1953

Studies on the relation between black mud and mortalities in the Rappahannock River, Virginia, in 1953

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Report distributed to Oystermen in Rappahannock Area.

STUDIES OF THE RELATION BETWEEN BLACK MUD AND MORTALITIES IN THE RAPPAHANNOCK RIVER, VIRGINIA, IN 1953

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Introduction Following the reappearance of "black mud" in May 1953, a meeting was held at Tappahannock to discuss possible causes of the condition and the steps which might be taken if there was a recurrence of mortality such as followed the "black mud" in 1949. Lacking any clear cut evidence that pollution or physical factors caused the mortality, we suggested that a newly discovered fungus disease called *Dermocystidium marinum* be studied as a possible causal factor.

A study has been made of this disease in the Rappahannock River in the past year. Each month a sample of oysters from Hoghouse Bar has been tested for the fungus. In addition one tray of Hoghouse oysters has been held at Sitterding's dock below Urbanna and four trays of the same oysters were moved to Gloucester Point for observation.

Results from the study of the fungus disease The total mortality for Hoghouse oysters at Gloucester Point between May 25, 1953, and March 10, 1954, was 28 per cent. In a similar period, only 10 per cent died in the tray at Sitterding's dock. In both areas nearly all deaths occurred in summer and fall and very few in winter and spring (Fig. 1). In the trays at Gloucester Point, 90 of 107

STUDIES OF THE [illegible] WATER [illegible]

[illegible] IN THE RA[illegible] FOR [illegible], VIRGINIA, IN 1984

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Introduction Following the [illegible] of [illegible] in May 1983, a [illegible] was [illegible] to determine the [illegible] causes of the condition and the steps which might be taken if there was a [illegible]. Inasmuch as [illegible] evidence that pollution or physical [illegible] the [illegible], we suggested that a [illegible] study [illegible] be undertaken to [illegible] possible [illegible] factors.

[illegible] has been [illegible] of [illegible] water [illegible] River in [illegible]. Black [illegible] is a [illegible] of [illegible] Pure Springs [illegible] for the [illegible]. In addition one [illegible] a [illegible] operated [illegible] below [illegible] and [illegible] of the [illegible] were [illegible] in Clarksville [illegible].

Location from the study of the [illegible] [illegible] The best [illegible] for [illegible] operation of [illegible] are [illegible] 20, [illegible] and [illegible] 16, [illegible] 26 [illegible]. [illegible] a [illegible] period, only 16 [illegible] in the [illegible] of [illegible]. In both [illegible] [illegible] [illegible] were [illegible] in [illegible] and [illegible] [illegible] [illegible] spring [illegible] of the [illegible] Point, 90 [illegible]

gapers, or 84 per cent, had moderate or heavy infections of the fungus. It is probable that the fungus was the primary cause of death in these gapers. It is presumed that a similar proportion of the deaths in the Rappahannock were caused by the disease. This assumption is based upon a comparison of infections of live oysters in the two areas; also the one gaper recovered from the Rappahannock tray had a heavy infection.

Monthly tests of live oysters, dredged or tonged directly from Hoghouse, showed that the peak level of infection was 46 per cent while oysters moved to the trays at Gloucester Point reached a peak infection of 80 per cent (Fig. 2). In both areas the fungus appeared in June, reached a peak in late fall, and disappeared again by late winter. Note that the time of deaths coincided very closely with the appearance and disappearance of the fungus disease. Infections of the fungus persist later in the winter than deaths since it takes some time for oysters to recover after cold weather inhibits the growth of the fungus. The monthly tests show that the fungus was much less active at Hoghouse Bar than at Gloucester Point. We would expect the occurrence of the fungus and mortalities to decrease progressively up the Rappahannock River from Hoghouse.

We do not believe that the fungus was the primary agent in the 1949 mortality. All the evidence indicates that the oysters died suddenly, probably in June or early July, and that the mortality was

[illegible]

[illegible]

[illegible]

essentially over by the first of August. In contrast, deaths caused by the fungus do not begin until July and are much more serious in August and September. Such deaths are typically spread over a period of three to five months without any sudden losses. We do believe that the fungus is a major cause of the usual summer and fall deaths in the saltier waters of Virginia.

Further studies on the causes of the "black mud"

We still have no evidence that the "black mud" and subsequent mortalities were related. Although less intense than in 1949, the "black mud" reappeared in 1953 without a repetition of oyster losses. Nevertheless, it is difficult to discount the strong impression that the two were related.

Since the "black mud" is undoubtedly caused by an excess of organic matter on the bottom, the source of this material is of first importance. It may be that through the winter this material accumulates on the bottom without additions from upstream, but it is also possible that spring freshets scour materials off the bottom upriver and deposit them along with silt when salt water is reached. Spring growths of plankton (microscopic organisms in the water) in the fresh waters of the river may be carried down and deposited, too. Heavy growths of algae and diatoms have been noted following spring runoff. The necessary nutrients for these growths have been washed from the land. Lastly, silt accompanying the spring freshets may bury and smother some organisms present

on the oyster grounds.

A restudy of the weather conditions has revealed some interesting facts about the years 1949 and 1953 in regard to the occurrence of the "black mud." In both years, river waterflow and winter temperatures were abnormally high. Between November 1948 and May 1949, the Fredericksburg station on the Rappahannock recorded more fresh water flowing down the river than at any other time in the history of the records, a period of 46 years. Furthermore, in the first ten days of May 1949, four inches of rain fell at the Culpeper station in the center of the drainage area of the river. This occurred just prior to the appearance of the "black mud." A further abnormality was the extremely warm winter; January averaged 8°F. warmer than normal and February somewhat above normal.

In 1953, the weather repeated this pattern although both waterflow and temperatures deviated less from normal than in 1949. It is possible that these factors may be useful in anticipating future troubles.

Summary and conclusions

In summary, we must point out that we still do not know the causes of the 1949 mortality and it is not likely that we ever will be certain. Since we examined the grounds on June 1, 1949, at a time when the "black mud" was nearly gone, without finding dying or dead oysters, it must be concluded that oxygen deficiency was not the primary cause. Our studies of known parasites and diseases seems to eliminate them as possible causes.

The best advice we can give at present in regard to the "black mud" is to watch oysters carefully around the middle of May each year, especially following warm wet winters when the waterflow is excessive. It is significant that the "black mud" appeared within ten days of the middle of May both in 1949 and 1953. The occurrence of the "black mud" in other rivers should also be watched for and reported.

In 1949 the "black mud" was reported in Maryland too, and since it appears to be a natural phenomenon, it is unlikely that it can be controlled. However, we do hope to discover the conditions that give rise to the "black mud" which may enable us to predict when it is going to occur. In such studies it is very important for us to be informed of its occurrence at the very beginning, how long it lasts, and the areas involved. We suspect that any damage to oysters may result from lack of oxygen or the presence of hydrogen sulfide which accumulates when oxygen is lacking. It is most difficult to test for these gases in the bottom layers of water used by oysters. However, the intensity and duration of these adverse conditions is of utmost importance. Oystermen can be of great help in discovering and reporting abnormal conditions promptly.

March 22, 1954.

Fig. 1. Deaths of Hoghouse oysters in trays at Gloucester Point

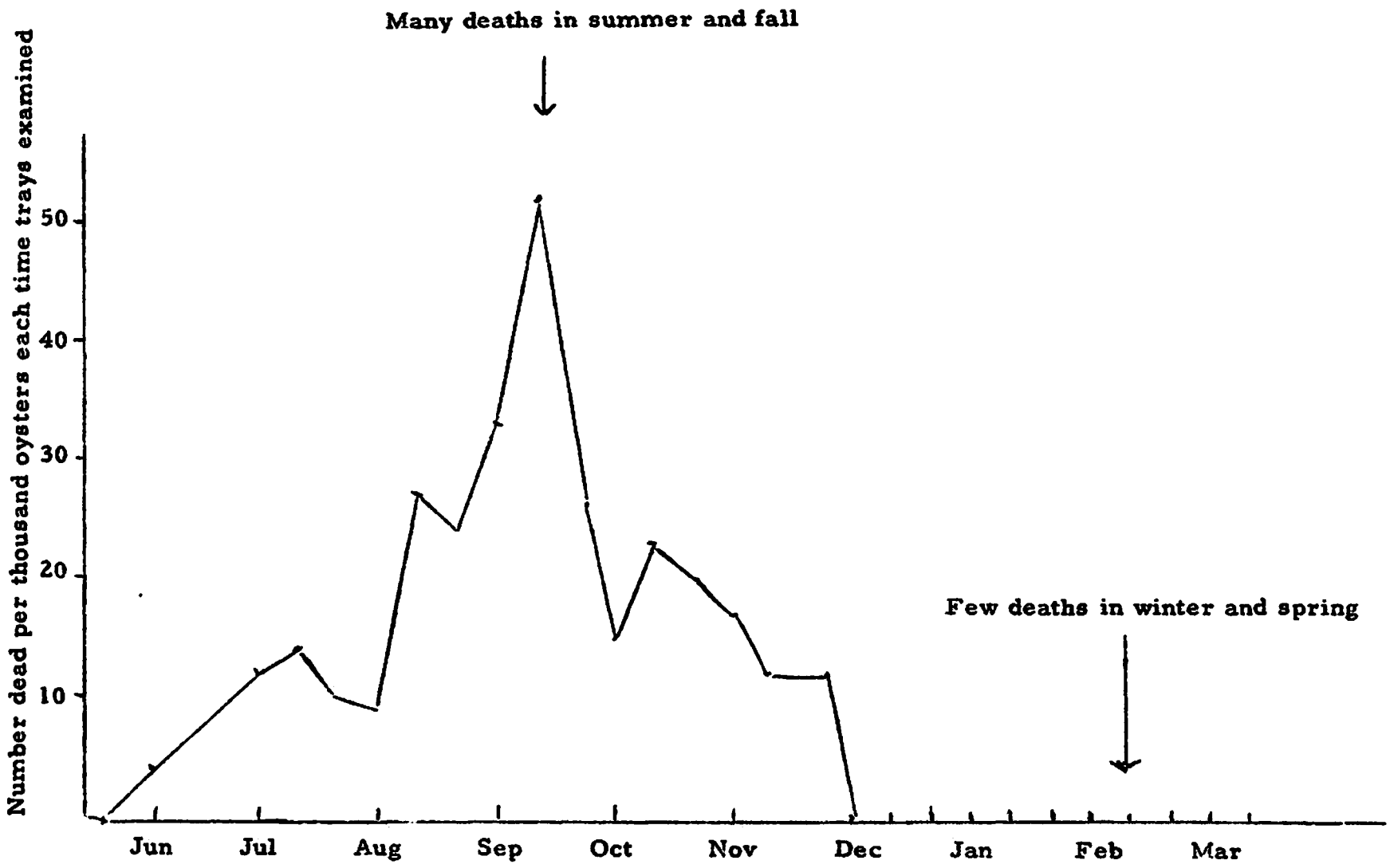

Fig. 2. Monthly levels of infection of live oysters by the fungus disease, Dermocystidium marinum