The
Life Scientist
UMD Biology Department News winter 1998

Biologists Explore Aquatic Ecology - North Shore to Alaska

by Kay Rezanka

The newly remodeled lab on the Life Science Building's third floor is teeming with research activity. There, Dr. Anne Hershey and her students are sorting and measuring insects, conducting water chemistry tests, determining chlorophyll content of algae, and examining the otoliths of fish to calculate their ages. Both in the lab and in the field, members of "The Hershey Lab" are pursuing answers to intriguing questions in the area of aquatic ecology.

Dr. Hershey and her students have conducted research on many lakes and streams in arctic Alaska and Minnesota. These efforts have been funded mostly by the National Science Foundation and Minnesota Sea Grant. Hershey collaborates with arctic scientists at Woods Hole Oceanographic Institute, as well as researchers at UMD and the Center for Water and the Environment at the Natural Resources Research Institute. Currently, Dr. Hershey and her graduate students are conducting research in three general areas: Arctic Streams, Arctic Lakes and Minnesota North Shore Streams.

Aquatic Research Team (Left to Right): Kay Rezanka, Andy Wold, Jenny Kysely, Jim Lee, Courtney Kowalczak, Gretchen Gettel, Dr. Anne Hershey

Stream surveys have been done for many years in the Kuparuk River and Oksrukuyik Creek in Alaska to gain a broad understanding of arctic stream ecosystems and to investigate the effects of

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Department Leadership A Challenge

by Gerald "Jerry" Niemi

With the departure of Dr. Don Christian from the Department of Biology last spring, I assumed the Department Head position in an "acting" capacity for one year.. Don accepted a position as Associate Dean in the Division of Biology at the University of Montana in Missoula. We all miss Don's leadership, scholarship and sense of humor in the department, but recognize that he was looking for a new challenge and a "change of scenery" in his career. I know Don is enjoying the hunting and fishing in Montana as well as his new job responsibilities. Don was my science colleague, fellow administrator, and a personal friend. We all thank Don for his 20 years of quality service to the department and the UMD community.

For me this has been a challenging and strange year. Although I have been involved in administration while the Director of the Center for Water and the Environment at the

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Randy Hedin and Bill Bailey Join Biology Staff

The last several years have seen an increasing number of students enrolling in Biology courses, resulting in an increase in department holdings, supplies and equipment, not only for teaching, but also for research. We are fortunate to have the services of Randy Hedin and Bill Bailey, Laboratory Services Coordinators, new to the Biology staff this past year.

Randy Hedin has been a familiar figure in the Biology Department for the last 10 years – first as an undergraduate, then as a graduate student, now as a laboratory services coordinator. Randy is responsible for directing the many tasks that are a part of preparations for large, multiple section courses. He orders materials, is a resource person for graduate student teaching assistants, and participates in laboratory instruction. He also manages the operation of the biology stockroom, maintains and inventories supplies and works on specific projects as they arise, such as the current project of rekeying locks in the Life Science Building. Randy has had a wide variety of responsibilities this past year, which makes the job interesting, but he sees a need to make the existing classrooms and space more usable by better organization and by improving the quality of supplies and equipment available. He says, "Working in the general biology sequence this year, I have realized the enormous amount of materials needed."

Randy holds bachelor's degrees in Biology and Chemistry from UMD and also earned an M.S. degree in Biology from UMD in 1996. He is married to Paula (Holter) Hedin, who is completing a master's degree under Dr.Lil Repesh in the UMD Medical School. Randy and Paula have a daughter, Dayle, who was born last September.

Bill Bailey is a long-time Duluth resident who has a B.S. degree in Chemistry from UMD. Before assuming his present position as a lab services coordinator in the Biology Department, he had work experience with local agencies, including the EPAlab and MPCA. He spent the last 15 years working for the UMD Department of Biochemistry and Molecular Biology, where he was involved with trace enzyme metabolism and enzyme kinetic studies. Bill's responsibilities as a laboratory services coordinator are to provide support for upper division courses in cell and molecular biology. He is also a safety officer and, along with Randy, inventories chemicals and maintains equipment. Bill would like to participate in the department's teaching mission by helping to develop a techniques course with hands-on experience in analytical instrumentation, which he feels is important in the fields of biotechnology and biochemistry.

Bill spends his leisure time as a serious amateur astronomer. He and his wife Barbara and 10 year old son, Patrick, reside in Duluth.

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fertilization on food webs in flowing waters. **Jim Lee** conducted his thesis work on the Kuparuk River where he focused on the impacts of nutrient disturbance on arctic stream insects. Increased periphyton growth and the establishment of aquatic mosses, both caused by increased phosphorus, influence stream insects, yet Jim has found that these effects are independent. Moss establishment is particularly important in arctic systems since they lack other substrates like the woody debris typically seen in temperate streams.

As part of a larger experiment involving the introduction of nitrogen into a stream, **Jenny Kysely** has been investigating how a stable isotope of nitrogen, 15N, is incorporated into various size fractions of fine particulate organic matter (FPOM), an important food source for stream organisms. By comparing the 15N content of FPOM and periphyton, she has determined that this stream's FPOM originates from riparian or upstream sources, rather than from instream algal sources as seen in other arctic streams.

The arctic lake studies have investigated predator control of the food web structure, especially the benthic, or bottom, communities. While lake fertilization experiments on the role of nutrients in lentic food webs are ongoing, currently Hershey and her colleagues are investigating the topography surrounding the lakes and their basins. These "landscape effects" seem to influence the distribution of predators and ultimately, community structure. The Geomorphic Trophic Hypothesis (GTH) is used to explain the distribution of fish across the landscape (based on lake area, depth, and stream outflow gradient) and to make predictions about the resulting food web structure of the lake. For her thesis work on this topic, **Gretchen Gettel** has compared the food web structures of lakes with different fish assemblages. She found that fish appear to assert strong control on food web structure in both surface and benthic food webs. However, when fish are absent from lakes, invertebrate predators are more common and affect the web structure in a manner similar to fish. **Amber Ulseth**, an undergraduate biology major, assisted graduate students in the field at Toolik Lake last summer. She has a UROP project involving the effects of parasites on slimy sculpin growth.

In recent years, Minnesota North Shore streams have been the focus of various studies on nutrient dynamics and trophic interactions. These have ranged from an assessment of the impact of salmon carcass decomposition (fish swim upstream to spawn, then die in great numbers) to the implications of larval black fly feeding habits on the organic matter pools, to the effects of the exotic Eurasian ruffe. Current North Shore stream research has shifted to projects that study the effects of watershed land use on ecosystem processes. These projects are designed to answer questions about the variability of nutrient limitation, macroinvertebrate community structure, organic matter retention and transport, and water quality in different watersheds.

Andy Wold is concentrating on how nutrient limitation differs among urban, wetland, and forested watersheds, and whether seasonal limitation patterns exist among these land use types. Additionally, he is examining how land use affects the distribution and community structure of fish and macroinvertebrates in North Shore streams, as well as the effects on the retention and transport of coarse particulate organic matter (CPOM).

Deb Anderson will be investigating how different watershed landscapes influence stream nutrient concentrations during storm events. She is also interested in using a GIS Soil and Water Assessment tool used to simulate changes in watersheds, as well as comparing nutrient model outputs to field data in North Shore streams. Both Deb and Andy will be continuing their field work this summer.

Last fall, **Kay Rezanka** introduced a stable isotope of nitrogen (15N) into Amity Creek in an effort to trace algal nitrogen through organic matter and consumer compartments. By comparing the 15N content of various food web compartments, she is determining the degree to which consumers rely upon instream or riparian-derived food sources. Kay is also interested in invertebrate grazer control of algal biomass and plans to continue research on this topic this summer.

Courtney Kowalczak has been Hershey's Assistant Scientist since 1991 (a position previously held by Jason McCrea) and has been involved in the field collection, sam-

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Visit With a Professor Emeritus

by Linda Holmstrand

Fourth in a Series

Dr. John Carlson is remembered for his friendly smile and his enthusiastic classroom manner. Agifted teacher, he taught botany courses to generations of UMD students during the 50's, 60's, 70's and 80's. Before coming to UMD in 1954, he earned his Ph.D. from Iowa State College in Ames, Iowa, after taking a bachelor's degree in Biology and Chemistry from St. Olaf College in Northfield. He served the university for 33 years, until his retirement. In addition to his reputation for excellence in teaching, he secured funding to research the developmental anatomy of several vascular plants, including soybeans and wild rice. He authored a number of publications in the area of plant morphology and was a member of many professional societies.

Retired since 1987, Dr. Carlson and his wife Dolores, a retired elementary school teacher, are enjoying a busy schedule of hobbies, volunteer work, travel and family activities. His love of plants and expertise in botany are evident in the flowers, vegetables and fruits grown at their home. As one of his former students and colleagues, it was my pleasure on a rainy day (yes, rainy) last February, to spend time talking with Dr. Carlson, renewing our friendship and reminiscing about the past. This article is about a happy and satisfying retirement, a just reward for more than 30 years of teaching, research and service to the university and community.

As he came into my office, I complimented him on his rich brown leather jacket. He grinned broadly, then proceeded to tell the story of its Finnish origin and the circumstances of its purchase. The jacket, and a fine-looking Cossack-style hat, were brought back from a trip last year to Finland, actually the second trip to Finland taken by the Carlsons since their retirement. Both John and Dolores have ancestral ties to Finland – his great grandfather was a pastor in a small village in northern Finland. Ahighlight of their first trip was to see his small church, still standing after the village has been plundered and burned. Their ties with Finnish relatives have been kept and some make the trip from Finland to Florida often, to rendezvous and visit with family here. Other memorable trips were to the Holy Land, Hawaii and in 1990, to Germany. "Local" travels have included a recent trip to Texas and quite often, visits to the twin cities and Rapid City, South Dakota, where children and grandchildren reside.

Volunteer activities are time-consuming for both John and Dolores. For seven years following retirement, John was a volunteer at the Chris Jensen Nursing Home. Currently he enjoys volunteer duties in the cardiac cath lab at St. Mary's Hospital. The Carlsons are also dedicated to serving their church and they are both energetic members of a head of the lakes Finnish choir, which Dolores directs. Music has always been important in their lives, but the choir, which had its origin at the time of the 1992 Finn Fest in Duluth, has been a special joy. John admits to singing, with correct enunciation, the more than 100 songs in their repertoire, but not understanding the words!

The four Carlson children, except for daughter Jan, are in Minnesota. Steve, the eldest, is a physician with the West Duluth Clinic. He and his wife Patt and two children, reside in Duluth. Another son, John, a pastor - musician – computer scientist, teaches at Bethel College. He and his wife Barb live in the twin cities with their two children. Jan is a middle school science teacher at Ellsworth Airforce Base. She and her husband Rod, a gold-mining geologist, and their two children, live in Rapid City, South Dakota. The youngest son,, Mike, is a diesel mechanics instructor at Lake Superior College and lives in Duluth with his wife Cathy and their three children.

All of us in the Biology Department wish Dr. Carlson a long and happy retirement. If alumni wish to contact him, the address is 5627 Lester River Road, Duluth, MN 55804.

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ple processing, and data management portions of the graduate students'research. Courtney's lab management skills and enthusiasm for assisting with field work have made her an integral member of the Hershey research teams.

Former graduate students of Dr. Hershey's include: Nan Allen, Amy Fisher Wold, Tracy Galarowicz, Andy Goyke, Kristi Hanson, Frank Kaszuba, Tyler Lampella, Glenn Merrick, Jeff Schuldt, and John Wheeler.

Herbarium Publishes Book

by David Schimpf

Gary Walton and Deb Shubat

The Olga Lakela Herbarium recently published ***Rare Plants of Minnesota's Arrowhead*** by Deborah Shubat and Gary Walton, with Dr. David Schimpf as facilitator and editor. This is a pocket-size field guide to 56 species of non-grasslike plants in Carlton, Cook, Lake and St. Louis counties. These species are all from the official Minnesota list of Endangered, Threatened, or Special Concern species released by the Minnesota DNR. Each species in the guide is illustrated with a colored photocopy, with scale, of an actual herbarium specimen. Each description also includes a map of the distribution of known collection sites, based on records as recent as August, 1997.

The guide, designed for use by practicing professionals, is intended to be a supplement to standard identification manuals. Its publication was subsidized by the Olga Lakela Herbarium Fund. Anumber of copies are still available to the general public. The cost is $10.00 + $0.75 tax + $1.50 shipping, if mail-ordered, and can be requested from Deb Shubat UMD Biology Department. The Herbarium Fund also contributed to the publication of Ownbey and Morley's well-known *Vascular Plants of Minnesota: A Checklist and Atlas* (1991, U. of Minn. Press) as part of its contribution to the outreach mission of the University.

News Notes……

Mel Whiteside is in the third year of a 5 year phased retirement, working fall quarter and part of winter quarter each year. Last May he was among five international scientists invited to speak to a symposium celebrating the 100th year of the Freshwater Biological Laboratory at the University of Copenhagen. He was also the co-author of a paper on Lake Superior zooplankton and one on techniques for collecting young fish (see grants and publications section, this newsletter) During the "off" time, he and his wife Gildi are pursuing their nautical interests. They are currently sailing their Valiant 39, *Itasca*, from San Diego to Baja, with plans to continue to Hawaii. The Whitesides will return to Duluth in August.

Anne Hershey will be spending spring quarter working with undergraduates in the Study in England program. She will also be seeking collaborative research opportunities with British colleagues.

Colleen Belk and **Virginia Borden** recently completed writing a textbook entitled "The Second X: The Biology of Women" for Harcourt Brace Publishers. It has already been adopted by several other colleges and universities for use in their Biology of Women courses.

Department Leadership,

Continued from Page 1

Natural Resources Research Institute for eight years, this position had been a challenge because I have not previously administered an academic program. It is strange to be sitting in the Department Head chair – a seat occupied by past legends in the department with names like Odlaug, Krogstad and Carlson. Strange also because I do not feel old, but it has already been more than 20 years since I was an undergraduate and graduate student at UMD.

I could not have made it through this year without the wisdom of the Biology faculty and staff. I especially want to acknowledge and thank Dr. Conrad Firling, Linda Holmstrand, and Dr. David Schimpf. Conrad and Linda have continued to serve as Associate Department Heads this year. Conrad has been in charge of course scheduling and coordination as well as leading department efforts in conversion to semesters (a major headache) that is scheduled to begin during the 1999-2000 academic year – only a little over a year away! Linda has been instrumental in handling details of the undergraduate program including the ever-challenging completion of Upper Division papers (remember those?) Dave has continued to serve as the Director of the Graduate Studies program and does a superb job of organization and delivery of information to graduate students and faculty. I have constantly sought the guidance of Conrad, Linda and Dave.

Despite the exodus of Don and the retirement of Dr. Hollie Collins last year, the department has moved forward boldly. The department will initiate a search for a vertebrate physiologist next year as a replacement for Don. We are having discussions with other departments on future positions in cell and molecular biology, as well as bolstering positions associated with aquatic biology. This past year, the department added two full-time laboratory service coordinators, Randy Hedin and Bill Bailey, to support biology instruction, administer the stockroom, and maintain equipment and to develop a safety program. Randy and Bill have already contributed significantly to the delivery of high quality biology instruction. The Biology office will be reorganized in the near future. Ruth Hemming, along with Mary Simon and many undergraduate students, keep the office running smoothly, but we all agree that the logistical layout of the office could be improved.

The department has continued to have a full agenda, and to me, an administratively challenging program. We are the largest department on campus. The department's 15 faculty members currently offer more than 40 courses, undergraduate and graduate, per year. We have more than 500 undergraduate majors and about 30 active graduate students. This past year, more than 15 graduate students have been supported as graduate teaching assistants. More than 50 undergraduate students are involved in research, either through undergraduate research projects (UROP), research assistants, or research for credit.
Biology also has the largest research program of any department on campus (see listing of grants and publications, this issue). We have traditionally had an active program in environmental-related research, and with the recent additions of Dr. Arun Goyal and Dr. Merry Jo Oursler, the department has greatly increased its research activity in cell and molecular biology. In addition, many department faculty members have joint projects with the School of Medicine and the Natural Resources Research Institute.

The Biology Department has an exciting future! We are planning a new Science Building and remodeling of the Life Science Building. As the biology program has grown over the years, and the Life Science Building has aged, we have all become frustrated with the lack of quality space for teaching and research. The University has recognized this, and hence we have begun to lay plans for the new science building (to be shared with the Chemistry department), which would primarily house new instructional laboratories. The remodeling of our current building would focus on improvements to the ventilation system, a problem which alumni may remember.

In closing, I wish you the best in your continued endeavors and urge you to stop by and visit with previous instructors when you are in the area. On behalf of the Biology Department faculty and staff, thank you for your continued support.

Herbarium Begins Database

by David Schimpf

Last September, the Olga Lakela Herbarium began a project to create an electronic database of its whole specimen collection. This will enable investigators to look up what the herbarium's holdings are from certain geographic locations or from certain botanical specimen collectors. Prior to this, such information could be obtained only by laboriously sorting through the collection, which has in excess of 40,000 sheets. In addition, it will be possible to look up information about specific plant taxa without having to remove them from the cabinets. This will reduce wear and tear on the specimens.

Deborah Pomroy-Petry was hired to create the database. Deb is a UMD Biology graduate who has been self-employed as a field botanical consultant, performing plant surveys in the region through various contracts. In addition to entering information from specimen labels, Deb looks for specimens that may have been misidentified or may be in need of repair. So far, she has completed work with our existing specimens of seedless vascular plants and gymnosperms, and is working on the dicots that are treated in the first volume on flowering plants in the new *Flora of North America* series.

Deb is using new software designed specifically for managing biological specimen collections. The money to support this project comes from the Olga Lakela Fund, a University endowment based largely on Dr. Lakela's bequest.

Don Christian Heads West

With feelings of sadness, yet wishing the best for his new endeavor, Biology faculty, staff and students said goodbye to Biology Department Professor and Head, Dr. Don Christian. Don accepted the position of Associate Dean of Biological Sciences at the University of Montana beginning August 15, 1997. In late July, he and his wife Sandy and children, Paul and Jenna, left Duluth for Missoula.

Don has been a member of the UMD Biology faculty since 1978, serving as department head for the last four years. Under his leadership, the department completed the establishment of the cell biology program, enhanced space and equipment holdings, and strengthened collaborative research programs with NRRI, the School of Medicine, EPAand various governmental agencies.
He will be remembered also for his excellence in classroom teaching and his service contributions to the campus and the community. We wish Don much success as he faces new professional challenges!

Don and Sandy Christian

Biology Faculty 1997-98

Front, Left to Right: Andy Klemer, Randy Hicks, Arun Goyal, MerryJo Oursler

Row 2: QinQin Liu, Linda Holmstrand, Dave Schimpf

Row 3: Anne Hershey, Raj Karim, Jerry Niemi

Top: Conrad Firling

Not Pictured: Colleen Belk, John Pastor, Lyle Shannon, Mel Whiteside

Grants to Biology Department Faculty:

Colleen Belk and ***Virginia Borden***
Grant from Saunders College Publishing in support and development of the textbook, The Second X: The Biology of Women. $ 6,000. 1997.

Dr. Arun Goyal
Carbon concentration mechanism in plants and algae. US Department of Agriculture. $ 100, 000. 1997-1999.

Glycerol synthesis stress tolerance in plants. University of Minnesota System. $ 25,210. 1997-1998

Identification of natural flavor volatiles to prevent fungal infection in apples: pathogen-host communication. Center for Crop and Food Bioprocessing, Michigan State University. $ 21,000. 1997-1998. (With Dr. R. Beaudry, Michigan State University).

Pathogen-host volatile communication. Biotechnology Research Center, Michigan State. $15,000. 1997-1998. (With Dr. R. Beaudry, Michigan State University).

Dr. Anne Hershey
Watershed effects on stream productivity and water quality discharge in Lake Superior tributary streams. Minnesota Sea Grant. $168,000. 1996-1998. (With Dr. R. Axler and Dr. C. Richards of NRRI).

Control of trophic structure and function of aquatic ecosystems in the arctic. National Science Foundation. $287,000. 1994-1997. (With Dr. M. McDonald, Minnesota Sea Grant Program). Potential impacts of invading ruffe (Gymnocephalus cernuus) on benthic and pelagic ecosystems of the Great Lakes. Minnesota Sea Grant. $1,193,000. 1995-1998. (With many others including Dr. R. Axler and Dr. C. Richards of NRRI).

Landscape control of trophic structure in arctic Alaskan lakes. National Science Foundation. $200,000. 1995-1997. (With Dr. M. McDonald, Minnesota Sea Grant Program; Dr. J. Pastor; Dr. M.Miller, U. of Cincinnati; Dr. C. Richards, NRRI; and Dr. W. O'Brien, U. of Kansas).

Key connections in arctic aquatic landscapes. National Science Foundation. $407,438. 1997-2000 (With M. McDonald, Minnesota Sea Grant and C. Richards, NRRI).

Landuse effects on stream ecosystem parameters and material discharge in Lake Superior tributary streams. *Minnesota Sea Grant*. $83,400. 1998-2001.

Dr. Randall Hicks
Survival and reproduction of pathogenic bacteria in a Great Lakes Estuary: Acomprehensive test of combined municipal and industrial sewage management. Minnesota Sea Grant. $81,036. 1996-98.

On-site sewage treatment alternatives: pathogen removal/technology transfer. Legislative Commission on Minnesota Resources. $75,000. 1997-1999.

Comparative analysis of archaeal nucleic acids in picoplankton from Great Lakes. University of Minnesota Graduate School Grant-In-Aid. $13,735. 1998.

Pathogen and nutrient removal by constructed wetlands for treatment of single home and small community wastewater flows. Minnesota Sea Grant College Program. $136, 653. 1998-00. (With Dr. R. Axler and B. McCarthy of NRRI).

Dr. Raj Karim
Synergistic effect of six plant extracts against HSV-1 and HSV-2 in HEP2 and vero lines. Omerin pharma, Rheinfelden, Germany. $4,500. 1994-1996.

Antiviral effects of betulin and its analogs against Herpes simplex virus. Natural Resources Research Institute. $30,000. 1997-1998.

Biochemical approaches of understanding antiherpes activity of plant steroid betulin and its derivatives. Whiteside Foundation. $4,900. 1998.

Dr. QinQin Liu
Identification of variation in sex expression and control factors in wild rice flower development for seed production. Minnesota Cultivated Wild Rice Council. $6000.
1998-1999.

Study of dynamic changes in wild rice flower development for seed production. Minnesota Wild Rice Council. $8000. 1997-1998. Assessing exotic maize germplasm for productive traits in Minnesota. Minnesota Corn Grower's Association. $9800. 1997-1998.
Study of genetic control of postmeiotic events using maize and Neurospora systems. University of Minnesota Grant-in-Aid of Research Scholarships. $21,000. 1995-1996.

Investigation of plant cell death mechanisms using maize postmeiotic mutants. $17,000. 1996-1997.

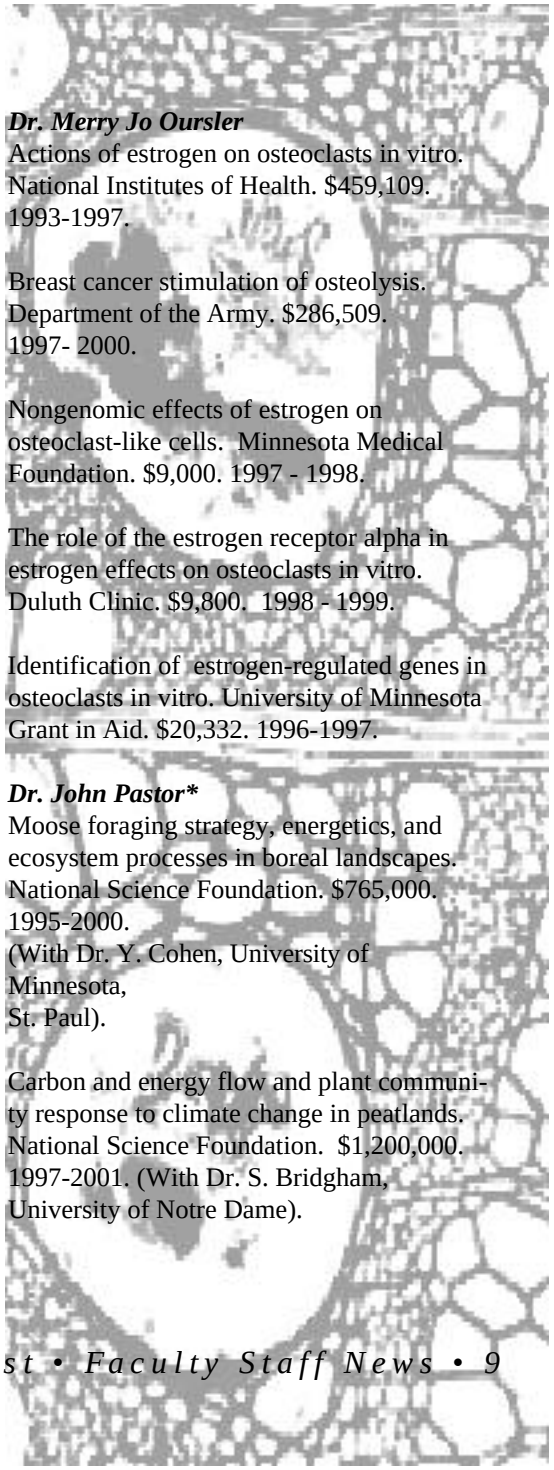
Dr. Gerald Niemi*
Effects of changes in the forest ecosystem on the biodiversity of Minnesota's forest birds. Legislative Commission on Minnesota Resources. $1,788,000. 1991- present.

Nesting success of forest birds in the upper Mississippi River, Minnesota. Minnesota Department of Natural Resources. $75,560. 1996-1998.

Wildlife species: response to forest harvesting and management in riparian stands and landscapes. Minnesota Forest Resources Council. $100,000. 1997-1999. (With J. Hanowski of NRRI).

Forest bird biodiversity: indicators of environmental condition and change in the Great Lakes watershed. Great Lakes Protection Fund. $382,000.1995-present.

Monitoring bird populations in Minnesota's national forests. North Central Forest Experiment Station, Chequamegon, Chippewa, and Superior National Forests, US Forest Service and US Fish and Wildlife Service. $198,360. 1991- present. (With J. Hanowski of NRRI).



Dr. Merry Jo Oursler
Actions of estrogen on osteoclasts in vitro. National Institutes of Health. $459,109. 1993-1997.

Breast cancer stimulation of osteolysis. Department of the Army. $286,509. 1997- 2000.

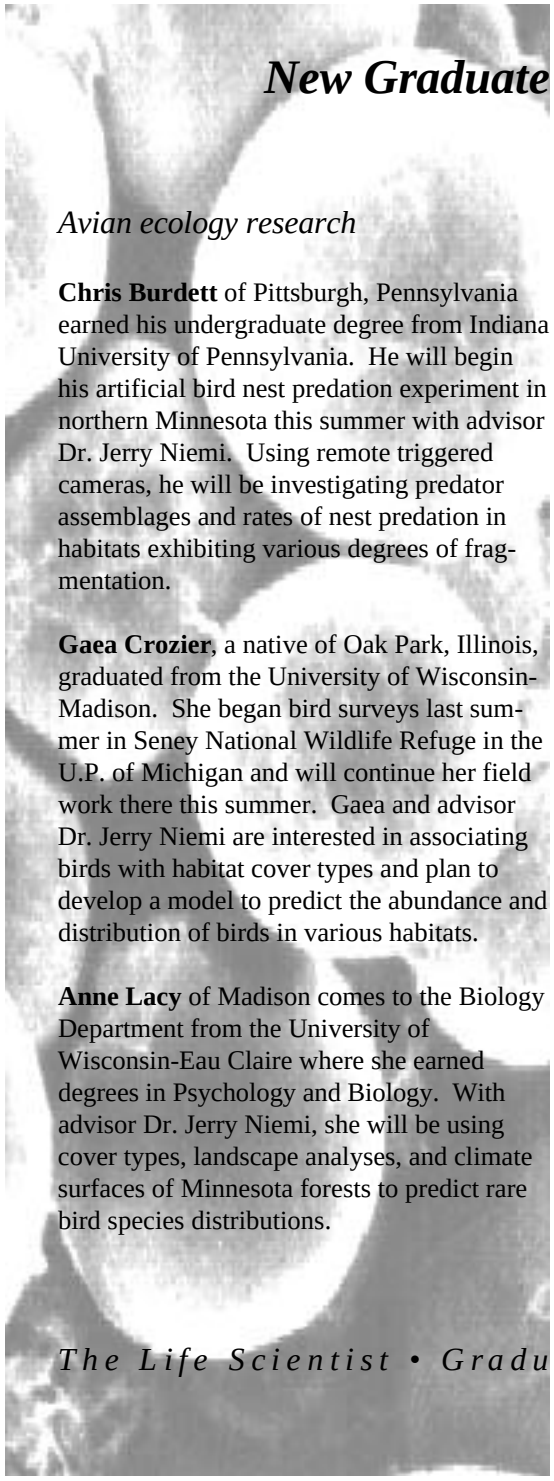
Nongenomic effects of estrogen on osteoclast-like cells. Minnesota Medical Foundation. $9,000. 1997 - 1998.

The role of the estrogen receptor alpha in estrogen effects on osteoclasts in vitro. Duluth Clinic. $9,800. 1998 - 1999.

Identification of estrogen-regulated genes in osteoclasts in vitro. University of Minnesota Grant in Aid. $20,332. 1996-1997.

Dr. John Pastor*
Moose foraging strategy, energetics, and ecosystem processes in boreal landscapes. National Science Foundation. $765,000. 1995-2000.
(With Dr. Y. Cohen, University of Minnesota,
St. Paul).

Carbon and energy flow and plant community response to climate change in peatlands. National Science Foundation. $1,200,000. 1997-2001. (With Dr. S. Bridgham, University of Notre Dame).



New Graduate Student Profiles

by Kay Rezanka

Avian ecology research

Chris Burdett of Pittsburgh, Pennsylvania earned his undergraduate degree from Indiana University of Pennsylvania. He will begin his artificial bird nest predation experiment in northern Minnesota this summer with advisor Dr. Jerry Niemi. Using remote triggered cameras, he will be investigating predator assemblages and rates of nest predation in habitats exhibiting various degrees of fragmentation.

Gaea Crozier, a native of Oak Park, Illinois, graduated from the University of Wisconsin-Madison. She began bird surveys last summer in Seney National Wildlife Refuge in the U.P. of Michigan and will continue her field work there this summer. Gaea and advisor Dr. Jerry Niemi are interested in associating birds with habitat cover types and plan to develop a model to predict the abundance and distribution of birds in various habitats.

Anne Lacy of Madison comes to the Biology Department from the University of Wisconsin-Eau Claire where she earned degrees in Psychology and Biology. With advisor Dr. Jerry Niemi, she will be using cover types, landscape analyses, and climate surfaces of Minnesota forests to predict rare bird species distributions.

After earning her bachelor's degree from the College of St. Benedict, **Jean Mengelkoch** worked with environmental contaminants and wildlife at the Patuxent Wildlife Research Center in Maryland and also as a wildlife technician for Hennepin Parks. This summer, she and advisor Dr. Jerry Niemi will be investigating dietary changes in the nestling stage of tree swallows. She will be comparing the diversity, abundance, and total biomass of ingested invertebrates to those available to the tree swallows.

Microbial ecology research

Brendan Keough, a native of Wausau, Wisconsin, earned his degree in biochemistry and molecular biology from Marquette University. He is working with Dr. Randy Hicks on a project using 32P-labeled probes to identify the presence of archaea in Great Lakes picoplankton. Brendan will be examining the archaea from picoplankton collected in North American, African, and Russian lakes.

Ryan Maki, a graduate of the University of Wisconsin-Superior and native of Hermantown, is being advised by Dr. Randy Hicks. Ryan is conducting experiments to determine if the presence of different types of sediments in the water column extend the life and/or period of viability of the pathogenic bacterium, *Salmonella typhimurium*. He hopes to assess which suspended sediment types and concentrations are most conducive to bacterial growth.

Jonathan Pundsack from Rhinelander, Wisconsin, earned his bachelor's degree from the University of St. Thomas and is currently in the Water Resources Program. With advisors Dr. Randy Hicks and Dr. Rich Axler, he is investigating the relative pathogen removal efficiencies of alternative wastewater treatment systems such as sand filters, peat filters and constructed wetlands. Jonathan has been conducting pilot experiments in preparation for work he will do at the Northeast Regional Correctional Center this summer and next winter to examine seasonal treatment effects.

Medical research

After earning her bachelor's degree in Psychology from UMD, **Sandy Fritzlar** from Elrosa, Minnesota, began her graduate work with Dr. Jon Holy of the UMD Medical School. She is investigating the influence of nuclear matrix protein organization on the effectiveness of topoisomerase-directed chemotherapeutic drugs. Currently she is transfecting cell lines with lamin (a nuclear matrix protein involved in chromatin organization) to assess cellular sensitivity to drug treatments.

Aubie Shaw, a graduate of UMD originally from Eveleth, Minnesota, began her graduate work

winter quarter. She is investigating the roles of insulin-like growth factors and their binding proteins in metastatic breast cancer-induced osteolysis. Aubie is conducting her research in the UMD Medical School with advisor Dr. Merry Jo Oursler.

Matt Thompson, a graduate of UMD originally from Foxboro, Wisconsin, began his graduate work this spring. As an undergraduate, he conducted anti-viral research on the herpes simplex virus with his current advisor, Dr. Raj Karim. Matt intends to focus on immunology research, perhaps studying arthritis.

Aquatic research

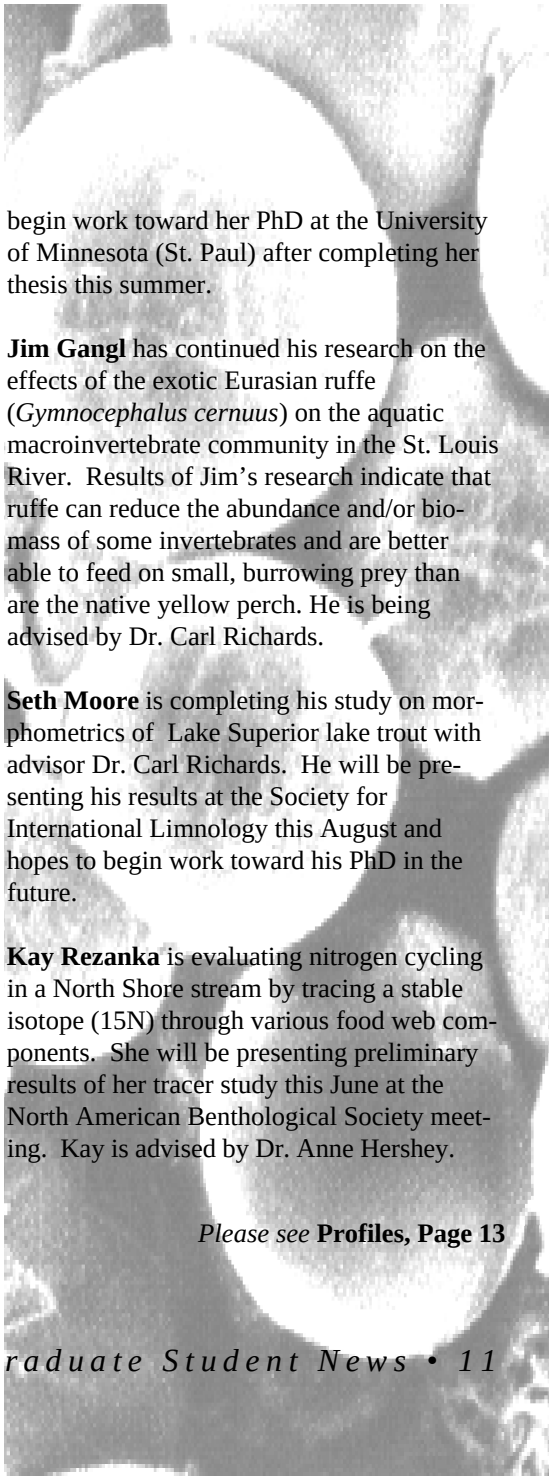
Deb Anderson, a UMD graduate with her MS in Environmental Biology, has returned part-time to the Water Resources PhD program. Deb is a Science Instructor and Department Chair at Lac Courte Oreilles Ojibwa Community College near Hayward, Wisconsin. With advisors Dr. Anne Hershey and Dr. Carl Richards, she is examining landscape influences on nutrient changes during precipitation events in different North Shore watersheds.

Jenny Kysely, who began her graduate work in the spring of 1997 under the advisement of Dr. Anne Hershey, spent last summer conducting a 15N tracer experiment to investigate the food web structure of an arctic Alaskan stream at the Toolik Lake Field Station. Jenny worked as a research technician for the University of WI Center for Limnology at Trout Lake Station and as a biologist for the EPAafter earning her bachelor's degree from the University of Wisconsin-Steven's Point. She will be presenting preliminary results of her research this June at the North American Benthological Society annual meeting.

CONTINUING GRADUATE RESEARCH
Aquatic Research: Northeastern Minnesota lakes and streams

Kevin Flynn is continuing his immunocytochemical study of testicular antigens in Eurasian ruffe. He is using a panel of antibodies to label cryostat sections of testes and to screen a ruffe testicular cDNAlibrary. He also has been isolating spermatocytes and sperm from fathead minnows to assay the DNA-damaging effects of cadmium. Kevin is advised by Dr. Jon Holy of the UMD Medical School.

With advisor of Dr. Mel Whiteside, **Rebecca Forman** is focusing on the dispersal of *Bythotrephes cederstroemi* (exotic zooplankton commonly known as the spiny water fleas) from Lake Superior to inland lakes in northeastern Minnesota. She will present the results of her research this August at the Society for International Limnology meeting. Rebecca will begin work toward her PhD at the University of Minnesota (St. Paul) after completing her thesis this summer.



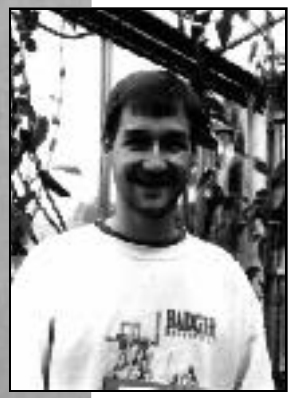
Jim Gangl has continued his research on the effects of the exotic Eurasian ruffe (*Gymnocephalus cernuus*) on the aquatic macroinvertebrate community in the St. Louis River. Results of Jim's research indicate that ruffe can reduce the abundance and/or biomass of some invertebrates and are better able to feed on small, burrowing prey than are the native yellow perch. He is being advised by Dr. Carl Richards.

Seth Moore is completing his study on morphometrics of Lake Superior lake trout with advisor Dr. Carl Richards. He will be presenting his results at the Society for International Limnology this August and hopes to begin work toward his PhD in the future.

Kay Rezanka is evaluating nitrogen cycling in a North Shore stream by tracing a stable isotope (15N) through various food web components. She will be presenting preliminary results of her tracer study this June at the North American Benthological Society meeting. Kay is advised by Dr. Anne Hershey.

Please see **Profiles, Page 13**

Nick Danz Receives Biology Teaching Award



In recognition of the effort and performance of its teaching assistants, the College of Science and Engineering annually honors an outstanding graduate teaching assistant from each department. The Biology Department's selection for this award for the academic year 1996-97 is Nick Danz.

Nick is originally from Barneveld, Wisconsin and holds a bachelor's degree in Biology and Science Education from the University of Wisconsin, Whitewater. His background experience includes summer teaching at a science camp and two years of teaching Life Science in Neenah, Wisconsin. At UMD, Nick has taught a broad spectrum of introductory laboratory courses including Biology and Society, plant biology and Human Anatomy. In addition he has graded exams and counseled biology students in the genetics course. Nick is a popular instructor, one whose knowledge of the subject, skill in presenting information and willingness to help students is well documented.

Nick's research interests are in the areas of northern hardwoods ecology and bog ecology. His thesis work, under the direction of Dr. David Schimpf, focuses on the effects of Canada yew on population structure of sugar maple and beech. He will receive his Master's degree in Biology in the spring of 1998. Nick's future plans are to complete a PhD program in plant ecology and someday to have a "cool job" as an ecologist. Good luck, Nick, and thank you for your excellent contribution to the Biology Department's teaching mission.

Sigma XI Poster Exhibition

During the week of February 9-12, the atrium of the UMD Medical School was the site of the 1998 poster session. There were several participants from the Biology Department.

Steven Garske and **Dr. David Schimpf** presented "Effects of Invasion by an Introduced Plant on Southern Boreal Forest Vegetation". The paper dealt with the spread of *Aegopodium podagraria*, or goutweed (also known as "snow-on-the-mountain"), an introduced Eurasian species which has increased locally and can cause reduced plant diversity.

Aubie Shaw and **Dr. Merry Jo Oursler's** exhibition was entitled "Identification and Quantification of Proteins that Stimulate Metastatic Breast Cancer-Induced Osteolysis" It focused on growth factors, secreted by tumor cells, that affect osteoclasts and consequently lead to weakened bone in the area adjoining tumors.

Paula Hedin, along with Dr. Lois Heller, Julie Smith and Dr. Alice Adams, showed a poster "Cytomegalovirus Infection Does Not Alter the Cardiac and Vascular Hypertrophic Response to Aortic Constriction" based on their studies of the combined effects of the virus (CMV) and increased aortic wall stress.

Profiles, *Continued from page 11*

Andy Wold is continuing work toward his PhD with advisor Dr. Anne Hershey. He is investigating how land use patterns affect North Shore stream parameters such as nutrient limitation, abiotic factors, and macroinvertebrate and fish assemblages. Andy will be presenting the results of his research this June at the North American Benthological Society meeting.

Aquatic research: Arctic Alaska lakes and streams

Gretchen Gettel is working with Dr. Anne Hershey on a project comparing the food web structures of arctic lakes with different fish assemblages. She will be presenting the results of her research this June at the North American Benthological Society meeting and then will begin work toward her PhD.

With advisor Dr. Anne Hershey, **Jim Lee** has been investigating the direct and indirect impacts of increased phosphorus disturbance on arctic stream insects. He completed his thesis in January 1998 and will be presenting his research at the North American Benthological Society meeting this June.

Terrestrial research

Nick Danz is completing his investigation of the potential effects of Canada yew on sugar maple and beech population structure with advisor Dr. Dave Schimpf. After completing his degree this spring, he plans to present the results of his research this August at the Ecological Society of America meeting.

Scott McGovern is studying the effects of nitrogen, antibiotic, and gut bacteria in the nutrition of the spruce budworm. He is being advised by Dr. John Pastor.

Chris von Rabenau is completing work done with Dr. Don Christian on the association of small mammal abundance and distribution with the vegetative structure of their habitat. In addition to serving as assistant manager of the Whole Foods Co-op, he and his wife are busy raising three sons.

Other Biology Graduate Students: Steve Garske, Michael Gillespie, Anne Gingery, Rick Gitar, Jay Sandal, Kevin Wolfe.

Senior Spotlight

by Stacy Johnson and Kate Katich

Alight, piercing through the struggles of classes. Hope, reaching to us from beyond the stress of tests. Graduation beckons to us, and for many proves itself attainable. Afew of these students, finding this goal near completion, were kind enough to share some of their memories with those of us still struggling toward that elusive diploma.

Jenny Hoven of Alexandria, MN, learned one of her most important lessons in Lyle Shannon's Animal Diversity class. The topic was the taxonomic levels of animals - Kingdom, Phylum, Class, Order, Family, Genus, Species. To help remember the proper sequence, several students were devising phrases with the same first letters. Never dreaming she's be asked to share with the class, Jenny showed her creative phrase to classmates near her, causing them to break into fits of giggles. Unfortunately she was called to the front of the room and had to blurt it out – King Philip Cried Out For Good Sex!

Jenny's advice to those of us striving toward graduation is to "relax and not get too up tight. Take things in stride. Mix liberal education classes in with your harder science classes. Take classes in lots of areas so you really know what you like". She wishes she had taken a statistics course. Her favorite class was Coral Reef Field Studies, taught by Mel Whiteside, Biology, and Howard Mooers from Geology. The class was small so she got to know other students well and included a class trip to Florida over spring break – not hard to take! Jenny hopes to gain field biology experience and eventually to attend grad school in either aquatic ecology or water management.

James Benzie, a student from Moose Lake, MN says, "Get to know other people and faculty – get involved. Do what you want, not what others want you to do. Try to balance your school life with your social life. Find your own way to study… the library doesn't work for everyone. "

James remembers one school day that began and ended in disaster. "I was in physics lab and we were using a flame and I started a towel on fire. Then I went to organic chemistry lab and blew up a test tube of something, which sprayed all over the ceiling and floor. The stain is still there. Sometimes you have those days."

One of James's favorite classes was Undergraduate Lab Teaching Experience. He felt it was valuable because he was forced to know the material forward and backwards, and got a chance to work directly with the professor. The professor that James admired most was Raj Karim, because of his approachability and passion for his work. James will be attending UMD Medical School next year and hopes to become a rural family doctor. He enjoys helping people and would like being part of a small community.

Michelle Kramer's hometown is Baraboo, WI. As a graduating senior, she advises freshmen to "Study hard and play hard. Classes are just part of the college experience. Get to know your profes sors. They are a wacky group of people that can teach you a lot. If you think research is the career choice for you, be sure to get the experience as an undergraduate. If it isn't for you, you can choose another career."

Michelle shared a story about how to relieve stress. "The class was Cell Biology, which was right about lunch time. Sometimes we would bring food to class. One day we had a bunch of stressed-out students and a bunch of animal crackers. One person started biting the limbs off the animal crackers with lots of sound effects. Colleen Belk looked over at us and we were all smiles. She was very down to earth and let us act like grade school kids for awhile. It helped."

Michelle looks back and wishes she had taken histology or a general anatomy course in preparation for medical school. And from the stories she's heard, Coral Reef Field Studies sounded like a great experience. Her plans are to specialize as a pediatrician, and of course, since she's engaged, she plans to get married some day. Her dream plan though, which probably won't happen, is to win the lottery and travel the world.

UROP Awards

by Stacy Johnson

One of the most valuable skills a university can teach its budding scientists is research skills. Unfortunately most students don't have the time to volunteer and the university doesn't have an unlimited budget for materials and equipment. The Undergraduate Research Opportunities Program (UROP) is, for serious students, a solution to these difficulties. Students have the chance to apply for up to $1300 to be used toward expenses for a research project, directed and supervised by a faculty advisor. The following students are the recipients of UROPgrants for the 1997-98 academic year, listed along with their advisor and topic.

Cherney. Melissa M.E. (C. Firling) The Effects of Adequan on Embryonic Chick Cartilage maintained In Vitro.

Ciernia, Josh (M.J. Oursler) SRC/RAS Signaling Pathway in Estrogen Treated Osteoclasts

Grahajm, Brittany (J. Pastor) Analyzing Moose Foraging Behaviour using GPS and GIS Technology

Kirkeide, Jill (M.J. Oursler) The Effect of Growth Factors on Bone Resorption

Mulley, Douglas (A. Goyal) Effect of UV-B on Photosynthesis of Algae

Nezworski, Jill (G. Niemi) Trends in the Northern Goshawk Population Continued

Sedgwick, Michael (Q.Q. Liu) Identification of the Genetic and Physiological Factors for Floral Development in Wild Rice

Tuck, Kathren (R. Karim) A Comparative Analysis of the Effects of Betulinic Acid and Betulin on Melanoma

Voracek, Julie (M.J. Oursler) The Role of the Isoflavanolds Genistein and Daidzein in the Production of TGF-(beta) by MCF-7 Beast Tumor Cells

Zarns, Lisa (M.J. Oursler) Effects of Constitutively Ras, Taf, and Src on MCF-7 Breast Cancer Cells and Osteoclast Cells

Biology Club News

by Jenny Hoven

The Biology Club had another great year, starting off with a very successful spring picnic in May. With record attendance, great food and beautiful weather, a good time was had by all. The fall quarter started with a pizza party and a Powerpoint presentation about the department and faculty given by Jerry Niemi and Lyle Shannon. In October, some club members not only donated food to the food shelf, but also got the wits scared out of them when they visited the "Haunted Ship" on the William A. Irvin. Winter quarter meetings were mostly for socializing. This spring is expected to be busy with the traditional pizza and bowling event, new officer elections and the annual spring picnic in May.

The Biology Club continued to provide tutoring services for undergraduate students. This past year some club members, particularly Michelle Kramer and David Mach, assisted the department and the tutoring center initiate a program for general biology, genetics and cell biology courses.

The Biology Club provided the coffee and cookies for Friday afternoon department seminars this year. Besides baking cookies, the club members also sold T-shirts and had a very successful plant sale. Because of the fund-raising, club membership was free and some of the activities were subsidized. Students who are interested in participating are always welcome. The clubroom is located in Room 235 of the Life Science Building.

Biology Club Officers '97-'98

Left to Right: Kate Katich, Treasurer; Jenny Hoven, President; Michelle Kramer, Vice-President

Absent: Troy Humphreys, Secretary

T. O. Odlaug Award

The Biology Department encourages and values the qualities of scholarship, leadership and service in its student members. Each spring, outstanding senior students who reflect these characteristics are nominated by the faculty for the T.O. Odlaug Award, named in honor of a former department head. The student selected is formally recognized by the department and receives a reference book of choice. Two students, **Debrah Erickson** (left) and **Aubie (Bundy) Shaw** (right) are co-recipients for 1997. We congratulate these two young women on their exceptional undergraduate careers.

Aubie, besides maintaining an excellent academic record, was active in Biology Club and the PreMed Association. She was the recipient of two UROPawards and presented her research findings at the Minnesota Academy of Science meetings, the UMD undergraduate research symposium, Sigma Xi exhibition and the National Council for Undergraduate Research. In addition she was a tutor for the Darland International program and worked as an undergraduate research assistant for several Biology faculty members. Aubie has been accepted into the UMD Biology Department's masters program and is currently working with Dr. Merry Jo Oursler on the topic of insulin-like growth factors in metastatic breast cancer-induced osteolysis.

Deb coupled her Biology degree with a minor in Russian, which resulted in a travel/ study experience in Russia. An outstanding student, she was selected for the CSE Dean's List for ten quarters. On campus, her leadership experiences included intramural sports, elected offices in Biology Club and mentoring women students in the College of Science and Engineering. In addition she was awarded a grant for a UROPproject, spent time as a volunteer in a local hospital and clinic and served as a youth director for her church. Deb is currently working as a nurse's aide at St. Mary's Hospital in Duluth, but has been accepted and will attend the UMD Medical School in the fall.

Congratulations!

We in the Biology Department are proud of our graduates and their accomplishments. At the time of this publication, the following have been notified of acceptance to professional or graduate schools. Our best wishes to all of them!

PeterAas – School of Medicine
University of Minnesota,
Duluth

James Benzie – School of Medicine
University of Minnesota,
Duluth

Debrah Erickson – School of Medicine
University of Minnesota,
Duluth

Joseph Lind - School of Medicine
University of Minnesota,
Duluth

Joseph Madden – School of Dentistry
University of Minnesota

Mark McSherry – School of Medicine
University of Minnesota,
Duluth

Tom Meir – College of Veterinary Medicine
University of Minnesota

Jill Nezworsli – College of Veterinary Medicine
University of Minnesota

Matthew Thompson - M.S. Program in Biology
University of Minnesota,
Duluth

Joshua Ziebell – Southern College of Optometery
Memphis, Tennessee

Commencement 1997

UMD's largest commencement ever was held at the Duluth Entertainment and Convention Center on May 24, with former Vice President Walter F. Mondale and Joan Mondale as the featured speakers. Degrees were conferred upon the following Biology students:

Master of Science Degree
Joseph J. Austin
Cynthia M. Hale
Kathleen R. Mayo
Catherine N. Podeszwa
Shane E. Yokum

Other Master's Degrees in Biology also awarded in 1997:
Charles W. Barnes
William P. Brown
Karen J. Ellingson
David A. Pascoe
Scott A. Stai
John R. Terwilliger

Bachelor of Arts Degree
Melissa J. Janzen
Joshua D. LeClaire
David A. Maki
Kenneth C. Nystrom
Nicolle L. Schellenberg

Bachelor of Science Degree (Biology OR Cell Biology)
G. Bradley Alsop
Rebecca S. Andersen
Kevin G. Anderson
Joshua T. Bartoe
James Benzie
Danielle M. Buske
Aubie K. Bundy
Jason D. Byers
Corrine Centa
Lei A. Chen
Natalie J. Dahlen
Tonya A. Davidian
Mindy Deadrick
Bernard R. Devin
John C. Dobson
Timothy P. Duffy
Kimberly A. Elofson
Debrah D. Erickson
Martha A. Fish
Christine M. Fisher
Angela S. Freed
Jayson O. Fultz
Douglas J. Gathje
Jacqueline D. Gordon
Patrick M. Grabner
Chad Gruszka
Brock B. Hamre
Jamison L. Harker
Becky M. Hodgkins
Catherine E. Honse
Ryan J. Hokanson
Troy D. Humphreys
Janell B. Jendro
Beth E. Johnson
Eric S. Johnson
Trevor G. Johnson
John P. Judge
Carolyn A. Kampa
Mary K. Karst
Chadwick M. Kooiman
Joseph M. Kostecki
Marc A. Krattenmaker
Katherine E. Kratz
Andy A. Krubsack
Michelle L. Langlee
Johnathan C. Lenz
April M. Levey
Bryan W. Lienke
Joseph B. Lind
Jennifer M. Lindgren
Mary M. Lunke
John A. MacDonald
Benjamin J. Madsen
Jodie Martini
Charity L. Maybury
Tanner J. McKenna
Kimberly A. Miller
Samuel E. Miller
Jody L. Nordwall
Suzette A. Olson
Patry J. Oman
Kjersti L. Paulson
Tanya K. Pierce
Thomas J. Pink
Troy E. Randgaard
Michael S. Ruuhela
Janna K. Salmela
Jill K. Salmi
Michael J. Scott
Joel M. Sederstrom
Patrick W. Shannon
Laura J. Sherry
Jennifer Schultz
Angela R. Smith
Jessica W. Steen
Melissa N. Sulzbach
Matthew L. Sundberg
Mark P. Suojanen
Heather N. Trom
Jonathan R. Utt
Kenneth J. Waldvogel
Travis W. Wille
Rebecca A. Witte
Wendy J. Wohlwend

Bachelor of Applied Science Degree
Anthony E. Altiere
Cynthia A. Davis
Brandy B. Forsman
Jeffrey A. Kolehmainen
Joshua D. LeClaire
Valerie L. McLain
Pamela S. Nichols
Shannon K. Salmi
K. Brian Seim
Gina L. Stelzer

Alumni News

Nancy (Arnold) Auer (B.S. ’73) is a professor of biology at the University of Michigan, Ann Arbor. She is pursuing her long-standing interest on lake sturgeon and currently has three research grants to support this work. She and her husband Marty, live in Ann Arbor with their son.

Jason Byers (B.S. ‘97) is working for 3M as a contract microbiologist, performing assays on antibacterial products. He will soon be supervising a new laboratory for Pace Analytical Laboratory Services in Minneapolis, testing 3M products in the research and development phase.

Ernest Bylkas, III (B.S. ’85) is an Associate Pastor at the Laurium Apostolic Lutheran Church in Laurium, Michigan.

Dori Defoe (B.S. ’95) has returned to Duluth after teaching high school biology for two years with the Peace Corps in Tanzania. She plans to resume graduate work in public health and to pursue a career as a health professional in developing countries.

Charles (Chuck) Elias (B.A. ’81) received a bachelor’s degree, with honors, from Michigan State in 1993. He is a registered landscape architect with Design Team Limited
in addition to teaching site engineering to students at Lawrence Technological Institute.

Julia (Peart) Elias (B.S. ’76) has been working for General Motors Acceptance Corporation for the past 20 years. She has been attending the University of Michigan and plans to complete her MBAthis spring. Julia’s interests are in accounting and information technology.

Shannon (Wright) Lotthammer (B.S. ’91) holds a master’s degree from the UM twin cities campus and is currently employed by the Minnesota Pollution Control Agency as a water quality specialist.

Mei-yao Louis (M.S. ’88) is a veterinarian (farm animals and pets) practicing in Watertown, SD. She and her husband Rick have 2 children and raise cattle on a small ranch.

Bruce Meyers (B.S. ’94) is in the Academic Skills Center at Kankakee Community College in Illinois. He visits Duluth every summer and enjoys walking through the department and reminiscing.

Jodi (Arvidson) Nicholson (B.S. ’95) holds bachelor’s degrees in both Biology and Psychology from UMD. She is attending Emory University in Atlanta, GAtraining for the Physician Assistant Program.

Robyn Richie-Jannetta (B.S. ’94) is a graduate student in the molecular physiology and biophysics program at Vanderbilt University in Nashville.

Charles Rose (M.S. ’92) completed his PhD in water resources at Iowa State and is now a faculty member in the Environmental and Technical Studies Department at St. Cloud State University.

Mark Steinbrecher (B.S. ’93) graduated with a doctorate in optometry from the Southern College of Optometry in Memphis, where he resides with his wife and daughter.

Darren Vogt (B.S. ’94) works as an environmental biologist for the 1854 Authority in Duluth. This organization protects, preserves and enhances the off-reservation treaty rights of the Bois Forte and Grand Portage reservations.

Terry Zenner (B.A. and B.S. ’73) holds an MBA from the University of Phoenix, and is president of Applied Micro Technology in Aurora, CO.

Gabriel Venticinque (’36) graduated from Duluth State Teachers College and was the first graduate in biology education.

Gifts and Donations

Our records show that the following alumni and friends made a donation to the Biology Gift Account or the Jack Hargis Lecture Fund during the last year. We deeply appreciate their generosity and thoughfulness. These gifts have helped us fulfil our educational mission.

Dr. Thomas E. and **Dr. Caroline Boehnke Becker**
Dr. Edward Bersu
Jon and **Suzanne Birch**
Don and **Sandra Christian**
Gabriel D'AVenticinque
Margaret Dooley
Paul and **Helen Hanten**
Maurice Margulies
Dr. Joseph Mayasich
Pharmacia and **Upjohn**
Proctor and Gamble Fund
Donald Rakowsky
Edgar Turcotte
Janice and **Paul Wicklund**

The Life Scientist – '98

An annual newsletter for alumni, faculty, staff, students, and friends of the UMD Biology Department

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to:

Alumni Update

please return so we can update our files

new address _____

name _____

address _____

_____

_____

class of _____

UMD degree _____
(MS, BS, BAS, BA)

What's new? (promotions, special recognitions, change of job, civic involvement, family, research, travel, etc.)

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