Sea Grant
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Focal Points
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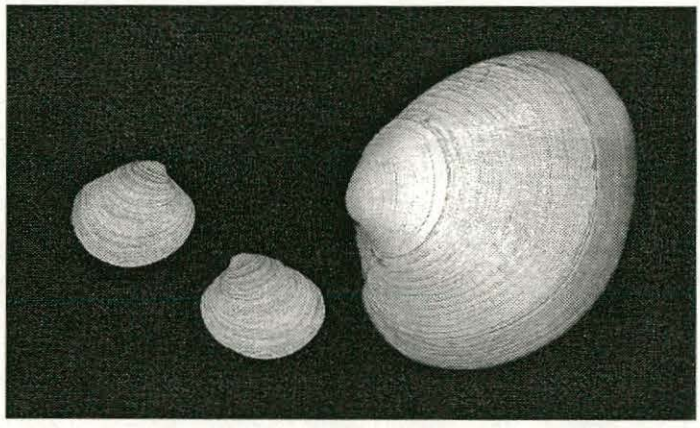
Shellfish Diseases and Their Control in Local Waters

Introduction

Shellfish harvesting, both commercial and recreational, wild and farmed, represents an industry generating in excess of $11 million dollars to the Cape Cod region within the Commonwealth of Massachusetts. One of the important issues with respect to maintaining healthy, harvestable shellfish resources in state waters is the identification and control of potential disease infestations in the shellfish populations. This is particularly true with respect to three diseases that are unique to two important commercial shellfish species, MSX and dermo in the American oyster, and QPX in the quahog.

Oyster Diseases

Dermo (named after the original scientific name of the infecting organism *Dermocystidium*, now called *Perkinsus*) and MSX (multinucleated sphere unknown) are both single-cell parasites that invade the oyster's soft body, grow and divide within the tissue, and eventually overwhelm the normal metabolic processes in the shellfish resulting in death of the individual. The combination of these two diseases has devastated the oyster industry in the Chesapeake Bay area and now is slowly moving up the Atlantic coast. MSX was first identified in Massachusetts approximately 15 years ago; dermo was identified in Massachusetts in the early 1990s.



The two quahogs on the left are approximately six months old and represent the size at which aquaculturists plant them. The larger quahog, right, is approximately 2-1/2 to 3 years old. Shown actual size, it is roughly harvest size (littleneck). It is also the size when most of the infected clams are dying of QPX in Massachusetts and New Jersey.

New Hard Clam Disease

The most recent discovery of a shellfish disease in Massachusetts was made in 1995. A new parasite, it has been infecting and killing both wild and cultured Massachusetts quahogs since at least 1992, but most likely even before then. The disease is known as QPX (quahog parasite unknown). Although the organism differs from the parasites infecting the oyster, the QPX parasite acts in a similar way to dermo and MSX and generally results in the death of the hard clam. QPX was first observed in New Brunswick, Canada in 1969. Since its discovery in Massachusetts, QPX has been found in Virginia (1996) and New Jersey (1997).

Dealing with Disease

In the cases of MSX, dermo, and QPX, it is unlikely that shellfish populations will naturally rid themselves of the diseases or that any attempts to eradicate them will succeed completely. Instead, it appears that shellfish managers will need to work around them. One way to do this is for managers to incorporate monitoring programs into their management plans. Farmers growing oysters and hard clams, on the other hand, may be able to control the impact of such diseases by incorporating subtle changes into their shellfish husbandry practices. Oyster growers, for example, found that if they moved their juvenile oyster seed into less saline waters for the first six months following the hatchery stage, the proliferation of the MSX parasite could be delayed long enough to allow the oyster to grow to a marketable size. It is worth noting that MSX, dermo, and QPX are not transmissable to human con-

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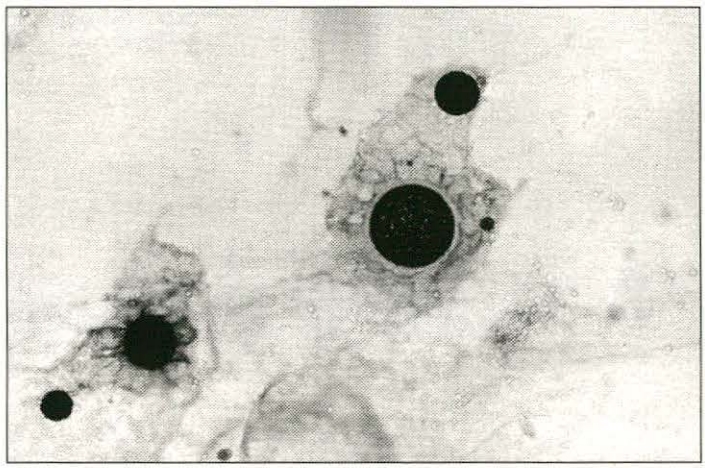
sumers and that these diseases alone do not compromise the taste or quality of the shellfish.

One possible management option for hard clam growers dealing with QPX is earlier marketing. In several southeastern U.S. states, farmers are allowed to market clams once they reach 3/4" valve width. These clams have been dubbed "pasta clams" because they are typically sold to restaurant chefs who use the clams in pasta dishes. This marketing tool is available only to farmed populations of clams and does not apply to wild populations, so as not to effect recruitment. This is an option for growers in Massachusetts whose clams are dying of QPX just before legal harvest size (1" valve width).

Disease Research

Research into improved husbandry techniques and other methods for improving survival rates for shellfish exposed to diseases such as MSX, dermo, and QPX, have been supported in large part by the National Sea Grant College Program and Sea Grant research taking place in individual states. Since 1990, the National Sea Grant College Program has sponsored a "National Initiative" focused on oyster disease research, and more recently, an initiative to address oyster disease concerns in the Gulf Coast states. As a result, significant break-throughs have been made in our understanding of oyster diseases and how to control or manage around them.

Because QPX is a relatively new problem facing shellfish growers and harvesters, the research response, thus far, has taken place at a fairly local level. On Cape Cod, for example, QPX was identified by WHOI Sea Grant Exension personnel working in conjunction with a research veterinarian and quahog farmers from Provincetown. In response to the high mortality rates in Provincetown's cultured quahog population, the WHOI Sea Grant Program responded immediately, contributing emergency response funds that permitted Woods Hole marine biologists and pathologists to identify the disease organism. Only after that was accomplished could resource managers and farmers attempt to minimize the impact of the disease on their quahogs.



Magnified approximately 250 times, the QPX organism is shown in laboratory culture, highlighted with a chemical stain (Giesma).
Photo: Roxanna Smolowitz, LAAMP at Marine Biological Laboratory, Woods Hole.

Since that time, WHOI Sea Grant and other agencies, including the Commonwealth of Massachusetts, have continued to fund research directed at understanding and controlling QPX. To date, the disease has been brought into the laboratory and can be grown in culture in the laboratory and outside of the quahog, a vitally important first-step in studying any new disease organism. In addition, efforts are underway to develop and test strains of quahogs that will be resistant to the QPX parasite. This was done successfully with oysters that are resistant to MSX.

Disease is a very important factor in resource management. Unfortunately it is often overlooked by resource managers due to their limited opportunity to observe wild shellfish stocks. Shellfish farmers, because they often work with a single species in a defined location, are keenly aware of the affects of disease. As is the case in agriculture or human health management, disease research is a never ending process. As disease organisms change and evolve, scientific research programs must adapt so that methods to counteract the devastating impact of disease may be developed.

For more information about the research or outreach projects profiled in *Focal Points*, contact WHOI Sea Grant at the address listed above.