

SUNDAY, SEPTEMBER 9, 2005

The Iron Fish and Terminator Team Up for the Ironman

THE BUBBLE

How do you get a precise reading of dissolved iron in ocean water when studying from a 2,516-ton steel ship? It certainly isn't as easy as dipping a bucket in the ocean.

Iron is one of the most abundant resources on the planet. It is an essential metal required by most living things, including phytoplankton. But, in the ocean, iron is not abundant. Little iron dissolves; most of it binds to organic particles and eventually sinks to the seafloor.

ECOHAB-PNW scientists think the competition for iron might

relate to the production of the biotoxin domoic acid by diatoms of the species *Pseudo-nitzschia*. Scientists go to great lengths to collect, analyze and experiment with uncontaminated water samples to learn about the iron within.

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Scientist Mark Wells has designed a method of gathering "pure water," away from the iron halo of the ship.

The instrument looks like a rocket: the body is a 3-foot grey PVC pipe, a tube sticks out of a pointed plastic top and three fins surround the base. Mark's students have painted orange, yellow and red flowers, peace signs and "groovy" on it. The rocket is fondly called "the iron fish."

The iron fish is towed beside the ship outside of the wake (the track of water left from the ship) and lowered to 5-meters depth. This requires the use of a crane and pulley off the side of the ship. Strong Teflon



tubing pumps water from the iron fish to the ship's deck. Short yellow strings (called "faring") are woven into the Teflon tubing. Besides matching the 60's style theme, the faring fringe provides stability to minimize vibrations of the fish as it moves through the water. The fringe keeps it smooth, yeah baby!

Once pumped out of the ocean, the water travels through tubing, 75-feet along the ship's bulkhead, to a lab space called "the Bubble." The Bubble is a contamination-free work zone. Plastic attached to a wood frame hangs over the metal bulkheads and ceiling. All air entering the room passes through filters to eliminate particles and dust that could mislead results. Scientists always wear white lab coats and plastic gloves to handle samples.

One of Dr. Well's graduate students, Lisa Pickell, collects pure water samples in the Bubble. She will treat each bottle with a different amount of iron and monitor the growth of the phytoplankton community daily. A large chemostats incubator on deck called the "Terminator" (the name refers to the fact that it is a large "hunk of metal" and to an initial experimental glitch where no organisms survived) will house the samples over 7 days, rocking them gently so the organisms and iron stay mixed uniformly.

Scientists need to be creative and resourceful to conduct precise and analytically sensitive research experiments. A good sense of humor also helps keeps spirits high.

Pickell's Innovative "Chemostats at Sea"

MAIN DECK STERN STARBOARD

A new technology is being tested on the Melville deck by PhD candidate Lisa Pickell (pronounced pic-KELL – not like the cucumbers soaked in vinegar). Lisa's research takes microbiology and chemistry to a new level – sea level.



Lisa works with the incubator called "The Terminator." This machine is set up so that she can add and extract small samples of seawater through spaghetti-sized tubes. When Lisa adds a treatment to one bottle, an overflow valve removes the same amount at the other end, to maintain a constant volume. This continuous-flow culture system is based on "chemostat" methodology. It is the first one of its kind to be used at sea.

This is Lisa's 11th research cruise. Her experiences include 3 ECOHAB-PNW voyages on the Pacific, a 6-week exploration of the Arctic on the Japanese ship R/V Mirai, and several research cruises on the Great Lakes with the Canadian Coast Guard.

"Being at sea, we are so close to what we are studying," Lisa says, her yellow Dole pineapple T-shirt matches the brilliant sunset light. "That really gets lost when you are in a lab in a building all day. I try to never take for granted that so few people actually get to do what I am doing and that is cool, even though the work hours can get long."

Canadian-born and raised, Lisa now lives in Maine where she studies at the University of Maine. She enjoys sea kayaking and winter skiing.