news

Zebrafish used for cataract prevention

"Cataracts are still the leading cause of human blindness"

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When Dr. Mason Posner came to Ashland in 1999 as a biology professor, he brought an interesting research project with him. The idea was to use these little fish called zebrafish - a fish that has become a really popular model for studying human disease, Posner said - to understand what causes lenses to form cataracts.

According to the National Eye Institute, cataracts are the cloudiness in the lens of the eye that develop as one ages. By age 80, more than half of all Americans either have a cataract or had cataract surgery at some point in their life.

Cataracts are treated by surgically removing the cloudy lense from the eye and replacing it with an artificial one.

"Worldwide, cataracts are still the leading cause of human blindness," Posner said. "We are interested in using these fish to understand what goes wrong in the lens to produce cataracts so we can design prevention strategies."

These particular zebrafish have a little quirk, though: they have heart disease. These little guys have a genetic defect. They do not produce a normal heart and they never make any red blood cells, so they die around seven days after hatching.

Their study "Why does the zebrafish cloche mutant develop lens cataract?" was funded by the National Institute of Health and published March 12 on PLOS ONE, an online inclusive journal community "working together to advance science for the benefit of society."

"These zebrafish have been used by a bunch of labs all over the world to understand heart disease and blood cell disorders," Posner said.

So what does that have to do with cataracts in people?

"The weird thing is these fish that are studied because they have abnormal hearts also get lens cataracts. There is only one study, published by a lab at Harvard on the cataracts to try to explain why these fish with this heart disorder get these cataracts," Posner said. "Our paper that just came out on PLOS ONE, we think it shows the conclusion from that Harvard study is incorrect. We don't know why they get the cataracts, but we are using it as a model for finding prevention strategies by using it as a test subject to try to get the cataract from forming in the first place."

The eye produces proteins in the lens that prevent cataracts. The idea was that Posner and his students manipulate the genetics of the fish to add more of those proteins to their lens. This gene-therapy type approach changed the function of the genes in the fish.

When the fish are one cell old, a fertilized egg, the students inject pieces of DNA into the fish that give them the ability to make more proteins when they eventually make a lens, at about 24 hours.

Zebrafish are valued as research subjects because of their quick development: they have a noticeable eye within a day and hatch out of their eggs around day three or four.

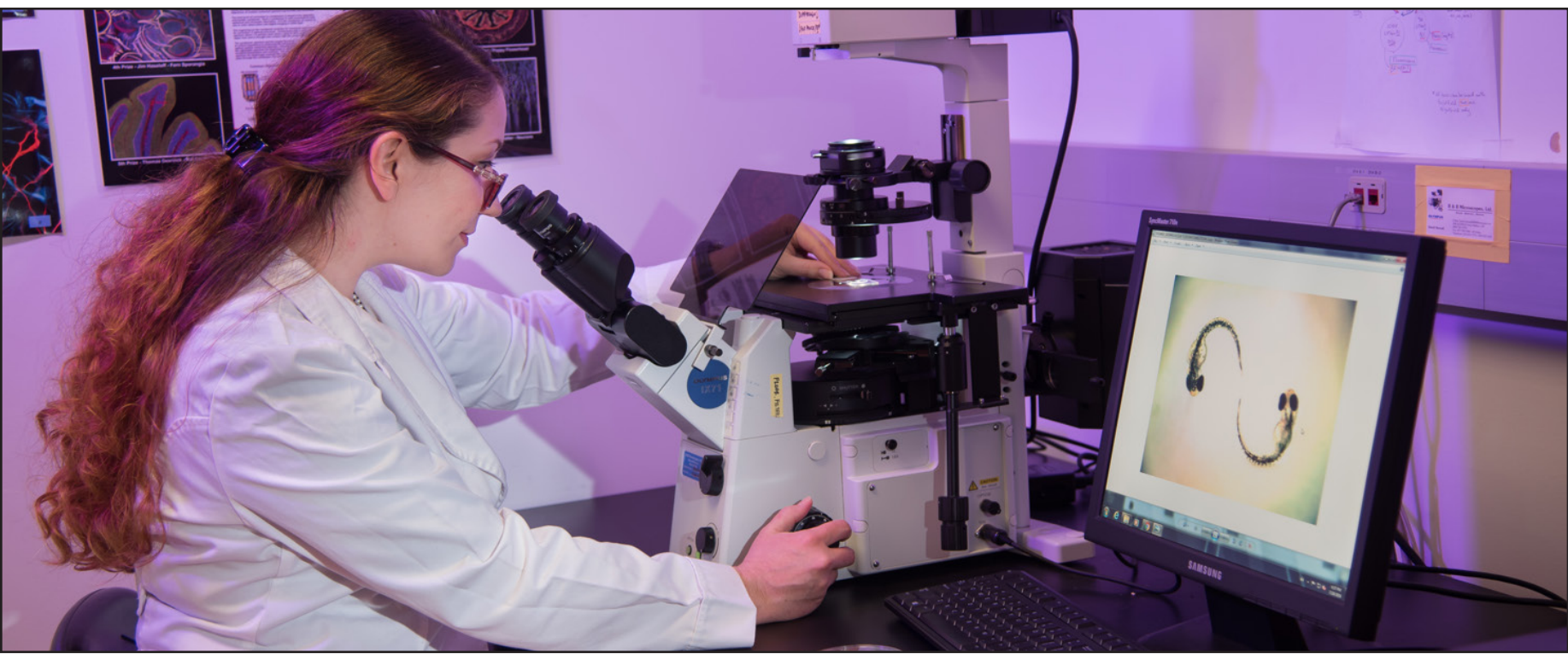
"One point of this research is to gain a better understanding of why cloudiness develops in the first place. We have all the same proteins in our lenses as these fish do," Posner said. "The second is if we can figure out how to manipulate the proteins that these fish make by manipulating their genes, theoretically we could use similar strategies in humans in the future."

The funding from NIH for this research supports undergraduate research, which is part of the reason Posner came to Ashland in the first place. Their freshly published paper has two student authors on it who just graduated in the last year or so, Kelly Murray and Matthew McDonald.

"The other big benefit of all this work is we are training students at the undergraduate level, getting them ready for graduate school and to go on to get masters and PhDs, then they can contribute to all sorts of research efforts," Posner said.

Murray went on to Cornell University to pursue her PhD program and McDonald works as a microscopist for a company in North Carolina.

To read the paper, visit PLOS ONE at journals.plos.org/plosone/article?id=10.1371/journal.pone.0211399.



MASON POSNER

Kelly Murray uses a microscope to research zebrafish and prevention strategies for cataracts.

Department set to sponsor reading

Resurrection of the Wild: Meditations on Ohio's Natural Landscape

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Ashland University's English professor, Dr. Deborah Fleming, will be reading from her new book Resurrection of the Wild: Meditations on Ohio's Natural Landscape on Tuesday, April 16 at 4 p.m. in the Ronk Lecture Hall in the Schar College of Education.

The reading is sponsored by the English department and is free and open to the public.

Fleming's book is $24.95 and will officially become available to buy in the AU bookstore, the Kent State website and Amazon on April 14.

"It includes several essays that discuss Ohio ecology, particularly eastern Ohio along the river and Ashland County," she said.

She talks about her own farm and the experiences she had while observing nature in the different seasons and breeding and raising two foals.

Growing up in Ohio, Fleming found a deep appreciation for its beauty, she said.

"Most people are under the impression that it is completely flat but those flat areas actually have a very vibrant ecosystem," Fleming said. "They are not uninteresting."

Her book also discusses the importance of preserving these landscapes.

"The delicate relationship among the different parts of the ecosystem are so fascinating that it seems to me that this miracle is worth preserving," Fleming said.

Hilary Donatini, English department chair, colleague and friend to Fleming, has enjoyed her artistic ability and being exposed to a different area of study.

"I am always very impressed by Dr. Fleming's passion for the environment and the natural world," Donatini said.

Book readings are popular among college campuses and provide an educational experience for readers, she said.

"The most exciting thing about these book readings is that you are face-to-face with a living author," Donatini said. "You can actually ask what the author was trying to do."

The event will not last longer than an hour and there will be refreshments. Fleming plans to read a few snippets from each section of her book.

"I'm going to read some of the funny parts," Fleming said. She wants it to be enjoyable for all listeners.

Along with learning more about the nature of Ohio, Fleming hopes readers will be inspired to preserve and appreciate all there is.

"I welcome anybody," she said. "This is not a book written for academics, it is written for the general reader."