

# INROADS

A newsletter of Nebraska's Institutional Development Awards (IDeA) Networks of Biomedical Research Excellence (INBRE)

## Thoreson, students share research excitement

Wally Thoreson, Ph.D., knows there is more to the world than the eye can see.

"Humans actually see only a limited spectrum of life. We can't see things that move very fast or slow," Dr. Thoreson said.

"The world as we see it is very much a function of the process of the eye. It's not an accurate reflection of what's there," he said.

Why we see the world as we do, the normal functions of the eye and what happens when disease disrupts those functions are all part of his focus of study.

Chemicals, such as calcium, produced by the eye and their regulation are also part of his study. Dr. Thoreson, professor of ophthalmology and visual sciences and director of research, has a five-year, \$1.5 million grant, funded by the National Institutes of Health, to study the synaptic communications from photoreceptors and calcium regulation.

For his work in eye research, specifically his investigation into synaptic transmission from rods and cones, Dr.

Thoreson received the 2003 College of Medicine Joseph P. Gilmore Outstanding Investigator Award.

He likes to look at the world in new ways and share his excitement about research with students.

Two INBRE students have worked with Dr. Thoreson for the past two summers.

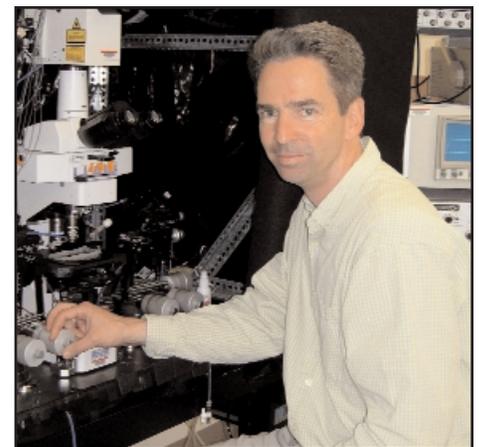
"The students keep me on my toes. They cause me to evaluate basic assumptions that I haven't looked at for a while. And I acquaint students with science and the scientific process, and try to get them excited about science," he said.

The program provides undergraduate students the opportunity to do graduate level research for 10 weeks during the summer.

"I give them a specific project with a scientific question to answer. I want them to learn something," Dr. Thoreson said.

His first student collected some data that's in an article scheduled to be published later this year. The student's name will appear on the article.

"It's unusual for an undergraduate to



Wally Thoreson, Ph.D., has a five-year NIH grant to study the synaptic communication from photoreceptors and calcium regulations.

get his name on a published paper," he said.

Those challenging questions and Dr. Thoreson's enthusiasm work together to create excitement about research - an excitement he hopes the students share.

## INBRE, COBRE relationship proves 'fruitful' for state, researchers

Ever since Jim Turpen, Ph.D., received the first Idea Networks of Biomedical Research Excellence (INBRE) Biomedical Research Infrastructure (BRIN) grant in 2001, the relationship between the INBRE/BRIN program and the Centers for Biomedical Research Excellence (COBRE) in the state has blossomed.

"The link between INBRE/BRIN and the COBREs is really fruitful," said Dr. Turpen, professor and vice chair of the department of genetics, cell biology and

anatomy at the University of Nebraska Medical Center.

"The advantage of the collaboration is that the INBRE/BRIN scholars have a place to learn about biomedical research and the centers help to cultivate their own pool of potential future graduate students," he said.

It's a seamless process that meets the goals of the Institutional Development Award program (IDeA), a federal program through the National Institutes of Health

(NIH) aimed at increasing the research capacity in states, such as Nebraska, that traditionally have not received much NIH funding. The goal of the program is to build a statewide biomedical research infrastructure among undergraduate and graduate institutions.

The IDeA program funds both INBRE/BRIN and the COBREs.

Not only do the two programs introduce undergraduate students to biomedical

Continued on page 3

# Nebraska INBRE: Are We Making Progress?

One critical component of the INBRE project is our ability to answer the question posed in the above headline. Put another way: Are we meeting our goals and objectives of enhancing the research capacity in the State?

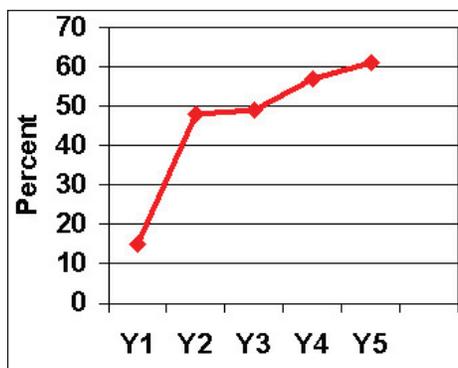
A major part of this project involves regular evaluation of our progress. This evaluation process has two aspects. One aspect is a series of objective data that document the contributions of our faculty and students to the scientific community in terms of presentations and publications. The second type of information is more sociological in nature and involves the impact the program is having on the faculty and students on our campuses. We have retained a professional evaluation consultant to assist us in collecting and interpreting the sociological data. At this time, I would like to report on the objective contributions that our faculty and students have made over the past several years.



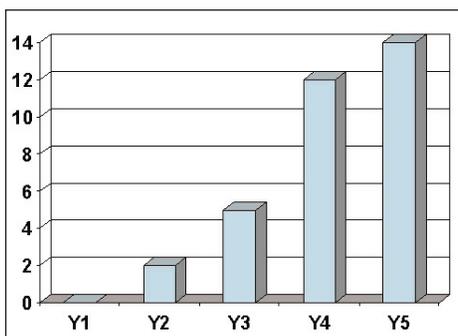
James Turpen, Ph.D.

One venue where we have had an impact is the Annual Meeting of the Nebraska Academy of Sciences. Our students and faculty are asked to present their research at this meeting. Graph 1 illustrates the impact of our participation at this meeting. During the first year of the project, approximately 12 percent of

conferences and to attend if their abstracts are accepted. This is moving from the statewide to the national level. Graph 2 shows the number of presentations our Scholars have made at national meetings. During the first and second years of the project, our students made two national presentations; in 2006, they made 14.



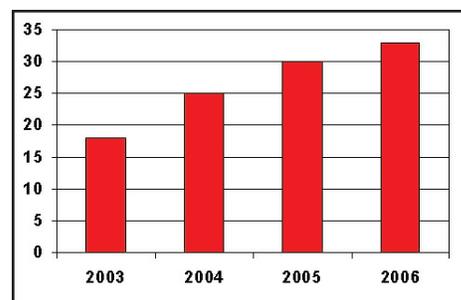
Graph 1



Graph 2

the biomedical related presentations were by INBRE faculty and students. At the April 2006 meeting, INBRE faculty and students accounted for 60 percent of the biomedical research reports.

Another measure of our productivity is presentations at national and international conferences. Our faculty and students are encouraged to submit their work for these



Graph 3

Over the course of this project, our faculty and students have doubled the number of annual presentations published in the peer-reviewed literature. This is shown in Graph 3.

Are we making progress? I think the data show that the answer is clearly yes. I commend the research productivity of the faculty and students on our undergraduate and graduate campuses.

## Jacobsen looks forward to biomedical research career

Michael Jacobsen is a scholar that universities around the country would be proud to claim as their student.

One of the main reasons that Wayne State College can make that claim, is because of the opportunities that it provides to undergraduates to conduct biomedical research through the INBRE program.

"The opportunity to do research really attracted me to Wayne State," Jacobsen said. "Once I got to Wayne State, I got involved in the INBRE program. I really enjoy it."

Jacobsen's love of research began in



Michael Jacobsen

*"Biomedical research is definitely an area that interests me. Someday, I hope to be a researcher in the medical field."*

-- Michael Jacobsen,

Wayne State College student and BRIN Scholar

high school at Laurel-Concord, where classes taught by Ed Brogie often did hands-on research. In the INBRE program, Jacobsen has worked with Doug Christensen, Ph.D., at Wayne State and with Serguei Vinogradov, Ph.D., and Joseph Vetro, Ph.D., at the University of Nebraska Medical Center.

In his research, Jacobsen has focused on the physiochemical and biochemical aspects of drug delivery in hopes of designing more effective drug delivery systems. Jacobsen was one of five BRIN

Scholars selected to present his research at the National IDEA Conference, which will be held in Washington, D.C., this July.

"Biomedical research is definitely an area that interests me," Jacobsen said. "Someday, I hope to be a researcher in the medical field."

At Wayne State, Jacobsen has been completing an average of 25 hours each semester while majoring in three subjects: chemistry, biology and computer science. Earlier this year, he was named a recipient of the prestigious Barry M. Goldwater Scholarship, which is valued at about \$7,500 for the 2006-2007 school year.

Jacobsen also was recently selected to be the Wayne State student trustee for the Nebraska State College System Board of Trustees.

# Bioinformatics Core strengthens research

Researchers who want to know how molecules interact with each other, analyze interactions and see it as three-dimensional models can call Simon Sherman, Ph.D., at the UNMC Bioinformatics and Molecular Modeling Facility.

Dr. Sherman, professor at the Eppley Cancer Institute, is director of the Bioinformatics Core Facility. "INBRE support for this core laboratory helps to make its services available to all investigators throughout the state," he said.

Bioinformatics tools have become vital for progress in disciplines such as structural biology and structural and functional genetics. These tools allow researchers to organize structural and functional data, to extract the relevant information, and to present it to a broad circle of researchers using dynamic, interactive Intranet and Internet tools.

The Bioinformatics Core Facility provides INBRE participants with computational and informational resources for intensive searching and processing of structural and functional information on biologically important molecules. Services are focused on genetic sequence analysis, molecular modeling and dynamic simulations and scientific data management. The Bioinformatics Core includes laboratories from three institutions: UNMC (Dr. Sherman), UNO (Hesham



Leo Kinarsky, Ph.D., left, research assistant professor, and Simon Sherman, Ph.D., director of the Nebraska Informatics Center for Life Sciences.

Ali, Ph.D.) and Creighton University (Sandor Lovas, Ph.D.). Researchers studying cancer, Alzheimer's disease, HIV, viruses, diseases of the brain and infectious diseases have found help from Dr. Sherman's laboratory.

Researchers bring him a sequence of amino acids to be analyzed and compared to the protein molecules with known crystal structures. Based on a sequence similarity, a three-dimensional structural model of the new protein molecule will be created by a process called homology modeling.

"All diseases start at the molecular level. We provide a service so you can see what's going on at that level," Dr. Sherman said.

Educating undergraduate, graduate and

postgraduate students in bioinformatics-related disciplines is another goal of the core facility. Several BRIN scholars obtained practical experience and participated in research projects in the laboratory. Dr. Sherman said that it initiates inter-campus and interdisciplinary certification and promotes graduate programs to better prepare Nebraska's students for work in the Post-Genomic Era.

The core also maintains the web content management and information sharing system – an easy-to-use Web site maintenance and data sharing tool, allowing INBRE collaborators to exchange data and make time-sensitive changes in the Web site. Dr. Sherman operates the lab with his associates, Leo Kinarsky, Ph.D., research assistant professor; Eric Haas, manager of the Genetic Sequencing Analysis Facility, and Oleg Shats, instructor of pathology/microbiology, and manager of Database Development and Data Management.

Established in 2001, the Bioinformatics Core Facility is an integrated part of the Nebraska Informatics Center for Life Sciences (NICLS), which also is under the direction of Dr. Sherman. The Web site of the Bioinformatics Core is [brin.unmc.edu/bioinformatics](http://brin.unmc.edu/bioinformatics). The Web site for the Nebraska Informatics Center for the Life Sciences is <http://nicls.unmc.edu>.

## INBRE, COBRE relationship proves 'fruitful'

Continued from front page

research but they also provide the funding for the infrastructure needed to build quality COBREs, where those students would go for graduate and post-doctoral training.

"We work to support each other," said Charles Wood, Ph.D., director of the Nebraska Center for Virology at the University of Nebraska-Lincoln, one of four current COBREs in the state.

"One of our goals is the training of undergraduate students, graduate students and post-docs so that they are prepared for a career in research on infectious diseases," Dr. Wood said.

Graduate student Kay Crabtree is an example of this, he said. Crabtree is a former INBRE/BRIN scholar from the University of Nebraska at Kearney who ended up coming to Dr. Wood's lab in Lincoln for her doctoral training.

"The BRIN has provided support for Kay initially, who is now being supported

by the T32 Training grant of the Center for Virology," Dr. Turpen said. "It's kind of like the seed money researchers often start with to get their research off the ground and prove to the NIH that it is something worth funding with a larger grant."

Dr. Wood said that many of the faculty in his lab have INBRE/BRIN scholars working with them this summer. Dr. Wood has mentored seven undergraduates in the program since he first partnered with Dr. Turpen.

After Dr. Turpen received initial funding to establish the BRIN program, he looked around the state to see who had the necessary resources available to help him. He needed to partner with UNL and Dr. Wood was the only one at the time who had a COBRE, lab space and faculty willing to mentor undergraduate students on that campus.

"He really saw the importance and advantages of the INBRE/BRIN program," Dr. Turpen said. "We've had great interactions with him."



The Nebraska INBRE is funded through a grant from National Center for Research Resources, a division of the National Institutes of Health.

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[www.unmc.edu/inbre](http://www.unmc.edu/inbre)

# 'Fantastic' INBRE funding assists UNK students, professor

Don't be alarmed if you walk into the lab of Kim Carlson, Ph.D., at the University of Nebraska at Kearney (UNK) and see a 4-year-old peering into a microscope.

That's just Dr. Carlson's son, Zane, who often accompanies mom to the lab during the summer.

Zane likes looking at the fruit flies his mom uses in her research and making them appear larger or smaller under the microscope.

"One day he explained all the parts of the fly to me and told me that they aren't happy living in the bottles and want to be in the garden," said Dr. Carlson.

It's gratifying for the assistant professor of biology at UNK to see her son learn and grow, she said. Her enthusiasm for teaching is only outweighed by her research of *drosophila melanogaster*.

"Fruit flies can be used to study any-



Kim Carlson, Ph.D.

## At a glance:

Kim Carlson, Ph.D., assistant professor in the department of biology at the University of Nebraska at Kearney.

Areas of research: OTK18 gene and its potential benefits in human gene therapy to treat HIV and aging, both using fruit fly models and applying the findings to humans.

Teaching responsibilities: genetics lecture and lab; human genetics; developmental biology; fundamental tools for biological sciences; and concepts of genetics to online graduate students.

Dr. Carlson is married to molecular biologist Darby Carlson, who is also her research assistant and a lecturer in the biology department at UNK. Together, they have two children, a son, Zane, 4, and a daughter, Victoria, 2 months.

thing that you would study in humans," she said. "Human disease, aging, a lot of what we know, all of those genes were first discovered and studied in fruit flies.

It's a great system and very easy for my undergraduate students to work with."

And with the help of a \$252,000 grant from the INBRE/BRIN program that Dr. Carlson and three fellow researchers received in 2004, they now have a place of their own in which to conduct their research. There's no more waiting for classes to end to get into a lab, she said.

"Our university now has both an animal facility and a research lab," she said. "It's fantastic! And it's all because of the BRIN program. BRIN helped pay for the construction or furnishing of both, we wouldn't have it otherwise."

Dr. Carlson is able to continue to conduct her research on the human OTK18 gene she worked on during her post-doctoral training at the University of Nebraska Medical Center and aging research she worked on during her graduate training at the University of Nebraska-Lincoln. And she is able to do something else she loves: teach undergraduate students about research.

"That's the reason I got my Ph.D., because I wanted to teach undergraduates and do research with them," she said.

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