Developing Mussel Control

ESF Alumnus Finds Bacteria Quell Invasive Mollusks

By Karen B. Moore

"I know the answer is there and that what is required to find it is perseverance," said Dr. Daniel Molloy of the 20 years he spent leading a research team looking for a way to control zebra mussels in the nation's waterways.

Molloy, emeritus biologist at the New York State Museum in Albany and ESF alumnus (Ph.D., '77), found that a bacterium — *Pseudomonas fluorescens* strain CL145A — kills zebra mussels and their invasive cousins quagga mussels, but has little to no effect on other organisms.

Zebra mussels are an invasive species that disrupt ecosystems by eating phytoplankton, the base of the aquatic food web. They entered the United States through the Great Lakes aboard freighters that inadvertently transported them from Eurasia. Zebra mussels also clog water intakes and pipes of power plants and municipalities.

Available commercially as Zequanox, the dead bacteria was initially registered by the U.S. Environmental Protection Agency for power plants to control the zebra mussels that clog water intakes and pipes. This year, Zequanox was also registered for use in open waters, lakes and rivers.

Zequanox isn't the cure-all, Molloy cautioned. "It won't eradicate zebra mussels from a lake," he said, and it needs to be applied yearly, but it will help reduce the numbers and can be applied to specific areas such as beaches and marinas. "It's not technically or economically feasible to do a whole lake," he said.

Currently a research biologist at SUNY Albany, Molloy began working with biological control methods while working on his thesis at ESF in conjunction with the New York Museum. At that time, he was looking for a method to biologically control black flies in the Adirondacks. Working with an international team of black fly specialists, his research demonstrated that one bacterium — *Bacillus thuringiensis israelensis* (Bti) — could effectively and safely control black flies.

"Our research in New York, particularly a larger scale pioneering trial near Saranac Lake, showed it was safe and effective," he said.

Since the 1980s, Bti has replaced the chemical applications that were used previously.

"ESF was an incredibly enriching educational experience," Molloy said. "I was surrounded by people who were very interested in environmental matters. It was intellectually stimulating."

Molloy's next project is "going for the gold." He is looking for another environmentally safe organism for the biological control of both zebra and quagga mussels. This time, he said, it would be a highly specific parasite that, following application, would become established and naturally spread, infecting and controlling zebra and quagga mussel populations in one lake after another.

"I am convinced that such a parasite exists in the native range of these mussels. Finding it — and of course subsequently demonstrating its safety — will be like trying to win the gold medal of pest control."

"If I have the funding, I'm going to accomplish it," Molloy said, "but don't expect it next month or next year. These things take time." And perseverance.

Dr. Daniel Molloy, (Ph.D., '77) pictured above and at right, researches methods to biologically control invasive species.

Photographs | Courtesy of Daniel Molloy