THE BLADE Toledo, Ohio
toledoblade.com®
News

Colleges & Universities | Article published December 1, 2001

BGSU researcher's work might save a warrior's life

Crustaceans tied to finding hidden mines

By JENNI LAIDMAN
BLADE SCIENCE WRITER

If you want to track a scent, you wouldn't mess around with anything as trite as a bloodhound, for pity sake. Not if you're Paul Moore.

To really nail the wiliest prey, Dr. Moore favors that champion of all trackers, the lobster.

Dr. Moore, a Bowling Green State University biologist, and an expert in the olfactory experiences of crustaceans, isn't the only one impressed by the nose power of the lobster.

Besides working with lobsters, Dr. Paul Moore of Bowling Green State University studies how crayfish detect odors, tracking behavioral responses of the crustacean to what the nose captures. (THE BLADE/DAVE ZAPOTOSKY)

| Zoom |

The Army and Navy were intrigued enough to hand a team of researchers, including Dr. Moore, a few hundred thousand dollars to study the animals' tracking ability.

Such research could aid in detecting mines on land and under water by way of the aroma of the nitrogen compounds the mines emit.

"One of the best animals we know to track odors in the environment are lobsters. They can travel great distances for food or mates. We think of them as simple animals, but they have a very complex system to allow them to do the task we're interested in,'' Dr. Moore said.

Dr. Moore and colleagues at Stanford University and the University of California at Berkeley revealed the secret to lobster tracking accuracy yesterday.

It's all in the flick of the nose.

Getting into the spirit of lobster sensory experience took a little bit of engineering, said Jeffrey Koseff, a civil and environmental engineer at Stanford.

Researchers took an exoskeleton that was cast off by a growing lobster and filled it with epoxy. Then, a lobster nose - actually a finger-length wand half the width of a pencil, called an antennule - sheathed a wire attached to the dummy lobster. A computer controlled the wire, providing the flick for the senseless shell.

Finally, as the lobster's nose was whipped up and down at about four **s**trokes per second, green dye oozed into its field of smell. While the dye oozed and the lobster flicked, three lasers cast a spotlight on the real estate right in front of the billion hairs that bristle along the antennule.

The final piece of the set-up was a high-speed camera to record the interaction of robot nose and greenish dye.

By studying the gradients of green - and thus the concentration of dye in the water - researchers could see how the lobster nose interacted with its environment.

It appears the quicker down stroke allows the animal to capture odor molecules for a snapshot of its environment, Dr. Moore said. The slower up stroke provides the bigger picture.

"It's like walking into a discotheque with all the lights flashing,'' Dr. Moore said. In a strobe light, the viewer sees dancer's frozen movement - the fast information of a down stroke. When the strobe burns out and the house lights come up, the dancer's arms and legs blur, but the image is more complete - something like the information in an upstroke.

The next down stroke clears the antennule of old molecules and collects a whole new set.

"These odorants are changing very rapidly in nature; you would think much faster than the lobster can detect. But by capturing and holding the information, it has perhaps a better opportunity to process it,'' Dr. Koseff said.

Dr. Koseff's team plans to pursue lobster smell by attaching electrodes to a live lobster's antennule sensing hairs to see what the animal's neurons are reacting to.

Dr. Moore is taking a different tack. His team will switch to crayfish - his usual study subject more recently - and repeat the experiment with the live animal, this time tracking behavioral responses to what the nose captures.

"We understand more about how crayfish perceive odors. When we have the input and the behavioral output, then we'll know what's going in the animal's head.''