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SURVIVAL TIME OF OYSTERS AFTER BURIAL AT VARIOUS TEMPERATURES[1]

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ABSTRACT

Experimental burials of oysters were made 3 inches deep in containers of soil held in running sea water at five temperature ranges from less than 5°C to over 25°C. Survival time varied from 2 days in summer to 5 weeks in winter, showing a direct relationship to temperature.

INTRODUCTION

Accidental burial of oysters can be caused by storms; siltation due to high run-off or channel dredging; oyster harvesting and planting activities; smothering by vegetation or other organisms; and probably by unknown agencies. Occasionally, oysters being held in trays on or near the bottom have been buried. Both natural and man-caused burial are widespread phenomena (Galtsoff, 1964).

Oysters were buried experimentally to study how burial affects them. One result of these studies is an indication of survival time and rate of decomposition at several temperature ranges.

METHODS

Oysters from the lower Patuxent River were used and all were held in running sea water until dredge and handling damage to the shells was repaired. In each series, 8 oysters were buried 3 inches deep in mixed sand and mud in each of 4 polyethylene trays. Control oysters were placed on top of the soil and the trays were immersed in a large running seawater aquarium.

Observations of the soil in the trays and in glass tanks showed the following conditions as indicated by the presence of reduced sulfur compounds:

1 inch below the soil-water interface — still aerobic,

1½ inches below the soil-water interface — transitional, becoming anaerobic,

2 inches below the soil-water interface — mostly anaerobic,

3 inches below the soil-water interface — entirely anaerobic.

This gradient is similar to conditions observed in natural bottom having the same type of soil.

In trial shallow burials, oysters buried 1/2 inch or less deep could usually clear their bills of sediment if the water was warm enough for active pumping. Thus the 3-inch depth employed in this experiment indicated survival under conditions that did not permit recovery from burial.

Initially, burial periods which would furnish the desired information on survival could only be guessed. The work of Lund (1957a, b, c) was suggestive, and Wilson[2] experimented with burials but these authors dealt primarily with aspects of survival other than temperature. After the first two series of burials were completed, it was possible to plan exhumations so that they were made during periods of moribundity. Later experiments thus show progressively increasing decomposition and deaths.

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[1] Contribution No. 356, Natural Resources Institute, University of Maryland.

[2] Wilson, W. B. 1950. The effects of dredging on oysters in Copano Bay, Texas. *In* Annual Report of the Marine Laboratory of the Texas Game, Fish and Oyster Commission for 1948-1949, p. 1-50.

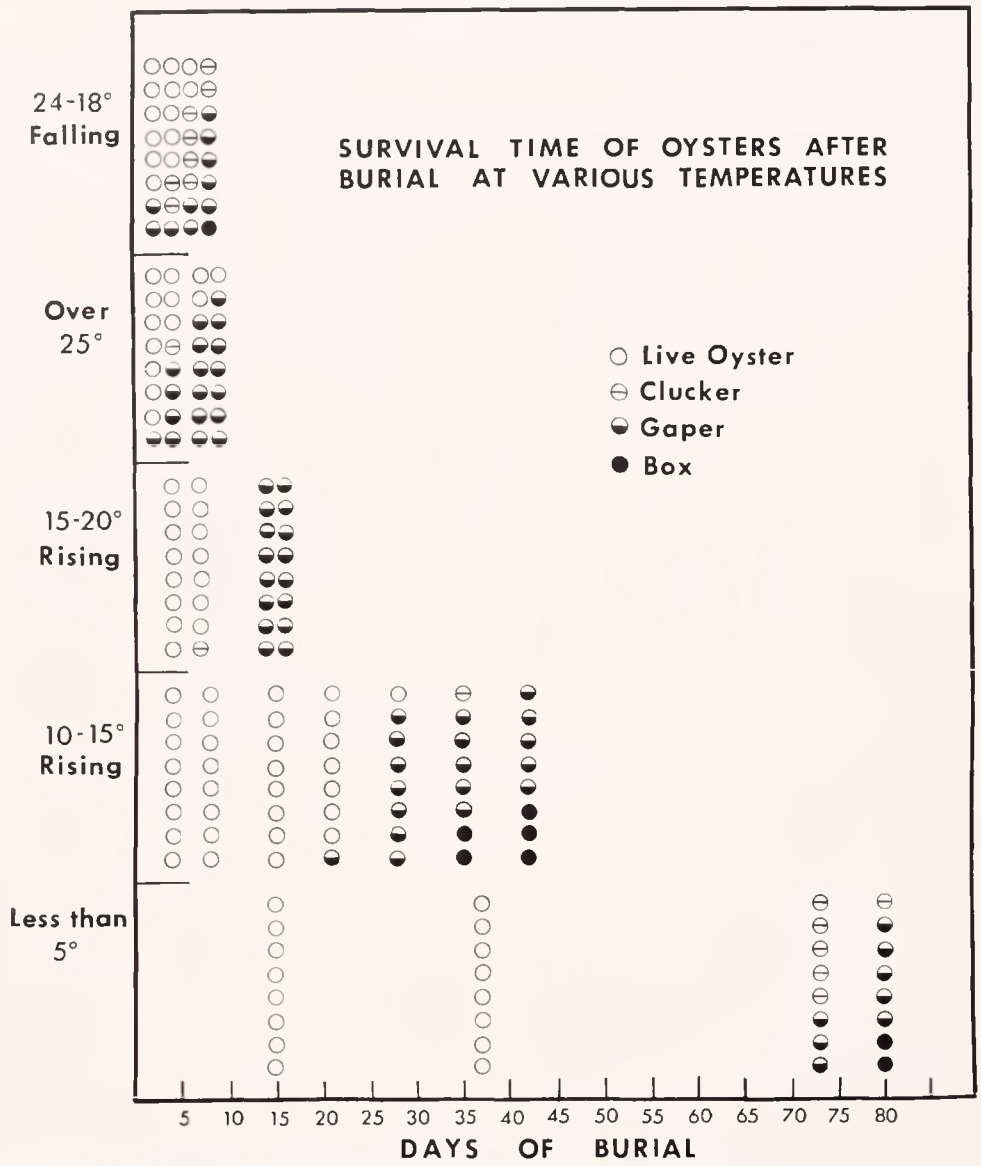

FIG. 1. *Condition of oysters at exhumation after various periods of burial. Each symbol represents a single oyster.*

RESULTS AND DISCUSSION

Figure 1 shows the results of burial at 5 different temperature ranges. At mid-winter temperatures of less than 5°C, oysters lived for over 5 weeks and decomposition was prolonged to over 10 weeks. Pumping would not normally occur when the water is this cold and experimental shell opening rarely happens at these temperatures.

In the 10-15°C series, the first dead oyster was found 3 weeks after burial. One week later, 7 were dead and later exhumations showed increasing decomposition.

At 15-20°C, most oysters survived for a week, but all were dead after 2 weeks. When this experiment was conducted critical moribundity periods were still not established.

During mid-summer temperatures of over 25°C, one buried oyster died in 2 days, 50 per cent were dead in 4 days, and after a week only one was alive.

In the fall with ambient temperatures declining from 24-18°C, a similar pattern was found,

with the difference that oysters died a little more slowly.

Although there are marked differences in survival times between the 10-15°C series and the 15-20°C series, it appears that within these ranges (below 20°C) once a certain threshold has been reached, death follows in about one week. At higher temperatures, this critical point is reached in less than a week.

All of the oysters were buried with the left side down. When they were exhumed and examined it was observed that the left side of the visceral mass decomposed before the right side and the posterior region decomposed before the anterior region. The exposure to the mud which occurred when they gaped and remained open seems to have hastened decomposition.

In several of the oysters that were exhumed alive, mud on the gills indicated that the valves were opened temporarily before they finally gaped and stayed open.

A direct relationship between temperature and survival time is shown by these experimental burials. Earlier death at higher temperatures may be due principally to a higher metabolic rate and more rapid consumption of reserves. The intrusion of toxic materials and bacteria from the mud when a buried oyster gapes may also be a significant factor in survival time and it probably hastens decomposition.

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