

Heiko Schoenfuss explains endocrine disrupters and their effects on fish in the Mississippi River Jan. 23 before the House Environment and Natural Resources Finance Committee at the State Office Building in St. Paul.



## Feminized fish sober lawmakers

**M**any environmentally aware Minnesotans recycle their florescent light bulbs and will not use chemical fertilizers on their lawns and gardens. But are they willing to give up their Prozac and birth control pills?

“We’re not going to ban pharmaceuticals because obviously we need them,” Heiko Schoenfuss told members of the Minnesota House of Representatives’ Environment and Natural Resources Finance Committee Jan. 23.

Yet, certain chemicals from these pharmaceuticals and from household cleaning and personal care products are among the “emerging contaminants” disrupting the endocrine systems of fish in the Mississippi River.

In his testimony to the committee at the State Office Building in St. Paul, Schoenfuss, associate professor in the Department of Biological Sciences and director of St. Cloud State University’s Aquatic Toxicology Laboratory, said the emerging contaminants — even in concentrations so minute they are measured in parts per trillion — can and do disrupt the endocrine systems of fish.

A study of water and fish samples from more than 40 sites in the Mississippi in 2006 revealed “hot spots” — areas with emerging contaminant concentrations high enough to affect fish. And fish samples from these spots showed feminization: male fish are producing egg yolk.

Higher concentrations of emerging contaminants in the Potomac River near Washington, D.C., Boulder Creek in Colorado and the California coast; are producing some intersex fish, according to studies conducted by the National Geological Survey in 2003. Intersex means the fish have both ovarian and testicular tissue.

“If we see effect in fishes, we at least have to be worried that something similar may be happening in humans,” Schoenfuss said, explaining that the endocrine system is 500 million years old and few differences exist in the way it operates in fish and in humans.

While banning the pharmaceuticals may not be the answer, Schoenfuss stressed that emerging contaminants enter the rivers via municipal wastewater treatment plants.

The plants remove solids and reduce many toxins before discharging their effluent into the rivers; however, they are not designed to treat these contaminants. In fact, there may not be a cost-effective wastewater treatment design that could do so, considering the myriad of compounds added to the wastewater stream by households and industry, Schoenfuss said.

**M**innesota’s Clean Water Legacy Act became law on June 6, 2006. The law’s purpose is to expedite the state’s implementation of the Federal Clean Water Act and clarify procedures by which the Minnesota Pollution Control Agency restores impaired waters. Water studies conducted at St. Cloud State University by faculty and students in the departments of Biological Sciences, Chemistry, Environmental and Technological Studies and others contribute to the data that inform both the general public and lawmakers about Minnesota’s water quality.

“Emerging contaminants interact with hormone receptors on the cells in our bodies,” Schoenfuss said, adding that because the receptors cannot distinguish between the contaminants and natural hormones, they readily bind to the contaminants. The contaminants then “tell the receptor sites to do something they would otherwise not do.”

When the receptors are estrogen receptors, which the cells of both males and females have, the results can vary from sluggish or non-existent reproductive activity, to feminization of male fish, to intersex fish.

Schoenfuss said some fish may show no effects, but their offspring or succeeding generations of offspring may show the effects.

Several members of the House committee called the testimony “sobering.”

Schoenfuss urged the committee to address the problem while it is “still a local, not a regional nor a statewide problem.” He said launching an education campaign, regulating the “heavy users” of these chemicals, and continuing research along with a system to “integrate data sets” from researchers would bring about the best long-term results.

For more information about emerging contaminants, please go online to [http://www.kare11.com/news/news\\_article.aspx?storyid=138149](http://www.kare11.com/news/news_article.aspx?storyid=138149).

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COSE now offers students entering St. Cloud State University a host of programs: 61 majors, 32 minors, 16 pre-professional programs and 10 graduate programs. From health sciences to meteorology, construction management to computer engineering, COSE offers a wide range of opportunities for students to find the right fit for their talents and career ambitions. The quality of these programs is well documented and many are nationally accredited.

For the past three years, COSE has averaged 120 internships per year. Internships greatly enhance our graduates’ chances of obtaining desirable positions in their fields.

The number of master’s degrees awarded in 2006 is triple the number awarded in 2004. Figure 2 displays the master’s theses submitted by the 22 graduate students who chose to write a thesis. Among these is Laxmi Subedi’s “Ductile Iron Shrinkage Analysis Using ATAS Parameters,” which was chosen SCSU’s 2006 Thesis of the Year.

Master’s Theses- FY 2006			
Name	Major	Thesis Title	Advisor
Davies, Jr., John	BIOL	Nesting Ecology of Burrowing Owls on the Little Missouri National Grassland	Restani M.
Bistodeau, Travis	BIOL	Larval exposure to an environmentally relevant mixture of Alkylphenol Polyethoxylates reduces reproductive competence in male fathead minnows	Schoenfuss H.
Kassube, Cory	BIOL	Annual survival of wild Turkey hens transplanted north of their ancestral range	Restani M.
Bartell, Stephen	BIOL	Generation of Monoclonal Antibodies Specific for Fathead Minnow ( <i>Pimephales Promelas</i> ) Vitellogenin	Woodard J.
Cisse, Abdoulaye	CSCI	An Accurate Computational Solution of Totally Positive Cauchy Linear Systems	Anda A.
Hinkemeyer, Brenda	CSCI	A Genetic Algorithm For The Longest Common Subsequence Problem	Julstrom B.
Shen, Xiaonan	ECE	A Study of Tissue Shear Property Characterization Using Simultaneous Multi-Focus Array Transducer and Synthetic Phantom	Zheng Y.
Dhital, Ashish	ECE	Multi user detection of reverse link for COMA systems	Zheng Y.
Gu, Ying	ECE	BCJR Decoding with Diversity for Mobile Communication Systems	Petzold M.
Saraf, Ashesh	MEM	Communication systems evaluation for distributed work group	Baliga B.
Subedi, Laxmi	MEM	Ductiles iron shrinkage, analysis using ATAS parameters	Baliga B.
Kafle, Himal	MEM	Implementation of Lean Manufacturing Using Simulation	Baliga B.
Keswani, Naresh	MEM	Development of Business Process Model for Quality Management System	Baliga B.
Zebulun, Humphrey	ETS	Bioremediation of a Pah Contaminated Soil Using <i>Pleurotus Ostreatus</i>	Bender M.

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