamitiasis in the oyster was achieved by introducing cultured Hexamita intracardially and orally. The host response to parenteral injection of Hexamita under various temperature regimes can be summarized as follows: (1) At 6° C. all oysters died 18 days after injection of 3.2 million Hexamita per oyster; throughout the entire course of infection leucocytosis was not detected. (2) When the oysters were given 400,000 organisms and held at 12° C. 2 out of 10 oysters survived for 14 days; and 1 still remained alive at the end of 20 days. (3) 50 per cent of the oysters were dead in 14 days after being given 1,000 Hexamita per oyster and kept at 12° C. (4) When Hexamita were injected into oysters at 18° C., they promptly disappeared from the blood circulation even when as many as 400,000 were introduced per oyster. This was not simply a sequestration of the organisms in some particular place since tissue squashes of gills, palps, visceral mass, etc. all were negative for live organisms as early as 4 hours after injection. (5) Leucocytosis was noticed in all experimentally infected oysters except those kept at 6° C. We are still unable to correlate this process with phagocytosis of Hexamita.

At 4° C. when unwashed Hexamita, washed Hexamita and sea water fortified with antibiotics were administered orally into three groups of oysters respectively, the infection in all cases remained subpatent throughout the entire six-week period. Hexamitiasis was observed only in the control group which was given only 0.1 ml sea water per oyster. The occurrence of a small rod bacteria with white smooth colony in the blood samples of all groups of oysters is probably a matter of chance and unrelated to treatment.