

## VIMS Student Develops Educational Board Game

VIMS graduate student John Carriger spent most of his time at a conference this summer playing games. Rather than voicing concern, his advisor Dr. Mike Newman joined right in.

Carriger was working with teachers to test an educational board game that he and Newman developed to help students better understand the worldwide problem of marine invasive species (see *The Crest*, Spring 2004). The pair unveiled the game during a July workshop of the mid-Atlantic Center for Ocean Science Educational Excellence (MACOSEE).

MACOSEE is one of seven COSEE centers established around the U.S. in 2002 to coordinate ocean-science education on a national scale. MACOSEE partners include VIMS, the Chesapeake Bay Foundation, the Rutgers Institute for Marine and Coastal Sciences, Hampton University, the Center for Environmental Science at the University of Maryland, the Jacques Cousteau National Estuarine Research Reserve, the New York Aquarium, and the Mid-Atlantic Bight National Undersea Research Program.

Carriger says that his game has two purposes. "It's designed to educate students about invasive species and their detrimental effects, and to make them recognize the overlap and precarious balance between economic development and environmental protection."

To start the game, individuals or groups take on the role of harbor manager at one of five imaginary ports, from tranquil Port Pleasant to the

highly polluted Port of Potty. With an initial bankroll of \$100, each player tries to maintain financial success while accumulating the fewest invasive species.

The game is divided into rounds in which each player rolls a die in an attempt to bring a ship and its associated revenue into their port. Some of these ships carry invasive species in their ballast tanks. If an invader is present, the player checks a reference card to determine if the port provides it with suitable habitat. If so, the player records the species along with the number of rounds it will require to become established. If two invasive species become established in a port, it loses business and the player begins to lose money. After each round players can hire inspectors to keep out invasive species. They can also pay to raise their port's economic level to attract more vessels.

"The winners are the players that end up with the fewest invasive species, the best economic performance, and the most money," says Carriger. At the end of the game, the group compares each port's success and reviews the strategy behind each player's actions.

The MACOSEE conference gave Carriger and Newman an opportunity to test the invasive species game with classroom science teachers from several mid-Atlantic states. Carriger worried the game might be too involved for pre-high-school students, but the middle-school teachers he worked with thought it would be perfect for their curriculum. Several of the teachers



VIMS graduate student John Carriger (R) tests his invasive species board game with a group of middle school science teachers during a conference of the Mid-Atlantic Center for Ocean Science Educational Excellence (MACOSEE).

developed lesson plans around the game so that they can use it in their classroom during the school year.

"The teachers absolutely loved it," says Newman. "There wasn't a single person who wasn't pleased. In written comments, one teacher noted 'the game rocks!'"

Carriger plans to refine the game based on the teacher's suggestions and to freely distribute the revised version to additional teachers during future meetings of groups such as the National Science Teachers' Association.

The overall goal of MACOSEE is to integrate marine research and education programs to encourage lifelong learning by teachers, students, coastal managers, families, and under-

represented groups in marine science.

Newman leads VIMS' participation in MACOSEE. His goal is to extend the group's activities into Virginia and the Eastern Shore and to oversee the distance learning, teleconferencing, and video-on-demand aspects of the program. He is also coordinating efforts with Hampton University to recruit minority student into the program.

Funded for the COSEE program is provided by the National Science Foundation (NSF), the Office of Naval Research (ONR), and the National Oceanic and Atmospheric Administration (NOAA).

For more information, visit [www.macosee.net](http://www.macosee.net)

—Cory Staryk

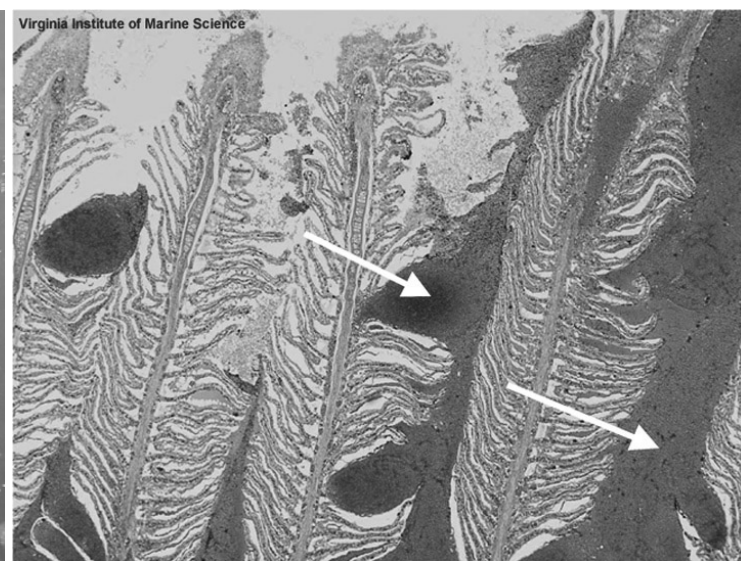
### *Croaker* continued from page 1

"Microbial organisms capable of causing disease in fishes are always present in the environment. Only when fish become stressed by a changing environment will they generally break out with disease.

According to Vogelbein, dying croaker submitted for evaluation to the Aquatic Animal Disease Diagnostic Laboratory at VIMS appeared healthy externally except for extensive bleeding from the gills. Microscopic evaluation of the gills showed degeneration of the respiratory tissues associated with a bacterial infection.



Large numbers of dying and dead croaker periodically appeared in offshore surface waters during July and August. All fish were large croaker estimated at 4-years old and older. The fish were bleeding extensively from the gills but otherwise appeared healthy.



A magnified thin-section of affected gill tissue showing widespread damage to the gill filaments and lamellae and severe bleeding (white arrows).