

Illuminating research

When Kodak stopped making an emulsion used for DNA marking, a Lundin research fellow found a new method for NMU By Vince Grout

Assistant professor of biology Erich Ottem calls it “a sea change.” He is referring to current and forthcoming expansions in research, instruction and opportunity at Northern Michigan University. Rozemary Howard is right in the thick of it. A junior zoology major from Gaylord, in the pre-veterinary studies program, she is pioneering a system of research that could have wide-reaching consequences. It is hands-on research often reserved for graduate students at other universities.

Ottem says, “As faculty advisers we provide guidance and best-practice protocols, but the students are doing the work. When NMU students go on to graduate programs, they often have more research experience than students from larger schools.”

Howard’s research, conducted through the McNair Scholars Program at Northern, focuses on applying fluorescence in situ hybridization (FISH) using mouse brains. She explains it this way: “All cells have DNA, which contain genes, which are then transcribed to messenger RNA (mRNA), which will code for proteins. When studying gene expression, it is much easier to determine the abundance of mRNA rather than the abundance of proteins.” She says there was an excellent procedure for this that used a silver emulsion produced by Kodak. However, Kodak has discontinued production of this emulsion and remaining alternate methods do not produce the same level of results. Howard believes that FISH will be a good replacement for the emulsion-based method.

“The target mRNA for us is BDNF, which stands for



NMU student Rozemary Howard working on a cryostat machine that allows her to make very thin sections (12 micrometers) of a mouse brain, which she then places on slides and freezes at -80C to analyze messenger RNA, which may lead to advances in understanding neuromuscular diseases.

Brain-derived Neurotrophic Factor, a protein that promotes the growth of sensory and motor neurons, and an mRNA that Dr. Ottem is very familiar with.” Howard’s

research supports Ottem's work aimed at providing a better understanding and treatment of pathology associated with neuro-muscular diseases such as ALS, commonly known as Lou Gehrig's Disease.

In addition, according to Howard, "If we can figure out a protocol that will enable us to quantify low abundance mRNAs, it will help scientists everywhere because currently there is not an extremely reliable method."

FISH can have applications in many fields including medical research and diagnosis, biology, pathology and plant breeding. Some FISH applications include determination of chromosome structure, function and evolution, chromosomal gene mapping, expression of genes, localization of viral DNA sequences, diagnosis of viral diseases, localization of oncogenes and sex determination. The uses and different approaches for FISH continue to increase. According to the National Human Genome Research Institute, "FISH is useful, for example, to help a researcher identify where a particular gene falls within an individual's chromosomes. The first step is to prepare short sequences of single-stranded DNA that match a portion of the gene the researcher is looking for. These are called probes. The next step is to label these probes by attaching one of a number of colors of fluorescent dye... When a probe binds to a chromosome, its fluorescent tag provides a way for researchers to see its location."

Howard and Ottem are helping to advance the use of FISH overall and, specifically, to develop FISH protocols for use in a variety of research applications at NMU.

Howard says, "The ultimate benefit of my work with Dr. Ottem is that we will have a new protocol that will be available to anyone who would like to use it for scientific purposes."

Last year, she received critical support to contin-

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ue her research over the summer thanks to the Anna and Rich Lundin Summer Honors Research Fellowship.

Roze was one of four fellowship recipients. The \$5,000 fellowships are granted to students in the NMU Honors Program.

The Lundins created the fellowship to provide meaningful and immediate support to NMU Honors Program students who have proposed or are engaging in exceptional research.

Rich Lundin graduated from NMU in 1973 with a bachelor's degree in business administration. **Anna** also graduated from NMU in 1973 with a bachelor's in nursing. The Lundins are long-time philanthropic supporters of Northern and its students. In 2009, they established the Margaret Kay Lundin Nursing Scholarship to provide financial help for non-traditional students pursuing a baccalaureate degree in nursing. In addition, Rich has dedicated his time and experience to the NMU Foundation Board of Trustees as vice president and finance committee member.

The 2012 fellowship recipients are doing work in a wide variety of fields. David Wood, director of the NMU Honors Program, says, "The students selected for these fellowships, and the faculty who agree to mentor them, demonstrate that groundbreaking undergraduate research spans the academic divisions at NMU." Such fellowships attract high-achieving students to NMU, who in turn

help drive more advanced research and a culture of excellence, increase graduation rates and enhance the university's reputation and global footprint.

"The award was one of the greatest honors I have ever received, besides being accepted into the McNair program," says Howard. "I was so excited to be chosen. The fellowship money saved my project." ■

