

Special coatings may give zebra mussels the slip

Center at UB tests surface chemistry as weapon against pest in Great Lakes

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The war against the dreaded zebra mussel will take place on a battlefield with a non-stick surface.

Something like Teflon but better. Something so slippery the tiny mollusks will try to attach themselves but give up in frustration.

Dr. Keith Kent is convinced of this. The zebra mussel, he says, will fall for a sophisticated version of that old prank — the greased door knob.

Kent, a former Roswell Park Cancer Institute researcher, and others who work in the esoteric science of surface chemistry, argue that an effective way to stop zebra mussels from clogging water-intake pipes, boat hulls and anything else connected to the Great Lakes is to coat things with materials the critters can't stick to.

What's more, they say, the materials already have been developed for medical applications and some already are on the market.

"The mechanisms that make mus-

sels stick to a water-intake pipe are virtually the same that make red blood cells clot in an artificial heart. The magnitude is just different," Kent said.

It stands to reason that the materials similar to those that keep blood from clotting in artificial hearts can keep mussels from clogging pipes and boat hulls. The same goes for materials under study for dressing burns without bandages and protecting teeth from plaque.

"Medicine usually benefits from other science. This is an example of a

reverse spin-off. Here's medical research that benefits the environment," said Dr. Robert E. Baier, co-director of the Industry University Center for Biosurfaces, a National Science Foundation center at the University at Buffalo.

Baier and his colleagues are testing a handful of biomedical coatings against the zebra mussel, including one made by Kent. The research is a logical addition to their work on the oceanic problems caused by barnacles.

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Mussels: Chlorine, as weapon, has drawbacks in Great Lakes.

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All this effort is aimed at a tiny black-and-white-striped mollusk that has spread throughout the Great Lakes system since being brought to North America several years ago in the ballast of foreign ships. It has no known natural enemy. Last week it was reported to have reached as far east as Rochester, threatening the Finger Lakes and Hudson River systems.

The zebra mussel can attach itself to the inside of pipes and delicate machinery, including the cooling systems of power plants and boats or the intakes and in-plant piping of municipal water systems. It does this in great, swift-growing colonies and causes widespread and expensive damage.

Chlorine is used to kill mussel larvae attached to pipes, much as it is used on ocean-based equipment to kill barnacles. This solution is the most inexpensive and immediate, but poses inescapable environmental problems in the Great Lakes, which provide drinking water for millions of people. Chlorine is not good for the water supply, health officials argue.

"It's an indiscriminate killer, reacting with trace organic materials to form compounds we want out of the environment," Baier said. "The solution offered by

coatings is mostly unknown, but the power industry should know it has another option. Practical formulations are already being used on oil drilling rigs."

Kent, who now lives in Tampa, Fla., makes and sells a silicone-grease coating called KISS-COTE. (The "KISS" stands for "keep it simple.") The coating for boat surfaces and cars has been used on speed boats and racing yachts for increased protection and speed, he said. The material, which comes in a syringe applicator, is spread so thin that one gallon is believed capable of covering a square mile. The thinner it is, the better it works.

"I hope it will become a protective, non-stick coating on everything you look and think about from boats and cars to kitchen counters and bathroom fixtures," he said.

In the early 1980s, Kent worked at the cancer center on safer and more effective ways to attach artificial body parts — in this case, prosthetic noses, cheeks and jaws — to human skin. Along the way, he fashioned a non-toxic silicone body part that was sticky in spots. His product is an extension of the work at Roswell Park, except the coating covers a surface with a film no thicker than a molecule.

Baier envisions Kent's coating

as the premium product for people who want high performance results, whether on a boat or in a critical water intake pipe. Large water users like power plants would need less-expensive, industrial-grade coatings.

Applying surface chemistry to zebra mussels, nevertheless, remains a ways off.

"It's not a new scientific field but a new problem. We're still a few years away from developing the technology to apply a one-molecule thick layer of these coatings to the inside of pipes," said Raymond King, a Calspan scientist.

King, through his King Consulting Co., has made one of several industrial-grade silicone grease coatings being studied at UB.

"Right now it's easier and cheaper to use chlorine, but we won't be able to go hog wild with the toxic stuff," he said.

The special coatings, in the end, won't kill the mussels. If they are used, the fight will end in a truce, experts say.

"The fact is the zebra mussel is here to stay no matter what we do. We're talking about a compromise with Mother Nature," Baier said. "One day we may consider the mussels immigrants instead of invaders. And I expect they'll become our friends and good neighbors. There just will be certain neighborhoods they can't live in."