

UNIVERSITY RESEARCHERS

UMaine grad student studies little-known sea cucumber, lately the object of a growing regional fishery

**Graduate study by Sheril Kirshenbaum
University of Maine
School of Marine Science**

by Catherine Schmitt

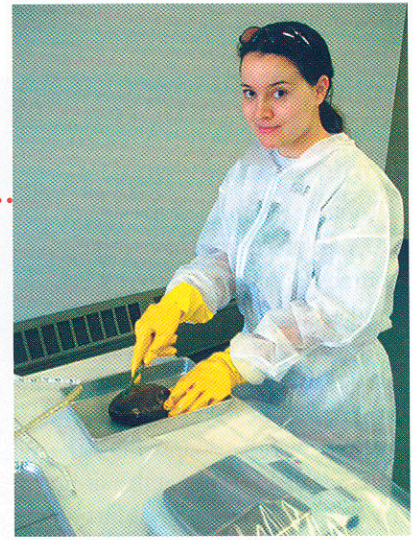
If you had told Sheril Kirshenbaum, when she graduated from Tufts University with a dual degree in biology and CLASSICS, that she would be working one day with a brainless blob of an animal that can spew its innards to confuse predators, she would not have believed you. Kirshenbaum is a graduate student at the University of Maine working with scientists, managers, and fishermen to understand the biology of the sea cucumber, a humble, seemingly shapeless creature that is becoming a rising star in Maine's fishing industry because of depletions of other marine stocks and new markets in Asia.

"Sea cucumbers are ugly and unappealing to most of us, but lately I've become rather excited about them," said Kirshenbaum. "If you look at anything closely enough you can get excited about it."

The sea cucumber industry in Maine is barely 10 years old, but is already valued at more than \$300,000 per year. Annual harvests have doubled in a decade to more than six million pounds in 2002. Several

processors in Down East Maine prepare and ship the cucumbers to China, where they are marketed as food and even as aphrodisiacs.

Both scientists and fishermen worry that the cucumber fishery in Maine may meet the same fate as the sea urchin fishery, which boomed when markets first opened up but quickly crashed due to over-harvesting and lack of



Sheril Kirshenbaum dissecting a sea cucumber at her UMaine lab.

Still, the small number of fishermen make the cucumber fishery easier to manage. Some of those cucumber fishermen are co-investigators on the UMaine research project. With funding from Maine Sea Grant, Kirshenbaum is working with Yong Chen in the School of Marine Sciences, the Maine Department of Marine Resources,

and with local fishermen to collect baseline information on sea cucumber populations and help establish monitoring methods for the fishery.

There are close to 1,000 species of sea cucumbers within the Holothuroidea class of echinoderms. These invertebrates with no brains or spines are found in many of the world's oceans. Indeed, various species of sea cucumbers have been harvested elsewhere around the globe for many years.

There are several species of holothurians in the Gulf of Maine but the one most commonly found nearshore, *Cucumaria frondosa*, is the subject of this new fishery, accord-

ing to researchers. *C. frondosa* is a cold water animal found along the western Atlantic coast from Greenland to the northern shore of Cape Cod. In the Gulf of

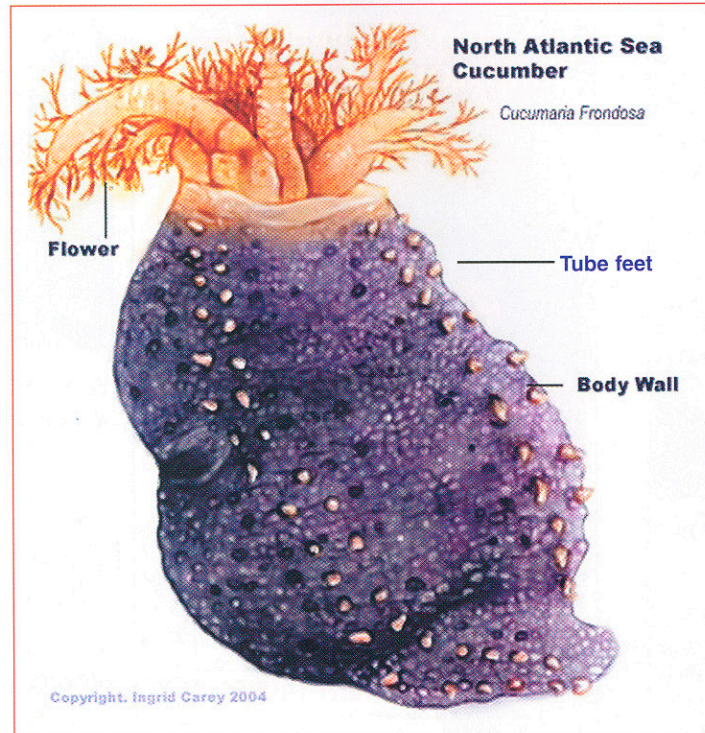


Illustration: Ingrid Carey, UMaine, Ingrid_Carey@umit.maine.edu

a regulatory structure. Maine's 1999 Emerging Fisheries Act limited the number of licenses, but landings have continued to creep up since then.

Maine it can be one of the most abundant benthic animals found over rocky bottoms. It is most commonly found in depths of less than 100 feet of water and it prefers to cling to hard surfaces, but it can also be found in coarse gravel or shell debris. Catching the slow-moving creature is best carried out by scallop-like dragging equipment or by individual divers.

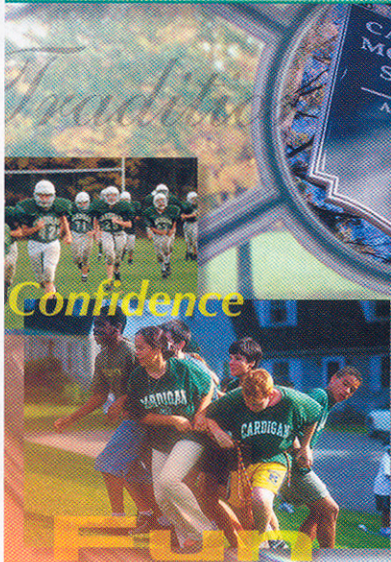
In Maine, the cucumber fishery is concentrated in Frenchman's Bay, where sea cucumbers cover large areas of the sea floor. They have no natural predators, and make up a large percentage of the benthic biomass, sometimes as much as 50 percent, according to Kirshenbaum, but the same was true of sea urchins before they were fished out. The major goal of Kirshenbaum's research project, she said, is to make recommendations to the state for sustainable management of the fishery. "The fishery is still developing," she said. "Effective management strategies must be estab-

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lished before it is too late to prevent over-exploitation and collapse." Kirshenbaum recently presented her research at the American Museum of Natural History Center for Biodiversity and Conservation annual symposium.

One of the challenges for researchers is learning to apply assessment methods used on other animals to sea cucumbers, she said. Sea cucumbers are unique in that they lack hard parts such as scales and bones for aging, and not much is known about their life cycle. Kirshenbaum and others on her team are developing a new standard protocol for mea-

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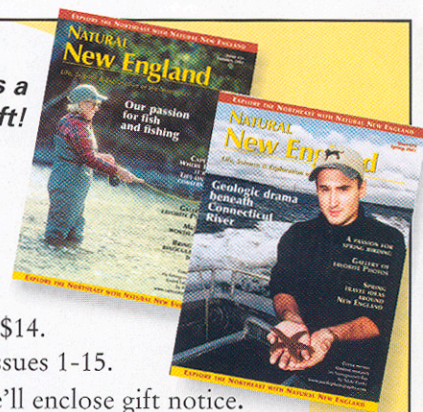
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suring sea cucumbers. She explained that she is also attempting to correlate size of animal with reproductive. Fishermen supply her with sea cucumbers, which she brings back to the laboratory at the Darling Marine Center. She determines their sex and makes measurements of each animal in order to establish a size-weight relationship. She is looking at how reproductive structures change with body size. The data she collects is submitted to the Maine Department of Marine Resources. Later this year, Kirshenbaum will be assisting in a full before- and after-harvest survey of Frenchman's Bay to find out how many cucumbers there are in the bay and what kind of habitat they prefer.

Kirshenbaum says she finds it intriguing that so much is still unknown about the sea cucumber. "We don't even know everything about how they move," she said as she related a story about leaving a sea cucumber on the lab counter, turning away for a few seconds, and coming back to find the animal had made its way across the counter to the sink. "They're hard

to study because they're always changing their shape," she added. Sea cucumbers can squeeze through tiny spaces, and they may temporarily expel their inner organs when stressed or disturbed.



These sea cucumbers are marked with plastic tags, a tracking technique that failed because the tags were quickly shed, according to Kirshenbaum

The largest sea cucumbers are known to be about two meters long, though most are considerably smaller. Their soft, elongated bodies have five double rows of tube feet along their underside, with powerful, longitudinal muscles used to control feet and other organs. The cylindrical shaped sea creatures have a mouth and anus at either end, with tentacles surrounding the mouth. They breathe by pumping in and expelling sea water.

Researcher Kirshenbaum said she is pleased with the collaborative nature of her sea cucumber project.

"Ideally, this will contribute to survival of the species and a continued fishery," she explained. "The things I'm learning can also be applied to other species. This is a great opportunity to manage a collaborative project, and because it's new, it gives me a chance to really have an impact."

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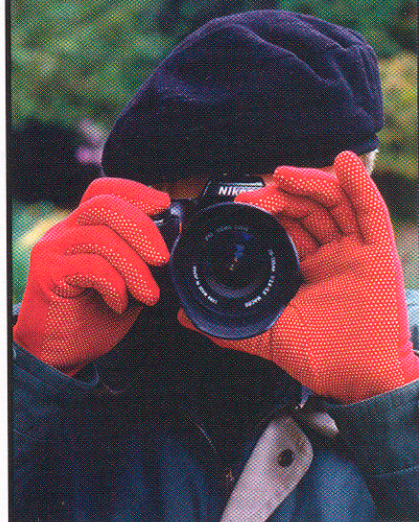
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