Fatheads, dorsal fins and tubercles

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"They're the lab rat of aquatic toxicology," explains graduate student Travis Bistodeau as he shows off tank after tank filled with little, unremarkable fish in the biology lab in the basement of the Math & Sciences Building at SCSU. They're little, but with Bistodeau's help the creatures are contributing to our understanding of how aquatic animals are affected by compounds found in common products like DDT, paints and detergents. It's important to know, said the student, since an estimated 60 percent of such synthetic, man-made compounds end up in aquatic environments.

Bistodeau is conducting research on the impact of endocrine-disrupting compounds such as synthetic estrogens on the reproductive behavior of freshwater fish. While considerable toxicological research has been done at the cellular and individual level, Bistodeau is focused on the larger groups or the "population" level.

The student of ecological and natural resources biology is working with fathead minnows, "lab rats" that are cheap and quick to mature. Cost matters, as Bistodeau exposes as many as 500 minnows at a time to the synthetic compounds he's testing, compounds found in the post-treatment output of wastewater treatment plants. While it takes six months for fatheads to grow from larvae into adults, it takes just seven days to the point where a researcher can evaluate important reproductive behaviors – called nest holding behaviors – that are critical to reproduction and might be affected by synthetic compounds.

Bistodeau described the typical reproductive behavior for a male fathead. After a mature female lays her eggs, a male fertilizes them, then defends them until they hatch. That nest holding behavior requires a properly-developed dorsal "fatty" pad behind the head (which is used to clean fungus and other debris off eggs within the nest) and a tubercle or snout (which is used for defense). Next he uses an assay test developed by SCSU Professor Heiko Schoenfuss, watching for chasing, nudging, and other behaviors that indicate which males are dominant and most likely to be "nest holders." The assay allows for previously exposed fish to compete

directly with control fish for the nest sites.

The compounds he's testing, Bistodeau has found, result in improperly developed dorsal pads and tubercles and a reduced ability of exposed fish to defend nest sites, which in turn impairs the reproductive capability of the minnows.

The lab in which he spends his time forever smells "fishy," but Bistodeau finds it delightful compared with the environment in which he worked when he was a student intern. As he calmly explained, he did sampling work in an "effluent channel" for the Minnesota Pollution Control Agency. And he gets out occasionally: he took a "best poster" award for his research at the Society of Environmental Toxicology and Chemistry regional meeting in April, which means he'll also be at the national meeting in Baltimore this fall.

After he earns his master's degree in biology late this summer, Bistodeau hopes to find work in ecology, in an aquatic equivalent of wildlife management or land management.

- Marge Proell