UW River Falls | Department of Biology

BIO-FEEDBACK

Summer 2009 Newsletter • Volume 8

BIOLOGY DEPARTMENT REMODELING PROJECT YIELDS FIRST MODERN TEACHING LAB

(Scott Ballantyne)

Summer is the time for barbeques, fireflies, swimming and in the biology department – moving. This past summer the entire contents of AGS 419 and the adjoining spaces were transferred to temporary homes across the hallway. Why did the centrifuges cross the road? To make way for a major remodeling of the 419 teaching laboratory. The project began several years ago, when three biology faculty members crafted a laboratory modernization proposal detailing their collective dream-teaching lab. This was not a simple facelift, but rather a major reconstruction. The lab is literally reoriented, with the front now the back. This directs student attention toward the instructor and away from distractions that might be caused by people accessing any of the newly created or remodeled adjoining spaces. The former podium, a frequent stumbling point for at least one instructor, is gone. In its place lies a dedicated room for culturing animal cells, an expansion that will greatly improve our animal cell culture course. Behind this room lies the newly created plant genotyping laboratory (see related article this issue). The most striking change to the main 419 teaching laboratory is probably the benches. This lab is now equipped with five island benches that facilitate group interactions and allow instructors to more easily move throughout the room (no more hiding in the back). This is also the first biology lab to be ADA compliant. The layout allows students easier access to the equipment and materials stored in the beautiful new cabinetry that lines the room's perimeter. Other amenities include a dedicated ceiling projector, instructors bench, whiteboard, several sinks, and perhaps most exciting – a bank of laptop computers! Students can now experience computers as integral and critical components of modern scientific experimentation. Teaching began in the renovated lab this past semester and all indications are that it was a complete success. We hope to bring you news of additional remodeling projects in the near future as we continue our campaign to upgrade worn out lab spaces with student- and instructor-friendly ones.

TISSUE AND CELLULAR INNOVATION CENTER GRAND OPENING AT UWRF

(Tim Lyden)

On March 9th 2009, the UWRF Tissue and Cellular Innovation Center (TCIC), directed by Tim Lyden, formally opened to much fanfare. This event, hosted jointly by Chancellor Connie Foster's office, the WiSys Technology Foundation and the TCIC, culminated a yearlong effort to transform Lyden's Lab into a new enterprise. The TCIC at UW-River Falls joined the Nanotechnology Center at UW-Platteville as one of two such centers in the UW-System. Plans call for a total of 5 UW Innovation Centers to be developed in the coming years. The other three will be at UW-Steven's Point, UW-Stout and UW-Whitewater with each focused on different areas of expertise. The TCIC is focused on tissue engineering and stem cell biology. These centers represent a new paradigm in which the traditional mission of teaching and training will blend with cutting edge research and industrial and clinical collaborations. Plans call for the centers to become self-sustaining within a five year period.

(continued on page 2)

Mature Arabidopsis plants with stems and seeds contained within plastic sleeves.

THREE BIOLOGY FACULTY COLLABORATE TO ESTABLISH A PLANT GENOTYPING LABORATORY

(Kim Mogen)

Biology students interested in undergraduate research now have yet another option when they are contemplating what kind of project they would like to do. Those interested in various aspects of plant genetics have an opportunity to do research by working on a diminutive, yet incredibly important plant named Arabidopsis thaliana. Arabidopsi thaliana is the model plant for studying plant development, just as the mouse, the zebrafish, and the C. elegans nematode are model organisms for studying animal development.

(continued on page 3)

TISSUE AND CELLULAR INNOVATION CENTER GRAND OPENING

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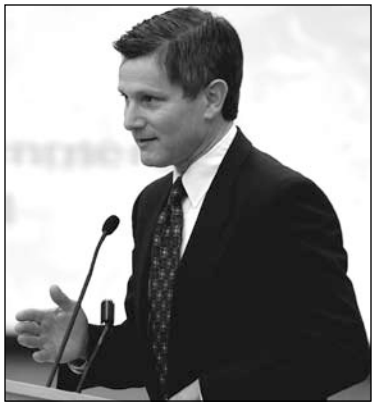
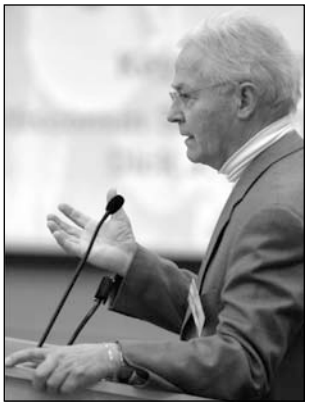
The event hosted presentations by collaborators from UW-campuses (UW-Stout, UW-Stevens Point and UW-RF), clinical collaborators from across the region (Marshfield Clinic, River Falls Hospital Cancer center and UMN Medical School) and representatives of industrial collaborators (Phillips Plastics, BioE, Hysitron, and CAP Biomaterials) from both Wisconsin and Minnesota. The presentations were followed by comments from Chancellor Foster, Maliyakal John (Managing Director of WiSys Technology Foundation), Kris Andrews (UW-System Vice President for Federal Relations), Dr. Bob Nelson (1990 UWRF Distinguish Alumni and senior research scientist at Regions Hospital) and the keynote address delivered by the Wisconsin Secretary of Commerce, Dick Leinenkugal. With the formal opening completed... now the real work of the TCIC begins!



Wisconsin Secretary of Commerce Dick Leinenkugal discusses the importance and impact of academic/ industry collaborations for the growth of the economy in the state.



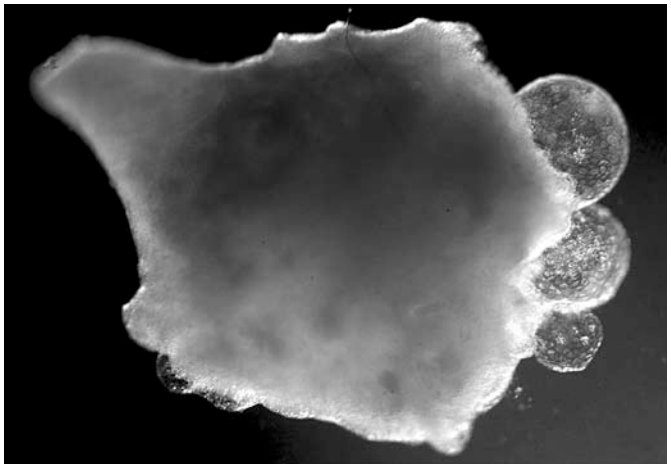
Bob Nelson, 1990 UWRF Distinguished Alumni and Senior Research Scientist at Regions Hospital in St Paul addresses the opening event crowd concerning the value of undergraduate research.

Throughout the day the audience numbered more than 125 people that included students, faculty, administrators, collaborators, economic development experts, state politicians, congressional office staff members and regional press representatives.

In the last year numerous students have done undergraduate research in TCIC project areas. Many presentations have been given, including events at the 17th Annual Ronald E. McNair Scholars Symposium in Berkeley, CA, the Annual Biomedical Research Conference for Minority Students in Orlando, FL, the Regional McNair Conference in Delevin, WI, and the National Conference on Undergraduate Research in LaCrosse, WI.

MARSHFIELD CLINIC COLLABORATION

(Tim Lyden)



Prostate tumor sample following one week of explant culture at the TCIC. These tumors displayed an interesting tendency to form cystic structures as can be seen here on the right side of the tissue.

During the summer of 2008, Dr. Lyden and the TCIC were awarded a second WiSys Technology Foundation ARG grant to establish a collaborative research program together with physicians at the Marshfield Clinic. Physicians at the River Falls Cancer Center and

Very early results are promising...

the Aurora-Green Bay Medical Consortium in Eastern Wisconsin also joined the collaboration. The project focuses on applying tissue engineering technology to the growth and testing of primary human tumors. The overall goal of the work is to develop new translational and personalized medicine approaches to the treatment of cancer and focuses on "tumor stem cells". Very early results with some breast, prostate, lung and colon tumors are promising. Studies are continuing to refine understanding of the processes being observed and to define the nature and dimensions of the sampling protocols and culture conditions.

THREE BIOLOGY FACULTY COLLABORATE TO ESTABLISH A PLANT GENOTYPING LABORATORY

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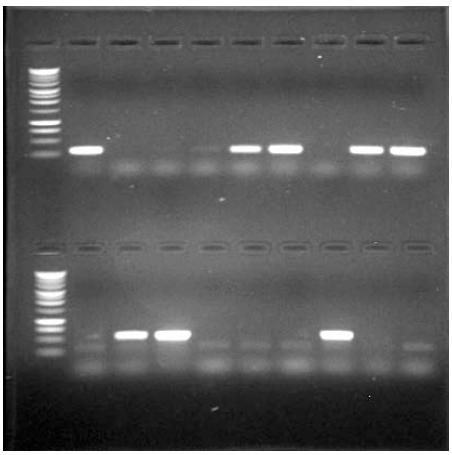


An agarose gel showing typical PCR genotyping results.

Last year Drs. Scott Ballantyne – a geneticist, Brad Mogen – a plant pathologist, and Kim Mogen – a botanist, joined forces to strengthen an on-going collaboration with the University of Minnesota Plant Biology Department. The overall goal of the UWRF - UMN collaboration is to make progress in understanding the genetics of how plants defend themselves against disease. When plants detect pathogens, the levels of many genes are known to change. Mutant plants offer a way to study the plant defense signaling network, but due to genetic redundancy, it is not as straightforward as it sounds. Generating single, double, and triple mutants is the key. The work of generating and genotyping the desired mutant plants is what the UWRF faculty and students are doing. Their focus is on genes that impact bacterial disease and also poly(A) binding protein genes. The valuable seeds will then sent to the UMN for disease assays. The UWRF Plant Genotyping Laboratory is up and running, with heartfelt thanks to generous funding from the Kettlekamp –Lieneman Professorship (to BM), a UWRF Foundation grant, and two NSF grants. A room was carved out of space from a recent lab remodel, and even though the plumbing is yet to be installed, much good work has already been completed. Over one hundred plants have been genotyped, twelve single mutant plants have been identified, and the first crop of seeds from single mutation crosses is drying, is ready to be genotyped at soon as it matures. In addition to genotyping, the laboratory is providing students with real-life experience in the new field of bioinformatics (using computers to analyze DNA sequence data). Working with students from biology, biotechnology, and computer science programs, they have found a sequence that is shared by several Arabidopsis genes involved in stress response. As internships, independent studies, or coursework, nearly 20 students have participated in Arabidopsis research. Many undergraduate posters were presented at the UWRF Fall Gala Evening of Research and Scholarly Activity in November, the UWRF RSCA Day in April, and one poster was presented at the Microbial and Plant Genomics Institute associated with the University of Minnesota. Dr. Ballantyne and two students, Raymond Moore and Pamella Wipperfurth, presented results at the international meeting of the RNA society in Madison this past May.

The new lab, with chemical storage, future sink, light banks on the left and bench space and computing equipment in the center and on the right.

FROM THE CHAIR

(Karen Klyczek)

Greetings! This has been another exciting year for the Biology Department, as you can tell from the variety of items in this newsletter. I am proud of the accomplishments of our faculty, staff, and students, and I continue to marvel at how much we can accomplish with so few resources and the limitations of our facilities. In spite of the dire economic situation in the state, we are hopeful that the department will continue to be recognized for its good work and that new opportunities for resources will become available. It has been a pleasure (and sometimes a challenge) to chair such a dynamic department for the past ten years. Best wishes to Mark Bergland, who will be taking over as chair beginning July, 2009

NEW FACULTY/STAFF

We welcomed Cheng-Chen and Becca to the Biology department last fall. We are delighted to have them. Below they introduce themselves to you.

CHENG-CHEN HUANG – ASSISTANT PROFESSOR

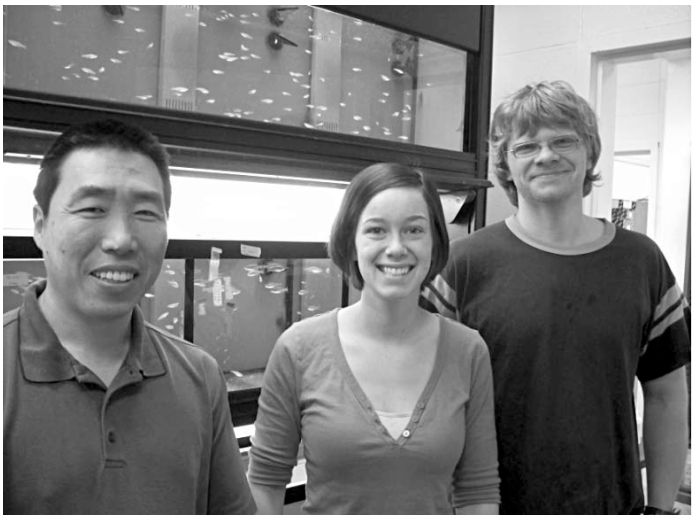
Here is a brief history of myself. I grew up and received my primary education in Taiwan. In 1993, I moved with my wife to New Jersey to study for my PhD degree in Cell & Developmental Biology at Rutgers University. After my PhD, I took a postdoc position at Wash U. in St. Louis with Dr. Steve Johnson where I began my research career using zebrafish as a model organism to study vertebrate development and genetics. My primary interest is on the development of their vascular system. Almost 3 years later, we moved back to Taiwan where I took a second postdoc position at the Academia Sinica, the best national research institute in Taiwan. In August 2008, we moved back to the States to join the Biology department at UWRF. Yes, it was a big change for us but my family and I were well received and happy to asettle in the western Wisconsin.

We have four children: Ernest, Herman (with cap), Hannah, Sarah (in stroller). My wife, Yifang, is a full time busy mom, at home. She is also a good cook. (Taiwan 2006)

The first year is always challenging. But I think I managed it well. I was teaching General Biology 150 and Cell and Molecular Biology 240. Although I had years of experience being a guest lecturer and a teaching assistant, taking charge of entire courses and labs is a very different experience. I find the most challenging task is to adjust myself from a research environment to an undergraduate teaching environment. Students' earlier comments were: running through the materials too fast and lacking details, which was obviously a presentation style geared for the researchers and graduate students that I was used to. At the end of the first semester, I fixed these problems and found myself really enjoying listening to students' feedback and eager to develop ways to improve myself and help the students learn the material. It's very rewarding.

My first year goal was to develop a new course in Developmental Biology for the students in biomed option and to offer research projects for undergraduates at UWRF campus. I am proud to say that both goals were well accomplished. First, the university curriculum committee approved the course proposal for Developmental Biology this April. Everyone in the department is excited about this new course that will discuss basic knowledge as well as modern developmental genetic approaches in understanding how a fertilized egg develops into a complex organism. Second, soon after I joined the department, I set up a zebrafish aquatic system for research. After advertising my research projects in several classes, my research began to attract a few students. This summer, there will be four students working in the lab on different projects. Three of the projects are based on mutations that I isolated in Taiwan. The fourth project, recently funded by WiSys (University of Wisconsin System), is to utilize zebrafish embryos for drug discovery. One of my students even received a summer research stipend from the UWRF Foundation. My sincere thanks to the UWRF Foundation for support of this work.

I am honored to provide research opportunities to the students at UWRF and to have my projects well supported by the university. I am also very grateful to the assistance that the department and my colleagues have provided me that made my first year at UWRF enjoyable and fruitful. I really look forward to the opportunity of teaching young people about biology and am very confident that our students have great potential to accomplish tremendous things in biological research.



Emily Swenson, Chuck Phillips and I, in front of our aquatic system. We have more than 500 fish of different ages in our system.

REBECCA BRONK-LAB MANAGER

I am Becca Bronk, the new Biology Lab Manager. I started in September 2008 and have kept busy this year learning the ropes. Everyone has been very helpful and we have an excellent group of student workers that keep the department tidy and assist me with laboratory preparations for many of the courses. We have been able to make many improvements throughout the department in organization and use of space, updating inventory, and enhancing lab safety and security with funding from the campus Chemical Hygiene Department.

In addition to my interest in working in the lab environment, I also enjoy fieldwork. I grew up in Minnesota with a passion for the outdoors and a particular interest in lakes and streams. As an undergrad at St. Olaf College this passion developed into a focus on aquatic ecology and I earned a B.A. in Biology and Environmental Science. I then earned an M.S. in Conservation Biology (Fisheries and Aquatic Biology) at the University of Minnesota. My research interests include aquatic invertebrates, community interactions, and species re-introductions. I enjoy studying streams in Southeast Minnesota and Southwest Wisconsin with my husband and any other volunteers interested in aquatic science. Before joining UWRF I worked at the Saint Anthony Falls Laboratory-University of MN assisting with the initial set-up of the Outdoor Stream Lab in 2008 and providing input on aquatic ecology and aquatic invertebrate research.

UNDERGRADUATE RESEARCH GIVES STUDENT VALUABLE SKILLS

(Terri Marquardt)

During my final year at UWRF I had the great opportunity to work on a plant genotyping project with Dr. Ballantyne. This project taught me how to successfully apply lab skills and genetic knowledge that I learned in lecture classes to a real world project. All of the experiences I gained while working on this project helped me to find a job after college. On top of all that I had a lot of fun too!! For my part in this project I was determining which, if any, individual Arabidopsis plants were homozygous or heterozygous for a specific gene. I was responsible for isolating the DNA samples I needed from the individual plants and keeping track of which plant belonged to which sample. I learned how to correctly use PCR and gel electrophoresis techniques and apply the results to come to a conclusion. I had the opportunity to make a poster for this project and present it at the UWRF fall gala. Working on this project helped me to further refine my lab skills, lab etiquette and organization skills, which helped me successfully obtain a job right out of college. I just started working at PreventionGenetics in Marshfield, Wisconsin as a DNA testing lab technician. At Prevention Genetics I am testing human blood samples for genetic mutations that have been shown to cause disease. This will require me to accurately dilute blood samples, run PCR tests and keep accurate notes on all the samples I run. I will also be looking at graphs of DNA samples to determine if the sample is homozygous or heterozygous for a specific isolated nucleotide. Thanks to the experience I gained while working on this project I feel prepared and confident to start my new job. Thanks Dr. Ballantyne and all the professors at UWRF for all your help and encouragement during my college career,
I miss you guys already!!

> I had the opportunity to make a poster for this project and present it at the UWRF fall gala.

LYDEN NAMED CAS OUTSTANDING TEACHER

Dr. Tim Lyden, Associate Professor of Biology, was named 2008 Outstanding Teacher in Science and Mathematics by the College of Arts & Sciences. He was also awarded a McNair Program "Above and Beyond" Mentor of the Year Award and the UWRF Foundation Dykstra Faculty Development Award. For additional information about Dr. Lyden and his work regarding the TCIC, please see his web site at www.uwrf.edu/cell.

NORTH KINNICKINNIC RIVER MONITORING PROJECT

(John Wheeler)

In 2002, the City of River Falls adopted a new Storm Water Management Ordinance that was "designed to protect the Kinnickinnic River from the negative impacts of storm water runoff associated with new development" (http://www.rfcity.org/Eng/Stormwater/northkinnimonitoring/). Soon after, the North Kinni Monitoring Project— a partnership between several groups including the City of River Falls, Trout Unlimited, UWRF, and others— was conceived and implemented to gather baseline information about river health and to schedule monitoring activities into the foreseeable future.

Figure 1. Kent Johnson (with net) and Joe Gathman sampling macroinvertebrates on the Kinnickinnic River, May 28, 2009.

At established stations along the river, project staff and volunteers monitor things like temperature, water quality, base flow, and composition of the local aquatic macroinvertebrate community. The term "macroinvertebrate" is a general name for any creature that lacks a backbone but is large enough to be seen with the naked eye (i.e. not microscopic). Species of aquatic macroinvertebrates vary widely in their tolerances to thermal and chemical pollution; therefore, the collective species that are present at a particular site can function as a sensitive "indicator" or "sentinel" group that reveals changes, if they occur, in overall aquatic ecosystem health. In this way, macroinvertebrates can serve as a kind of early-warning system if the river ecosystem starts to deteriorate or change.

Figure 2. Kent Johnson and Joe Gathman transferring a sample from net to storage container in the field, May 28, 2009.

Some of us in the UWRF Biology department have participated as citizen volunteers since macroinvertebrate sampling began in 2004. Kent Johnson (Trout Unlimited) and Clarke Garry sampled in 2004, 2005, and 2006. John Wheeler came on board when Clarke Garry retired and has helped Kent Johnson with the effort since 2006. Joe Gathman joined the project in 2008. Clarke Garry's web page about macroinvertebrates can still be viewed at http://www.rfcity.org/Eng/Stormwater/northkinnimonitoring/macroinvertebrates.htm.

"to protect the Kinnickinnic River from the negative impacts of storm water runoff associated with new development"

Macroinvertebrate sampling happens each year in late May. We sample at three sites. At each site, we collect three samples (replicates). Each sample consists of debris and macroinvertebrates that are dislodged from the cobbles, gravel, and sand at one place in the riverbed under a riffle. Debris and macroinvertebrates that drift into a net are transferred to a container and preserved with alcohol. Later in the lab, 125 specimens are randomly "picked" from each sample which means that they are carefully disentangled from the debris and transferred to a new vial of alcohol. We must be very careful not to damage the specimens at this stage.

Picked samples are then sent to a lab at UW-Steven's Point where a UW-Extension expert indentifies all the specimens. Each species has a "tolerance value"; these tolerance values are then used to calculate the Hilsenhoff Biotic Index (HBI) value for that sample. The HBI value is a numerical indicator of overall aquatic ecosystem health. More information about the HBI index, scale, and procedure can be viewed at http://watermonitoring.uwex.edu/wav/monitoring/bioticLearn.html

Figure 3. A typical "picked" sample from the North Main Site, Sample 1, collected May 30, 2006.

The term "macroinvertebrate" is a general name for any creature that lacks a backbone but is large enough to be seen with the naked eye (i.e. not microscopic).

JOHN E. BUTLER

(1956-1961) Recipient of the Distinguished: Veterinary Immunologist from IUIJ (International Award). Recipient of the Distinguished: Veterinary Immunologist from American Association Veterinary Immunologist (National Award). Three year NSF grant "Role of ileal Peyers Patcher"; Nation Pork Board Grant "Porcue Circovirus 2" and NIH grant on pig model for cystic fibrosis. John-butler@uiowa.edu

EDWARD L FLOSS

(1959) I enjoyed the recent Fall 2008 issue of the Bio-Feedback Newsletter. Please know that Benny Kettelkamp and Kate Lieneman were the two most influential instructors of my entire educational experience! The Biology department was upstairs in North Hall at the time, and I lived in a small converted barn (yes, it once was!) apartment owned by Dan Linehan, directly across the street from North Hall at 317 1/2 E. Spring Street. I've been retired since 1994, but served as the chair of the Marine Technology Department at Cape Fear Community College for 25 years. I earned an MS in Zoology at the University of New Hampshire in 1963, taught at St. Francis College in Biddeford, Maine for 2 years, later at Southern Maine Vocational-Technical Institute in South Portland, Maine for 4 years, then for 26.5 years at Cape Fear Community College in Wilmington, NC. Since retiring, my wife and I lived in Milan, Italy for 3 years, afterwards Ottawa, Canada for 3+ years, before returning to Wilmington in 2006. My hobbies are photography, photo editing, writing, gardening, and genealogy. My wife and I have 3 grown sons and 4 wonderful grandchildren. Besides Dr. Kettelkamp, the only classmates I've corresponded with over the years are Jay Bergstrand, Tom Barry, and Aaron Burchell (transferred to UM after his 1st year). I can honestly say that many professional successes achieved along the road must in large part be attributed to the wonderful years spent as a student at WSCRF. Especially, Ed Prucha, Benny Kettelkamp and Walker Wyman left indelible marks on my life. Look for me at the 50th reunion on May 16th. efoss@ec.rr.com

LEE E. JABS

(1963-1967) Recently retired from teaching biology and human anatomy and physiology at Evansville High School. Recently retired from teaching evenings at Black hawk Technical College in Janesville, WI. Currently busy with church involvement, family (three daughters and one grand daughter), and horticulture hobby. Janehj3@yahoo.com

BILL GURNON

(1969) Check out my new web site at www.TheStoryCollector.com. Let me know what you think and share a story or two. bill@gurnon.org

JIM OLSON

(1972-1977) President of: Olson Investment Management, INC.; a financial planning and investment advisory company. Jamesstuart.olson@LPL.com

STEVEN KASS

(1999) After graduation, I attended the University of Minnesota to pursue a MS in the Veterinary Medicine program (Infectious Disease). I completed my degree requirements and thesis defense in 2007. I am currently employed as an Asst. Scientist by the University of Minnesota's Surgery Department. Specifically the Schulze Diabetes Institute (formerly the Diabetes Institute for Immunology and Transplantation), where our team does xeno and allo islet transplantations. stevobears@hotmail.com, kassx013@umn.edu

HEATHER PELZEL

(2001) I am currently a dissertator at the University of Wisconsin Madison in biomolecular chemistry, and I'll hopefully be graduating in December. My research is focused on determining one of the mechanisms responsible for the early downregulation of gene expression in apoptotic cells. I live just outside of Madison with my husband and son. hrhaglund@wisc.edu

KATE (KNOESPEL) KNAUFF

(2004) Currently working as a Medical Technologist / Clinical Laboratory Scientist in the Core Laboratory at Rowan Regional Medical Center in Salisbury, NC. k8erk@hotmail.com

KARA NELSON

(2006) I have been a soil conservationist in Polk County for the USDA Natural Resources Conservation Service since immediately following graduation. I plan conservation practices on private lands ranging from nutrient management to wildlife. I also get to assist other partners like DNR with prescribed burning, goose banding etc. kara.nelson@usda.gov

TIM PEARSON

(2008) Immediately following my graduation, I took a position as supervisor and tree grower at Northern Christmas Trees and Nursery. I oversee growing operations for fruit, shade, and ornamental trees. Our company's cultural diversity presents challenges as well as opportunities to learn Spanish. A tremendous benefit for my position is the chance to travel to a variety of trade shows and to other states during the Christmas tree season. timothy.pearson@uwrf.edu

NATASHA (RADKE) THONER

(2004-2008) After graduating from River Falls, I began Pharmacy school at the University of Minnesota.

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BIOLOGY IS GOING GREEN!

We are cutting back on our use of paper and putting the newsletter on our Web Page (www.uwrf.edu/biology). If you do not have access to a computer and/or would still like to receive a paper copy of the Bio-Feedback Newsletter, please notify us by email or by sending us the Contact Information sheet indicating so. If we don't have your email address, please send it to kim.l.mogen@uwrf.edu. More in depth articles will be posted on departmental web pages. Thank you!

BIOLOGY ALUMNI INFORMATION

Visit our departmental home page: http://www.uwrf.edu/biology/welcome.html

Name: _____

Address: _____

Phone: _____

Email: _____

Years attended UWRF: _____

Employment or other news: _____

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May we share this information with your fellow biology alumni? Yes No

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