

DERMO DISEASE



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Introduction

Dermo disease is caused by a single-celled Protozoan parasite, *Perkinsus marinus*. Originally, it was thought to be caused by a fungus and named *Dermocystidium marinum*. Even after the reclassification the disease is commonly called "Dermo".

Dermo is an intracellular parasite (2-4 μm) infecting the hemocytes (blood cells) of the eastern oyster, *Crassostrea virginica*. It is not known to be harmful to humans. Dermo's life cycle consists of several different stages which proliferate inside the oyster. Its vegetative life cycle consists of dividing cells which enlarge and, in turn, divide to produce more daughter cells. Dermo can also be induced to form zoospores, which are able to swim with the aid of two flagella.

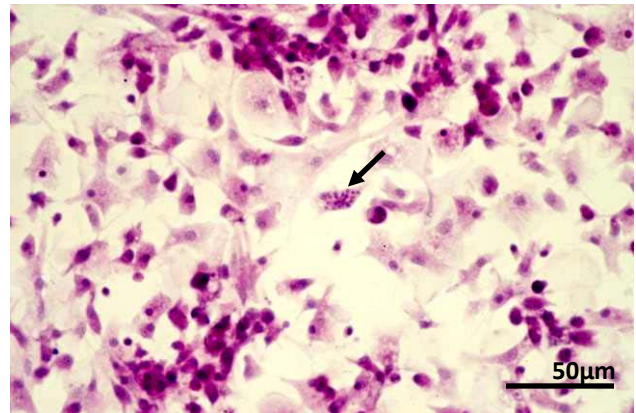
Dermo disease caused extensive oyster mortalities in the Gulf of Mexico in the late 1940s. Later, it caused chronic and occasionally massive mortalities in the Chesapeake Bay. Since 1990, Dermo has been detected in Delaware Bay, Long Island Sound, Massachusetts, Rhode Island and Maine.

Transmission

Dermo is transmitted from oyster to oyster. Natural infections are most often caused by parasites released from the disintegration of dead oysters. Infective stages, free in the water column, are ingested by uninfected oysters and invade the epithelium of the stomach and intestine. Waterborne stages of the parasite may spread the disease over long distances. Transmission may also occur by vectors such as scavengers feeding on infected dead oysters or by parasitic snails. Alternate molluscan hosts may serve as important reservoirs for Dermo.



Dermo cell and zoospore. (Malcolm Shute)



Hemocyte monolayer preparation with the hemocyte in the middle infected with several Dermo cells (Inke Sunila)

Environmental factors

Dermo is considered a warm water pathogen which proliferates most rapidly at temperatures above 25°C (77°F). Activity of the disease is primarily regulated by temperature in this region: an endemic situation in Connecticut might result from a series of warm winters. However, Dermo can even survive freezing. It is suppressed by low salinities (<8-10‰), but the parasite proliferates rapidly when oysters are transplanted into higher salinity waters. There are different genetic strains of Dermo in different geographic regions. Some of them cause heavier infections than others.

Dermo Infection

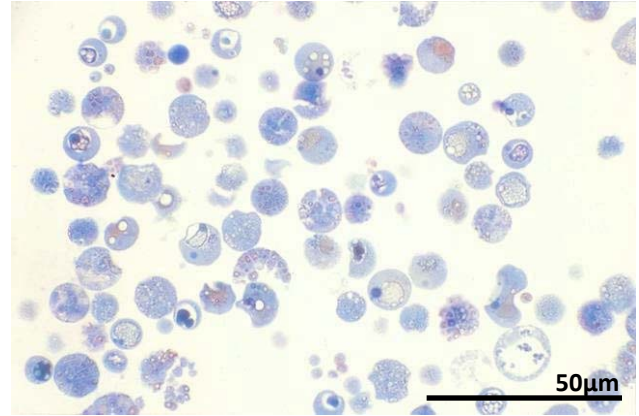
Infectious stages are present in the warm months from May through October. Initial infections are usually detected in June. Mortalities occur from July through November. Oysters die due to tissue lysis and occlusion of hemolymph vessels. Prevalence and intensity of the disease decreases during the winter months, and the disease can not necessarily be detected during winter in infected oyster beds. Some parasites remain dormant and will proliferate as temperatures rise in the spring, releasing stages that initiate another round of infection.

How do I know if my oysters are infected?

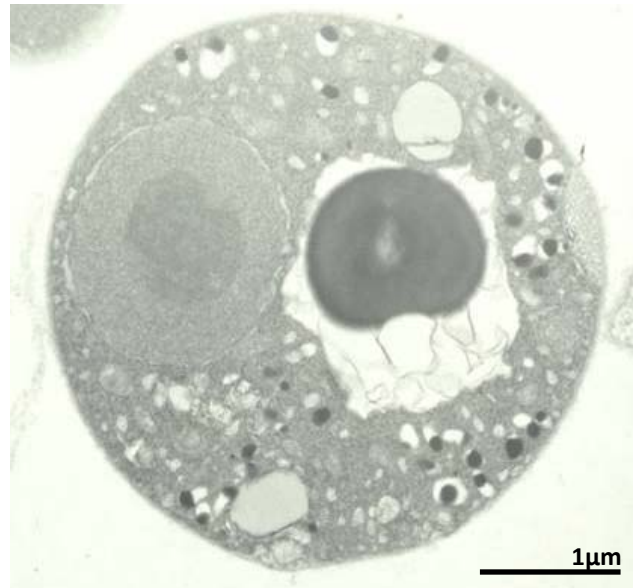
Dermo can be diagnosed by microscopical examination of a preparation from the oyster's anal-rectal tissues cultured in Fluid Thioglycollate Medium (Ray/Mackin tissue assay). Dermo cells enlarge forming hypnospores, which can be made visible by staining them with iodine. Prevalence (%) indicates, how many oysters in the sample carry the parasite. Intensity (Mackin scale) indicates, how many enlarged hypnospores there is in a microscope field at a given magnification. The Bureau of Aquaculture provides a diagnostic pathology service for the State's oyster growers.

Status of Dermo in Connecticut

Dermo has spread rapidly throughout the oyster population along the shoreline. However, infection with Dermo does not necessarily cause death of the oyster. Dermo can be characterized as a slow-killing disease. It takes up to three years in Connecticut after initial infection to parasite intensities to approach levels high (3 on Mackin scale) enough to cause death of the oyster. Oysters are marketed when they are three to four years old. Consequently, Dermo has not caused significant mortalities in Connecticut's commercial oyster stocks. High oyster mortalities in 1997 and 1998 were due to a MSX outbreak, not Dermo infection. On the other hand, Dermo-associated mortalities have been detected in areas of unusually slow oyster growth or during restoration efforts when oysters are grown infinitely.



A plastic thick-section of cultured Dermo cells (Inke Sunila)



Dermo cell under electron microscope (Inke Sunila)



Dermo hypnospores in a Thioglycollate culture (Christopher Dungan)

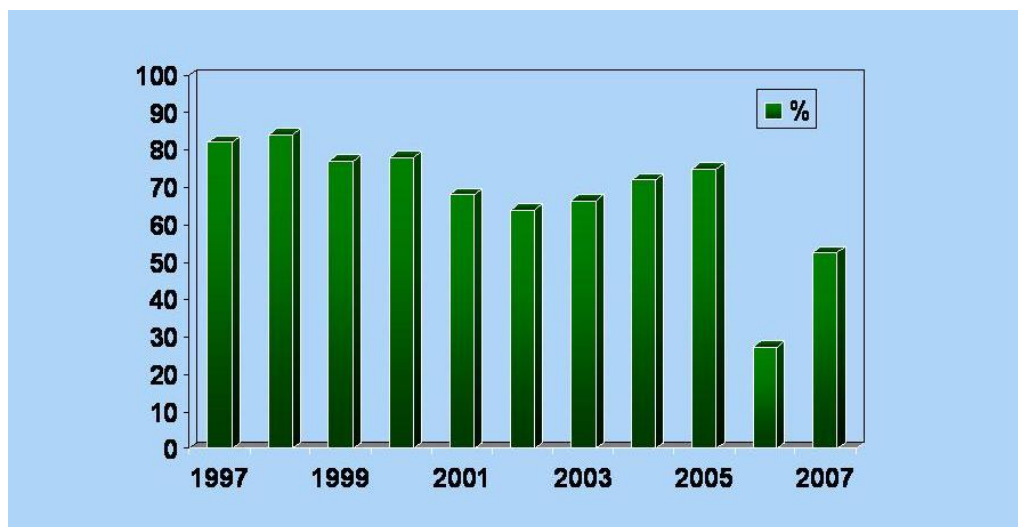
Managing Dermo Infection

Dermo management guidelines developed outside the State are not necessarily applicable to Connecticut's oyster beds. Managers in adjacent states may suggest that growers avoid transplanting infected seed oysters, or remove all oysters from an infected ground in order to let grounds "fallow" between plantings.

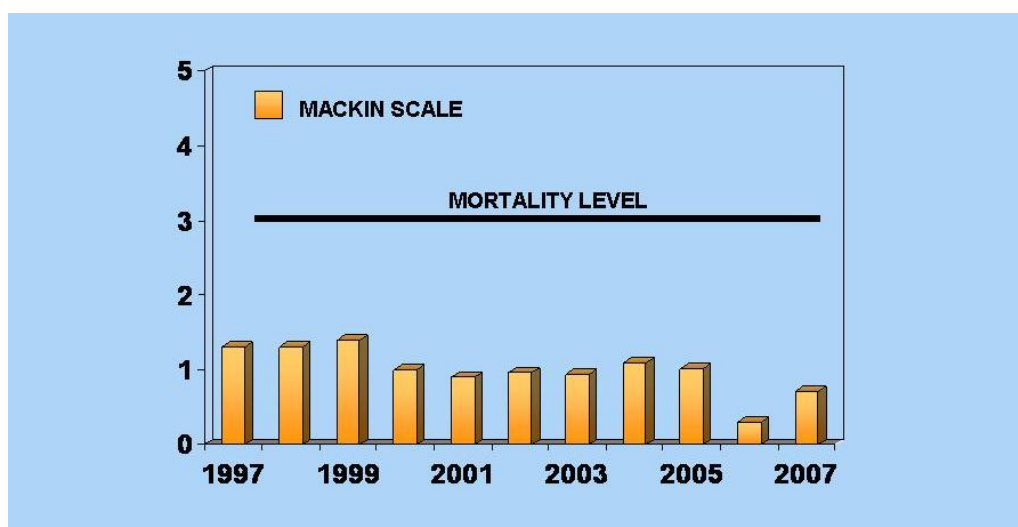
The State of Connecticut has developed its own Dermo prevention guidelines for oyster grounds (see right).

GUIDELINES FOR DERMO MANAGEMENT IN CONNECTICUT

- Infected oyster grounds should be kept in operation as an active part of the transplantation programs
- Since both seed and adult oysters can be infected without significant mortalities in market oysters, transplantation can occur from seedbed to grow-out areas
- When relying on hatchery-raised seed, use Dermo-resistant strains



Prevalence of Dermo in Connecticut since 1997. (Inke Sunila)



Intensity of Dermo in Connecticut since 1997. (Inke Sunila)