



# UAF College of Natural Science & Mathematics

UNIVERSITY OF ALASKA FAIRBANKS

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## RESEARCH EXCELLENCE

### Limitless opportunities for student research experience at UAF.

#### Spiny tenrecs from Madagascar provide wildlife biology undergrad with valuable research experience

by **Jonathan Fiely**

B.S. Wildlife Biology

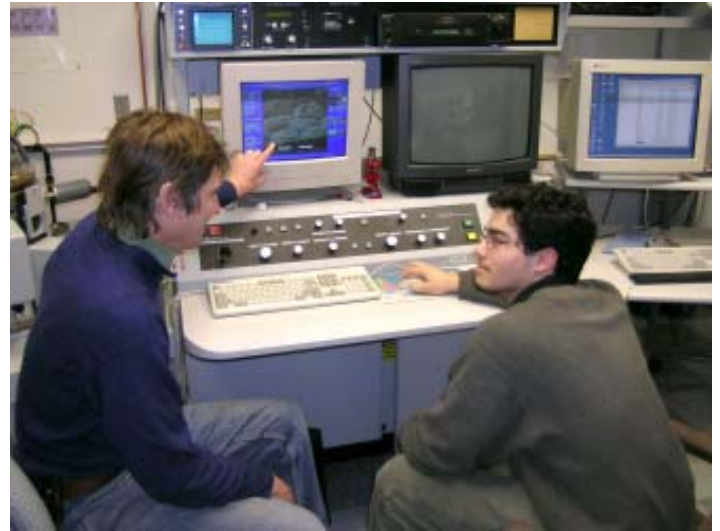
Conducting research as an undergraduate student provides valuable education and experience, an opportunity that my employer and advisor Dr. Link Olson (Curator of Mammals, University of Alaska Museum of the North and Assistant Professor of Systematic Biology, Dept. of Biology and Wildlife) offered me with the chance to assist with his research on tenrecs, small insectivorous mammals primarily endemic to the island of Madagascar. The five species of spiny tenrecs (subfamily Tenrecinae)

are characterized by spiny pelage, and although these spines are superficially similar to those found in other mammals, such as hedgehogs and porcupines, their structure is fundamentally different.

Few studies have focused on the variation in quill morphology among the different species of spiny tenrecs, and high-resolution scanning electron microscopy (SEM) has never been used to characterize variation in the external morphology of tenrecine quills.

This past fall I was awarded a grant through the UAF's Undergraduate Research Opportunities Program fully funding a study that included specimen acquisition and the use of the scanning electron microscopy facilities in the Advanced Instrumentation Lab (AIL) of the Dept. of Geology and Geophysics under the supervision of Dr. Kenneth Severin (Director of the AIL). With the high-resolution imaging that SEM offers, this project will investigate several questions of tenrec biodiversity.

*See COVER STORY p.13*



Jonathan Fiely (right), undergraduate student researcher in the Dept of Biology & Wildlife, is working with Ken Severin, Director of the UAF Advanced Instrumentation Lab (AIL), to analyze tenrec spines using AIL's scanning electron microscope. Photo by Link Olson.



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## College of Natural Science & Mathematics

### Joan Braddock, Dean

#### A UAF Secret

The focus of this issue of the CNSM newsletter is research in the sciences at UAF. This special issue draws attention to what might be one of the best-kept secrets at UAF, undergraduate research opportunities in science. Many research projects on campus provide opportunities for real-life hands-on experiences for undergraduate students. Opportunities may include jobs, internships, or independent study courses providing upper division credits. Several years ago, the Institute of Arctic Biology estimated that they had nearly 100 undergraduate students working on laboratory or field research projects in one year!



In this newsletter, our cover story highlights Jonathan Fiely's undergraduate research project on the spines of a small insectivorous mammal from Madagascar. His advisor for the project is Dr. Link Olson, Assistant Professor of Systematic Biology in the Department of Biology and Wildlife and Curator of Mammals at the University of Alaska Museum of the North. For his project, Jonathan is using a high-resolution scanning electron microscope at UAF's Advanced Instrumentation Laboratory located in the Natural Sciences Facility.

In his column, Associate Dean, Dr. Larry Duffy, highlights some of the outstanding undergraduate research projects nominated in the past years for the Brina Kessel Medal for Excellence in Science award. Several graduate students have also contributed articles about their research for this issue, providing a guide to the diversity of research occurring at UAF and acknowledging the many outstanding graduate students in our college.

In this issue, we highlight some of the administrative offices on campus important in facilitating research at UAF. These include the Vice Provost for Research, whose office

oversees the Office of Sponsored Programs (OSP), Office of Research Integrity, and the Office of Intellectual Property and Licensing. The OSP supports a number of undergraduate research projects each year through a competitive proposal process. For more information you can visit their web site at [www.uaf.edu/osp/undergraduate.html](http://www.uaf.edu/osp/undergraduate.html). A special report by Maggie Griscavage, Director of Grant and Contract Services, offers insight into the essential services provided by GCS.

Columns by the Geophysical Institute, the Institute of Arctic Biology, the Arctic Region Supercomputing Center, and the International Arctic Research Center provide information on the research institutes, including the types of projects that have supported undergraduate research projects.

If you are an undergraduate student, you might be wondering how you can participate in a research opportunity. There are several options available. One good approach is to talk with a professor whose course you particularly enjoyed, your undergraduate advisor, or appropriate science or mathematics department/program chair. Another approach would be to check out faculty at UAF on the web to find someone whose research interests you. You can find a variety of paid student positions on the UAF Human Resources web site at [www.uaf.edu/uafhr/Employment/Student.html](http://www.uaf.edu/uafhr/Employment/Student.html). A new resource, the UAF Science Education Outreach Network, is scheduled to launch in late spring and will detail the science outreach programs offered at UAF. Many of these programs offer opportunities for undergraduate students.

One of my goals in the next year is to advertise our tremendous opportunities for hands-on experiences at UAF. One day soon I want undergraduate research opportunities to be the first thing people think of when they think about the College of Natural Science and Mathematics. I wish everyone a successful spring semester and terrific summer.

#### OFFICE OF THE DEAN 358 NATURAL SCIENCES FACILITY 474-7608

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Please direct comments, contributions and mailing address corrections to Patty Fisher, email: [fnjpf@uaf.edu](mailto:fnjpf@uaf.edu) or Ph (907) 474-1867 PO Box 755940 Fairbanks, AK 99775

## A Value Added to UAF: Profiles in Undergraduate Research

### Lawrence Duffy, Associate Dean

Departments in the College of Natural Science & Mathematics all value undergraduate participation in research and scholarly activities. The college recognizes this in several ways, one of which is the Brina Kessel Medal for Excellence in Science. The award was named for



Dr. Kessel to recognize her many contributions to her discipline, to Alaska, to the University of Alaska, and because of her love for her students and commitment to high standards.

Dr. Kessel has been a professor at the University for more than 40

years and has devoted a lifetime to the study of ornithology, emphasizing the birds of arctic and subarctic Alaska.

The following are examples of undergraduate research projects that have earned students nominations for this exceptional award.

#### Paul Atkinson, Geology

Paul threw himself into a project involving trace element analyses of some unusual volcanic rocks he had previously encountered in the African rift belt. Wanting to see how those volcanic rocks compared to others, he examined a few volcanic rocks from the Fairbanks area. He was so enthusiastic about the Fairbanks-area volcanic rocks that he designed a field mapping/sampling program and then followed that up with extensive chemical analyses.

#### Rick Hechert, Biochemistry

Rick took on the difficult project of purifying haptoglobin from river otter plasma. The goal was to make a better "reagent" or analytical system for determining haptoglobin levels in plasma. He decided that an immunochemical method would be better than the current Hemoglobin-Haptoglobin complex method. He was able to isolate haptoglobin in order to produce an antibody. The river otter is an important species in Alaska and they have been used in oil spill research.



Dr. Kessel congratulates 2004 Brina Kessel Medal for Excellence in Science award recipient, Adam Yeager, following award presentation at the Natural Sciences Facility.

#### Shane Coleman, Genetics

Working under the direction of Professor Gerry Shields, Shane was part of a team who hoped to deduce original migration patterns into the new world (North America) and to answer the question of who first stepped foot on North America. His efforts in the project included the isolation and sequencing of mitochondrial DNA belonging to a group of Canadian Inuits from Igloodik of the Northwest Territory.

#### Laurie Martin, Forensic Chemistry

Laurie designed and conducted an independent research project at UAF on the benefits of using Fluorescein over Luminol for identifying blood stains on a variety of surfaces at crime scenes. She published the results in a forensic chemistry journal.

#### Loda Griffeth, Natural Products

Loda started a project involving determining the secondary chemistry of the seaweed *Fucus gardneri*. Shortly into this project, it became clear that the secondary chemistry of this plant was straightforward and she added the secondary chemistry of a South African savanna plant, *Colophospermum mopane*. Her project determined the structures of three new natural products and her work will be published in a peer-reviewed journal.

#### Adam Yeager, Biology

Adam was interested in whether populations of *Populus balsamifera* (balsam poplar) differ genetically across a latitudinal gradient from the Kenai Peninsula, through the interior and to the northernmost populations that occur in isolated stands north of the Brooks Range. His hypothesis is that populations in the interior should exhibit higher levels of genetic variation than those to the north and to the south because the interior was not glaciated during the Wisconsinian Glaciations. He worked diligently to successfully sequence and analyze DNA sequence variation among individuals for the alcohol dehydrogenase (ADH) gene in poplar. He had to overcome several hurdles during optimization of this technique. Additionally, he has introduced techniques to the lab for direct sequencing PCR products and making heterozygosity determinations, thereby bypassing the time-consuming cloning stages of the methodology. Adam has developed a rigorous analysis of his data that will be included in a larger manuscript incorporating his work to be published in a high-profile peer-reviewed journal.

These are just a few examples of the many undergraduate research projects conducted each year in departments throughout the college. Through these efforts in which both student and faculty mentor benefit, CNSM may be viewed as the undergraduate research center for Alaska.

# RESEARCH *powerhouse*

## University of Alaska Fairbanks

If it's about the North, chances are it's being studied right here. Current research spans many disciplines, much of it focusing on issues that affect Alaskans and their way of life.

Oversight and advancement of UAF's research mission and the development of research policies are the responsibility of the Vice Provost for Research. With more than a dozen research centers and institutes that focus on the Arctic, UAF has experienced professors and scientists available to students both in the classroom and on an individual basis. UAF researchers are experts in their field and receive funding from a wide variety of local, state and federal sources.

Research and academic institutions around the world look to UAF as a leader in arctic studies and related education. Research dollars coming to UAF have increased substantially, from \$56.4 million in 1997 to \$175 million in 2003-04. UAF ranks 55th out of 200 universities in the amount of research money awarded from the National Science Foundation.

Graduate enrollment is up more than 9 percent from last year; both graduates and undergraduates benefit from studying with some of the nation's top scientists.

Academic ranked faculty at UAF have a tripartite appointment which includes teaching, research, and service. For the research component of their workload, many CNSM faculty hold joint appointment with one of the research institutes profiled in this issue.

For a complete overview of research activities on the UAF campus, visit the research homepage on the UAF website.

[www.uaf.edu/uaf/research](http://www.uaf.edu/uaf/research)



## International Arctic Research Center

Syun-Ichi Akasofu, Director

The International Arctic Research Center (IARC) is a very unique international institution in that its research staff works together to study the Arctic as a system in understanding climate change. More specifically, the goal is to reduce the uncertainty of arctic climate change prediction. For this purpose, IARC works closely with a number of arctic institutes in the world that conduct research in atmospheric science, oceanography, permafrost/frozen soil, biota, and others. Observational, theoretical, and modeling studies are integrated at IARC. As an educational project, we have been conducting successful summer schools every year, bringing students and post-docs from all over the world to Alaska; prominent scientists are invited as lecturers. In 2005, the summer school will be conducted aboard a Russian ice-breaker in the Laptev Sea. For more information, visit [www.iarc.uaf.edu](http://www.iarc.uaf.edu).

## Arctic Region Supercomputing Center

Frank Williams, Director

Through work at the center, the Arctic Region Supercomputing Center (ARSC) encourages UAF undergraduate students to contribute to their particular fields of research and to the field of high performance computing. As part of their employment, student assistants are partnered with center researchers on projects in their field of study. Currently, ARSC students are working on projects that include develop-

ing sound applications for virtual reality systems, developing virtual tours, porting the access grid node to OS X and developing web service software for information retrieval. ARSC student Patrick Webb began his involvement with the center through participation in ARSC's Alaska Research Summer Challenge, a National Science Foundation-funded summer intern program at the center. Webb worked with

## Geophysical Institute

### Roger Smith, Director

CNSM and the Geophysical Institute (GI) are engaged in a common endeavor of education and research as partners. Through the joint appointments of some 40 faculty in Chemistry, Physics, Geology and Geophysics and Atmospheric Science, GI offers a research organization with facilities supporting projects ranging from space physics to tectonics and sedimentation including atmospheric science, cryophysics, seismology, volcanology and

**Left:** International Arctic Research Center (left) alongside the C.T. Elvey Building, home of the Geophysical Institute (right) on the West Ridge of the UAF Campus. Photo by Tohru Saito.

remote sensing. In common with UAF as a whole, student mentoring and education is a prime activity. At the GI, students find research opportunities through funded projects and faculty supervision. Although the majority of students working at the GI are in graduate courses, there are also opportunities for undergraduates. Details of activities and opportunities can be found at [www.gi.alaska.edu](http://www.gi.alaska.edu).

Recently, there have been several natural events bringing actual or threatened destruction to life and property: a 9.0 magnitude earthquake and consequent tsunami in the Indian Ocean with terrible loss of

life, a 7.9 magnitude earthquake in Alaska with relatively very little damage, and eruptions of several volcanoes. Instruction in CNSM and research at GI, IMS and ARSC has addressed the mitigation of earthquake, tsunami and volcano damage in Alaska. Work done by the Alaska Earthquake Information Center, the Alaska Volcano Observatory and the Tsunami Center and Observatory combines operational function with university research by faculty and students providing support to the Alaska Emergency Services, NOAA, FAA and USGS. On February 2, 2005, Senator Stevens recognized participation by

*See GEOPHYSICAL INST p.6*

## Institute of Arctic Biology

### Brian Barnes, Director

The Institute of Arctic Biology (IAB), Alaska's gateway to graduate-level study of the circumpolar Arctic, is also home to undergraduate research opportunities in wildlife, ecology, ecosystem, genetics, bioinformatics and biomedical research. *High school students are even getting a jump on college at IAB.*

Undergraduates are active research participants in projects such as the role of serotonin in obsessive-compulsive disorder, the neuroprotective role of hibernation and how it may lead to better treatments for stroke, how insects survive temperatures of -42 degrees C, and what role plants play in climate change and Arctic biocomplexity, to name a few.

Students publish in peer-reviewed journals and many contribute posters or talks to scientific conferences and meetings; all gain invaluable experience working with exceptional scientists and form professional and personal relationships that can last a lifetime. For more information, visit [www.iab.uaf.edu](http://www.iab.uaf.edu).



**Above:** IAB Director Brian Barnes, left, shows arctic ground squirrels used in neuroscience research to National Institutes of Health Director, Elias Zerhouni (right.) UAF neuroscience Professor Kelly Drew, second from left, and an NIH staff member in August 2004. UAF photo by Todd Paris.

**Right:** User Consultant, Jesse Niles, explores the virtual permafrost viewer application in the Discovery Lab. The application was created by students and staff at the Arctic Region Supercomputing Center. Photo by Leone Thierman© Arctic Region Supercomputing Center.

President's Professor John Walsh, ARSC/ Computer Science Joint Appointee Glenn Chappell, and ARSC visualization specialists to create a three-dimensional visualization of permafrost data over the Alaska landscape. Webb is continuing this work as a student assistant at the center, working with Visualization Specialist Bill Brody and UAF researchers to add data and interactivity to the program.

Webb is among several students from departments as varied as computer science and art who are currently working at ARSC. For more information, visit [www.arsc.edu](http://www.arsc.edu).



# Resources for UAF Researchers

*GEOPHYSICAL INSTITUTE continued*  
a group of UAF students in testimony at a US Senate hearing on tsunami protection. At that same hearing, Professor Roger Hansen of GI gave testimony on the needs for tsunami protection for life and property in Alaska. If you are interested in these projects, you can contact Professors: [John Eichelberger](#), [Roger Hansen](#), or [Zygmunt Kowalik](#).

Coming in 2007, the International Polar Year (IPY) occurs on the 50<sup>th</sup> anniversary of the International Geophysical Year (IGY). Like the IGY, IPY plans to focus the research efforts of all interested nations on the solution of critical questions of polar science. Also like IGY, IPY will make special efforts to create legacies for the future of polar research. At UAF, there will be a wide range of activities in the geophysical, biological, marine, sociological and anthropological research. CNSM and GI will be heavily involved in the research, educational programs and implementation of results for the benefit of Alaskans.

Information on UAF participation can be found at <http://IPY.alaska.edu>.

Prof. Keith Echelmeyer retired from his faculty position this spring. Serious health problems made unpredictable inroads in his work schedule, and he has decided to restrict his activities to research and student



## UAF to seek a Vice Chancellor for Research and Economic Development

by **Paul H. McCarthy**, Interim Vice Provost for Research

UAF is now recruiting for a Vice Chancellor for Research and Economic Development (VCRED) as a result of one the several administrative changes Chancellor Jones announced shortly after his arrival on campus. Chancellor Jones noted his interest in raising the profile of university research and linking the university's research mission with a parallel effort to have the university become a more active partner in the state's economic development. UAF's annual research budget is now over \$113 million and has a significant economic impact on the Fairbanks North Star Borough and the State of Alaska.

The new VCRED will act as a key spokesperson and advocate in coordinating and expanding UAF's research effort on campus and within regional and national venues. The position will facilitate more responsive and effective technology transfer to public and private-sector partners.

Potential means to enhance technology transfer include developing of a research/business park that would host university "incubator" and "accelerator" services to the private sector. These services would encourage university faculty to join with commercial sector partners to capitalize on research results that have important near-term practical applications.

While the search for a VCRED is occurring the Office of the Vice Provost is developing specific steps through a series of near term (6-18 months) and longer term performance goals to implement this transition. Dr. Susan Henrichs, Dean of the Graduate School is chairing the Search Committee. Appointment of the VCRED is targeted for July 1. The position announcement is available on the UAF Human Resources website [www.uaf.edu/uafhr/employment/Executive.html](http://www.uaf.edu/uafhr/employment/Executive.html).

## Nature's Laboratory

**Aurora lights up the night sky above the Elvey Building, home of the Geophysical Institute on the UAF campus.**

mentoring. He will continue to have office space and pursue research at the Geophysical Institute. However, he will not teach classes in the Department of Geology and Geophysics. Professor Echelmeyer has an excellent record of service to the university in teaching, research and service.

For more information, visit [www.gi.alaska.edu](http://www.gi.alaska.edu).



UAF Photo by Todd Paris

## Greetings from the Director Grant and Contract Services!

by Maggie Griscavage, CRA

How busy are we?? Well, the Grant and Contract Services office handles approximately 600 new awards and modifications to existing awards, each year. For FY 2004, the total award value reached >\$152M. Six GCS grant technicians review and bill over 4,000 individual funds, with expenditures for FY 2004 reaching just over \$137M. The GCS staff are responsible for financial compliance and expenditure reporting to all of our various sponsors, and as such need to be well-versed in each

of their agencies' terms and conditions for each award. Their individual agency responsibilities can be found at the GCS website at: [www.uaf.edu/grcon/sponsors.html](http://www.uaf.edu/grcon/sponsors.html).

Providing information that will help you manage those awards for which you are responsible is one of our goals. GCS provides a Guidance Manual to help you get information that you will need, and you can find it at: [www.uaf.edu/grcon/manual/index.html](http://www.uaf.edu/grcon/manual/index.html). Chapter Three has information specifically for principal investigators, but the Manual covers many activities in greater detail throughout the document. Personal assistance and counseling is available to PI's and administrators, and you should feel free to contact any of us for any of your sponsored funding questions. The director's number is ext. 6446, and the main office number is ext. 7301. We work with you and your department technicians to help keep the university in compliance with the award terms and conditions.

**GCS tip-of-the-day**

The director, GCS, is the authorized institute official for accepting sponsored awards made to UAF. Unless you have a letter from the Chancellor authorizing your signatory status, don't sign for the university.

## ESTES: What Is It? Engineering, Science & Technology Experiment Station

by Larry Duffy, ESTES Director

The College of Natural Science and Mathematics (CNSM) has a research administrative unit called Engineering, Science and Technology Experiment Station (ESTES). ESTES has been in existence since 2001 and provides research support for UAF faculty members. Research projects range from nanotechnology and engineering to environmental and computer science. Science education and interdisciplinary proposals are also supported. This support

is in the form of proposal preparation and proposal management for externally funded grants. Using research and affiliate faculty appointments, ESTES may also provide a faculty research workload release. ESTES is managed by a Director who reports to the CNSM dean.

ESTES seeks to promote research at UAF by fair university return policy. Using overhead funds received from successful proposals, the Principal Investigator (PI) of the funded proposal will receive 30% of the recovered funds for reinvestment in his/her research program. The remainder is distributed to the PI's department (10%) and ESTES (60%) for operational costs and research development. ESTES joint appointments are an exception.

Proposals must be submitted to ESTES no later than ten days before their due date. Faculty are encouraged to contact the ESTES office as early as possible for help in developing their proposal. Contact Wendy Frandsen 474-6872, email [fnwlf@uaf.edu](mailto:fnwlf@uaf.edu).

# Researcher's Toolkit

### VICE PROVOST FOR RESEARCH 474-7314

[www.uaf.edu/research](http://www.uaf.edu/research)

Primary responsibility for the oversight and advancement of UAF's research mission. The VPR oversees the Office of Sponsored Programs (OSP), Office of Research Integrity (ORI), and the Office of Intellectual Property. & Licensing.

### OFFICE OF SPONSORED PROGRAMS 474-5223

[www.uaf.edu/osp](http://www.uaf.edu/osp)

Provides support to UAF faculty and staff as they develop proposals for external funding for research, teaching, and other scholarly activities.

### OFFICE OF RESEARCH INTEGRITY 474-7800

[www.uaf.edu/ori](http://www.uaf.edu/ori)

Monitors institutional investigations of research misconduct and facilitates the responsible conduct of research through educational, preventive, and service activities.

### OFFICE OF INTELLECTUAL PROPERTY & LICENSING 474-7765

[www.uaf.edu/osp/ip.html](http://www.uaf.edu/osp/ip.html)

Assists faculty and departments across the entire UA system with patent, copyright, trademark, and licensing issues.

### GRANT AND CONTRACT SERVICES 474-7301

[www.uaf.edu/grcon/](http://www.uaf.edu/grcon/)

Manages and monitors all post award activities for the University of Alaska Fairbanks research projects. Responsibilities include the set up of new accounts, budget revisions, the preparation of bills and collections of amounts due from funding agencies, and compliance reviews.

# Wildly Diverse Student Research Experience

This segment features profiles of student research written by the students themselves. It is a very small sampling of the diversity of student research ongoing in the sciences at UAF, but offers a glimpse into the hard work and dedication of these exceptional students and the UAF faculty that guide and inspire them.

## FEATURED STUDENT RESEARCHERS:

**JONATHAN FIELY**

**DANA GREENE**

**AMANDA KOLKER**

**CASSIE MELLON**

**ISLA MYERS-SMITH**

**TANJA PETERSEN**

**DANIEL RINELLA**

**MELISSA ROBINSON**

**ERICA RODGERS**

## Space Physics and Aeronomy Successful Sounding Rocket Experiment

by **Erica Rodgers, Ph.D. Student**  
UAF Space Physics and Aeronomy,  
Dept of Physics, Geophysical Institute

On October 15, 2004 I watched in amazement as NASA sounding rocket 36.217 soared above the skies of the New Mexico desert. I was taken aback by the thrilling moment when the Black Brant/Terrier rocket lifted off from the Athena launcher. A year's worth of hard work was about to pay off because two and a half minutes after launch I would see real time flight data from a science instrument I helped develop at UAF.

A dedicated team of scientists, engineers and technicians at the Geophysical Institute (GI) designed and developed the Avalanche-photodiode X-ray Spectrometer (AXS). I worked with the AXS Principal Investigator, Dr. Scott Bailey of the GI, and members of the GI Electronics and Machine shops to turn metal and electrical components into a functional science instrument that utilizes state of the art technology.

The AXS is a solar observing instrument which measures the amount of solar radiation that reaches the Earth (irradiance) between .1 and 3.5 nanometers. These



Photo by Erica Rodgers

**Rocket payload completely assembled and ready for transport.**



Photo courtesy of Rick Ruhklick.

**Rocket Integration Team at White Sands Missile Range. L to R: Erica Rodgers, Rick Ruhklick, Phil Chamberlin, Tom Woods and Rick Kohnert.**

short wavelength photons are called soft x-rays. The AXS instrument uses an advanced technique to measure individual photon events in a photodiode detector. High-speed modern analog and digital electronics are used to determine the energy of the incoming photon. The energy is then converted to a photon wavelength by binning many photon events and a spectrum is produced. The AXS instrument provides brand new science because the full-disk solar x-ray spectrum between .1 and 3.5 nanometers had not been accurately measured prior to this rocket experiment. A knowledgeable understanding of the solar spectrum at these short wavelengths is key to understanding the energy input into the Earth's upper atmosphere. Solar irradiance at these short wavelengths is absorbed in the Earth's atmosphere between 60-70 miles (96-113 km) which is why measurements must be

*See RODGERS p.14*

## Geology and Geophysics

### Studying Volcanoes in Kamchatka, Russia

by **Amanda Kolker, Ph.D. Student**  
UAF Dept of Geology & Geophysics,  
Geophysical Institute

Imagine: a thin strip of land in the Northern Pacific built by perfectly conical, snowcovered stratovolcanoes. Meadows rich with wildflowers, ridges of multicolored volcanic rock, views of the deep blue Pacific on both sides. Tall glaciers feeding powerful waterfalls, steam vents and hot springs everywhere, and 35 people trudging around atop all this magnificence for two weeks.

Those 35 people were a group of Russian and American students and scientists, gathered together this past August for the 2<sup>nd</sup> annual International Volcanology Field School. The group operated under the joint leadership of John Eichelberger, Dept of Geology and Geophysics, UAF; and Dmitry Melnikov, Dept of Geology and Geophysics, Kamchatka State University of Education.

Our camp was a remote mountain hut, 70 km south of Kamchatka's largest city, Petropavlovsk-Kamchatksky. On sunny days, we hiked to volcanologically significant sites: the interior of a caldera, a geothermal area, a waterfall-cut rock wall with good stratigraphic exposure, for example. On rainy days we powered up the generator and delivered powerpoint presentations to one another in the mountain hut (one of those lovely paradoxes of wilderness living in the 21<sup>st</sup> century.)

Within hiking distance from our hut were the summits of Mutnovsky and Gorely volcanoes. Mutnovsky is an active andesitic arc volcano with several recent eruptions and a small glacier-hosting summit caldera. It is also notable for its active geothermal system, which provides energy to a 35mW geothermal power plant located on the flank of the volcano, and supplies Petropavlovsk-Kamchatksky with about one-third of its electricity. Gorely volcano is

*See KOLKER p.12*



Photo by Jennifer Adleman

**Hiking out of Crater 3 to Crater 2, Mutnovsky, Kamchatka, Russia.**

## Biology and Wildlife

### Science of Global Change

by **Isla Myers-Smith, Masters Student**  
Dept of Biology and Wildlife, Institute of Arctic Biology, Alaska Cooperative Fish and Wildlife Research Unit

Unlike the portrayals in recent films and books, there is nothing glamorous about the science of global change. I learned that lesson my first summer in Fairbanks waist deep in swampy water with swarms of mosquitoes around my head. But it is exciting to be working with experts in the field of global change biology here at UAF. I am studying with a community of scientists trying to measure how much carbon will be released from the boreal ecosystem as the North warms and how this, in turn, could accelerate climate change. Living in Alaska for the past 3 years has given me the opportunity to observe global warming first hand. We have had exceptionally warm winters, earlier spring breakup and the most extensive forest fire season on record. When climate change happens in your backyard, it is hard to ignore. It is both thrilling and daunting to be monitoring the ecosystem response to climate-induced disturbance and to try and project future changes to the landscape of interior Alaska.



Photo by Isla Myers-Smith

**The less glamorous side to science: measuring CO<sub>2</sub> and methane fluxes from a sphagnum bog on the Tanana Flood Plain.**

# Pursue Your Interests

## UAF Student Researchers

by **Daniel Rinella, Ph.D. Student**

Dept of Biology and Wildlife, Institute of Arctic Biology, Alaska Cooperative Fish and Wildlife Research Unit

Coowe Walker, Kachemak Bay Research Reserve (L), and Daniel Rinella, Ph.D. student in Biology and Wildlife (R), measure the magnitude and biological importance of nutrients and carbon delivered to Kenai Peninsula watersheds by spawning salmon. They are linking stream chemistry, marine stable isotope signatures in stream and riparian organisms, and marine: terrestrial fatty acid ratios with the ultimate goal of developing tools for monitoring the biological importance salmon nutrients at large spatial scales.



Photo by Mark Wipfl

### Biological Sciences

#### Tracking salmon-derived nutrients in Kenai watersheds

## Neuroscience

### Quest for an Animal Model of Obsessive-Compulsive Disorder

by **Dana Greene, Ph.D. Student**

Dept of Biology and Wildlife, Institute of Arctic Biology, Alaskan Basic Neuroscience Program

Obsessive-Compulsive Disorder (OCD) is a chronic and debilitating psychiatric condition that is characterized by intrusive and persistent thoughts (obsessions) and repetitive behaviors (compulsions) that become ritualistic in an attempt to escape the obsessions. Currently there are very few animal models of OCD that express spontaneous compulsive-like behaviors. House mice bidirectionally selected for high and low levels of repetitive nesting behavior reveal a 40-fold difference in the amount of cotton collected in the cage. The main goal

of this research is to develop these nesting mice as animal models for OCD that will allow for the elucidation of mechanisms that result in compulsive-like behaviors. My current research has focused on determining the face validity and predictive.

We have found that drugs effective for OCD treatment in humans decrease nest building in high selected male mice. These findings suggest this model has good face and predictive validity. The long-term implications of this work are the development of effective treatments and a potential cure for OCD through gaining insights in mechanisms

**Below:** Representative nests of a big (left) and a small (right) nest builder after 24 hours of access to cotton. The big nest builder exhibits compulsive-like nest building behavior as compared to the small nest builder. Photo by Abel Bult-Itto.



**High Selected      Low Selected**

controlling compulsive-like behaviors.

If you are interested or know of undergraduate students that are interested in behavioral neuroscience or psychology research opportunities, please feel free to contact me at 474-6490.

by **Tanja Petersen, Ph.D. Student**

Volcano Seismology, Dept of Geology & Geophysics, Geophysical Institute

We all gathered together in our crowded little camp, the “Baked Mountain Huts”, while the strong winds were howling outside. Volcanic sediments got blown around, sanded the outside of our shelter, got pushed through the many gaps in the walls and forced us to wear ski-goggles on



Photos by Tanja Petersen

**After we arrived at the caldera rim the clouds lifted and presented us with the ice-covered lake down in the caldera.**

by **Melissa Robinson, Masters Student**

Dept of Biology and Wildlife, Institute of Arctic Biology

In the Arctic fish are often central to local residents’ lives, yet there remains major gaps in our understandings of fish stocks and health. Such is the case with humpback whitefish in the Upper Tanana region of Alaska, where residents of Northway village have been harvesting whitefish for hundreds of years. In the past decade local residents reported catching fewer and smaller whitefish than in the past. Prior to 1998, little was known in the fisheries

walks to the outhouse. We were a group of Japanese, Russian and American students and scientists combined under the leadership of Professor John Eichelberger. After two days of stormy weather, lectures, presentations and microscope sessions we woke up early and were full of hope for a day of good weather. And there it was: a beautiful calm morning in the Katmai National Park, Alaska. The high wind clouds had disappeared; instead an ocean of mist filled the Valley of Ten Thousand Smokes below us. This would be the day we would attempt the long hike up to the rim of Katmai caldera!



**Misty morning expedition toward the foothills of Mount Katmai, Katmai National Park, Alaska.**

On that morning in the middle of June 2004, we started our hike through the desert-like volcanic landscape embedded in the lush green of the Aleutian Range. After 6 hours we arrived at the rim of Katmai caldera, but at first we only got a glimpse of the lake hidden beneath a blanket of clouds. It was a magic moment when the veil finally lifted and exposed the full

*See PETERSEN p.12*

## Wildlife Biology

### Local Knowledge & Humpback Whitefish in Interior Alaska

community about whitefish in the Upper Tanana region. This provided an opportunity to link observation from a fisheries study headed by the U.S. Fish & Wildlife Service (USFWS) with those of local residents to better understand the life history of these fish. In 2002 an interdisciplinary research project between the USFWS, UAF, and Northway Village began. Researchers, biologists, and local residents work together both in the field implanting radio telemetry receivers and in the village conducting interviews with local fish experts. Through this process both fisheries biologists and local residents are learning more about humpback whitefish, which will help sustain their population.

As a member of the Regional Resilience and Adaptation Program at UAF, I have

been working with fisheries biologists and Northway residents on this research project for the past three years and will be finishing my degree this spring.



Photo by Glen Manunde Jr.

**Melissa (R) interviewed Northway resident, Howard Fix (L), using maps to document past & current fishing locations and whitefish movements.**

# Exceptional Faculty Support

## UAF Student Researchers

### Petersen: Volcanoes Katmai National Park, Alaska

*Continued from p.11*

beauty of the caldera that was formed by the collapse of Mount Katmai during the 1912 eruption: steep flanks of rock, partly covered by glaciers and snow, surround a frozen lake. Professor Eichelberger has hiked up to the rim of Katmai caldera every year but one since 1986 and has taken about 100 students and scientists there; and now it was us he shared his joy and happiness about the beauty and solitude of this special place with. We thought about the remarkable volcanologic aspects associated with the caldera formation for a while and ended the day hiking back to camp through the golden light of the Alaskan nights around summer solstice.



International Volcanology Field School, Kamchatka, Russia.  
Dr. Eichelberger giving us a lecture without his trusty, portable dry erase boards! Photo by Jennifer Adleman.

### Rodgers: Successful Sounding Rocket Experiment, *see story p.8*



The rocket campaign was a collaborative effort involving the U.S. National Oceanic and Atmospheric Administration (NOAA), University of Alaska Fairbanks, and the University of Colorado (CU) under the direction of Tom Woods of CU. UAF Geophysical Institute Team Members: (L to R) Brian Fischer, Tim Manning, Greg Shipman, Rick Ruhkick, Scott Bailey, Erica Rodgers, Kevin Abnett, Dale Pomraning and Jay Helmericks. Photo by Gary Newman.

### Kolker: Volcanoes Kamchatka, Russia

*Continued from p.9*

a shield volcano comprised of three nested calderas. It is primarily pyroclastic basalt and basaltic andesite, and has also had numerous recent eruptions.

At the end of the field course, many of the participants attended a conference on Japanese-Kamchatkan-Aleutian Subduction Processes (JKASP) in Petropavlovsk-Kamchatksky. The five-day conference brought a thought-provoking end to our field experience (and was a good way to ease back into city life).

While Russian hospitality is not as legendary as, say, Sicilian, we could not have asked for better care from our hosts. At the field site there were no complaints.

We were more than comfortable, the atmosphere was friendly and convivial, the scientific discussion was never dry, and our beloved chefs constantly performed miracles in the little hut kitchen. Upon our transfer to the city, many of the Russian participants eagerly played tour guides for equally eager Americans.

The richness of living within another culture, even for a small period of time, almost goes without saying. However, not so obvious is how science is influenced by its cultural and linguistic environment. For many of the participants, this was one of the most valuable lessons learned.

## COVER STORY

### Fiely: Wildlife biology undergraduate encourages fellow students to explore research opportunities with faculty.

Continued from p.1

Recognition of two separate species of streaked tenrec (*Hemicentetes*) may be strengthened with SEM analysis of quill structure, and an identification key of these species based on quill morphology will assist in the recognition of prey remains in the field, giving researchers a new tool for understanding Madagascar's island ecosystem.



The roll of spines in predator defense will also be clarified; unlike the barbed, detachable quills of *Hemicentetes*, the lesser Malagasy hedgehog

tenrec (*Echinops telfairi*) has permanent quills that it self-anoints with saliva containing toxins from its prey, a behavior proposed to be at least in part related to spine structure.

I'm excited to see this project through, and look forward to continuing my education through research. Subject matter aside, the value of undergraduate research shouldn't be ignored by any student enrolled in the sciences here at UAF. Although one's degree program may already fiercely compete for time, the programs and faculty of UAF are more than willing to assist any student who has the ambition to start the process.



**Above:** Fiely's advisor, Dr. Link Olson, holding a juvenile tailless tenrec (*Tenrec ecaudatus*) from Madagascar. Dr. Olson is Assistant Professor of Systemic Biology, Biology & Wildlife Dept, and Curator of Mammals, University of Alaska Museum of the North.

**Left:** Scanning electron image showing the barbed tip of a *Hemicentetes semispinosus* spine.

**Cover:** Three of the 5 species of Malagasy spiny tenrec. Clockwise, from top left: *Echinops telfairi*, *Tenrec ecaudatus*, *Hemicentetes semispinosus*. Photo by Link Olson.

## Examining the Effects of Wildfire in Northeastern Washington

by **Cassie Mellon**, Masters Student

UAF Fisheries, Alaska Cooperative Fish & Wildlife Research Unit

I am looking at the effects of wildfire on headwater streams in Northeastern Washington. In August 2003, the Togo fire, a



Cassie Mellon setting an emergence trap in an unburned stream. Yes, there is water under there. They are very small headwater streams.

very intense 5,000 acre fire burnt through the Colville National Forest. I spent the summer of 2004, and will be returning to this site in summer 2005, looking at the effects of this fire on the invertebrate communities of headwater streams from within this fire. I am looking at the drift of aquatic invertebrates, their emergence from the streams, and the benthic community and comparing results from streams within the burned area to similar unburned ones. As invertebrates drift downstream and emerge into the riparian area they become an important source of food to other ecosystems. Following a fire, the community of invertebrates that live in the stream may change and this could effect the food supply to these ecosystems.



Shelly Brannon, above, undergraduate in Fish & Wildlife at Oregon State University, worked during the summer as a field assistant for Cassie Mellon. Shelly pictured taking a benthic invertebrate sample from a burned stream. UAF Associate Professor Mark Wipfli is Mellon's advisor.

# Mission Accomplished

## UAF Student Researchers

*RODGERS continued from p.8*

made from altitudes above where this irradiance is absorbed.

AXS science is important to the aeronomy community because solar soft x-ray irradiance affects the chemistry and composition of the Earth's upper atmosphere. Solar soft x-ray irradiance provides a significant and highly variable source of ionization to the lower thermosphere. The solar soft x-ray irradiance varies over the 11-year solar cycle and 27-day solar rotation, thus the associated chemistry and composition in the lower thermosphere varies dramatically over these time scales.

## A year's worth of hard work was about to pay off . . .

One way in which solar soft x-ray irradiance affects this region of the atmosphere is through the dissociation of odd-nitrogen leading to the production of nitric oxide (NO). NO is important to the energetics of the lower thermosphere as it provides the primary cooling process. Also, under certain conditions NO can be transported down to the stratosphere where it catalytically destroys ozone. The variability of solar soft x-ray irradiance also significantly affects space weather. Studies of space weather, particularly changes in space weather, are extremely important to satellite health, space based communication/navigation and astronaut safety.

The design, development and pre-flight



Photo by Judy Rodgers

### Erica Rodgers in the flight operations control room at White Sands Missile Range.

calibration of the AXS were funded by the National Oceanic and Atmospheric Administration (NOAA). The AXS provided an underflight calibration for the NOAA GOES (Geostationary Operational Environmental Satellite) solar soft x-ray observing instruments that are currently in orbit. The AXS measurements will be used to improve the accuracy of the GOES soft x-ray instrument measurements.

This rocket campaign was a collaborative effort involving NOAA, UAF and the University of Colorado (CU) under the direction of Dr. Tom Woods of CU. The AXS instrument was one of five science instruments aboard the CU rocket science payload. UAF team members first traveled to CU for AXS integration with the rocket payload. During this integration a series of telemetry tests were performed to ensure instrument and rocket compatibility. UAF team members then traveled to White Sands Missile Range where we worked closely with our CU colleagues during the rocket integration which began three weeks prior to launch. Rocket integration consisted of several pre-launch tests such as science instrument and science payload testing. Simulated rocket subsystem performance tests and environmental tests were also performed. The final integration took place when the rocket payload was fully

assembled for flight and transported to the launch rail for motor integration two days before launch.

The rocket payload weighed 949 lbs at launch and the motors weighed 5100 lbs. The rocket climbed to a peak altitude of 165 miles (265 km) at Mach 1.8 after burnout of the Terrier motor and at Mach 7



Launch of NASA sounding rocket 36.217 from complex 36 at White Sands Missile Range on October 15, 2004.  
Photo by Rick Ruhkick.

# the college News & Events

## *RODGERS conclusion*

after burnout of the Black Brant motor. The rocket flight lasted 15 minutes and followed a parabolic trajectory as the rocket payload reached its peak altitude 5 minutes after launch. The science instruments were turned on 2.5 minutes before the payload reached its peak altitude and were turned off 2.5 minutes after the peak altitude for a science measurement time of only 5 minutes. Power to the science instruments is turned on above a certain altitude where the low pressure of the evacuated payload can be equilibrated to the low pressure of the outside environment. The payload parachute deployed 10 minutes into the flight and the payload landed 45 miles north of the launch site.

The AXS was of particular interest during the rocket campaign as it was the maiden flight of this science instrument. Two and a half minutes into the rocket flight real time AXS data plotted on the flight operations control room computer. During launch I monitored and verified real time flight data for all five science instruments and I was very excited to see AXS data plus data from the other four instruments. The AXS measured four times an optimistic predicted value of solar soft x-ray irradiance. This exciting science observation opens the door to years of data analysis and subsequent research. At present, we are performing post-flight data analysis and calibrations of the AXS instrument.

The rocket launch was extremely successful in all aspects. The rocket provided a perfectly guided and controlled launch, and all five science instruments performed as expected. The only thing left was to retrieve the rocket payload from its landing site in order to ensure a 100% successful mission. I was part of the rocket payload recovery team that flew in a helicopter over the New Mexican desert where we recovered the payload in a big puddle of mud!

**Right:** Rocket recovery team returns after retrieval of rocket payload from White Sands Missile Range. Photo by Daryl Heusinkveld.

## **The 60th American Chemical Society Northwest Regional Meeting and Small Business Conference**

will be held in Fairbanks June 15-18, 2005. UAF Chemistry & Biochemistry stock clerk, Marlys Schneider, is an organizer for the meeting along with faculty, Drs. Larry Duffy, Bill Howard, Cathy Cahill and Richard Stolzberg. For more information, visit [www.norm-schb-2005.org](http://www.norm-schb-2005.org) or contact Marlys Schneider, 474-6287, email [fnmes@uaf.edu](mailto:fnmes@uaf.edu).

**The 12th annual Science Potpourri** will be held in the Natural Sciences Facility on Saturday, April 9. Faculty, staff & students throughout the college and the UAF campus join event coordinators, Jeff Drake, GI, and Marlys Schneider, Dept of Chemistry & Biochemistry, to showcase the sciences at UAF through an array of fun, interactive exhibits. The annual event is free and open to the community.



I would like to thank Dr. Scott Bailey and members of the GI Electronics and Machine shops for a great learning experience, as well as members of the CU rocket team for their enthusiasm to include the GI as part of their team.

More information on the AXS instrument and a movie of the rocket launch can be found at <http://snoe.gi.alaska.edu/bailey/>

Erica Rodgers

## **2005 Award Recognition & Graduation Barbeque May 12th, Noon - 2:00 PM**

**CNSM FACULTY, STUDENTS & STAFF,  
MARK YOUR CALENDARS:**

**THURSDAY, MAY 12TH, NOON - 2:00 PM  
FRONT LAWN OF THE  
NATURAL SCIENCES FACILITY**

**DEAN, JOAN BRADDOCK, INVITES ALL  
CNSM FACULTY, STAFF & STUDENTS TO  
THE ANNUAL CNSM GRADUATION  
BARBEQUE & AWARD RECOGNITION.**

Among those to be recognized at the May 12th barbeque are the following outstanding student award recipients.

### **2004-05 Outstanding Undergraduates**

**Aaron Heuer**  
Biological Sciences

**John Rowley**  
Chemistry & Biochemistry

**Patrick Webb**  
Computer Science

**Anya Kircher**  
Geology & Geophysics

**Shannon Hammond**  
Mathematics

**Tim Stern**  
Physics

**Melissa Bifelt**  
Statistics

**Erin Carr**  
Wildlife Biology

*Additional 2004-05 student & faculty award recipients to be announced.*

# the college News&Events

## NSA Approves Information Assurance Certification for UAF Computer Science Students

Professor Kara L. Nance will be receiving recognition and a certificate from the Assistance Secretary of Defense for National Information Infrastructure at the Committee on National Security Systems (CNSS) Annual Conference for her work in developing the Information Assurance and Computer Security curriculum at UAF. The CNSS represents a broad cross-section of federal departments and agencies, which set the training standards for information assurance professionals in government and industry. The certificate recognizes the UAF Computer Science curriculum and the new information assurance and computer security courses as meeting 100% of the required national standards for Information Systems Security Professionals (NSTISSI

The ASSERT lab is housed within the Computer Science building, but is completely self contained and physically isolated from any external network. As a result, activities such as research into intrusion detection systems, or the study of worm propagation techniques, which would be challenging or harmful to perform on the campus network, can be conducted in the ASSERT lab. This allows students, faculty, and staff involved in class work or research to gain hands-on experience in a realistic environment custom configured to meet their needs. Research problems currently being addressed in the ASSERT Lab by faculty, research staff, graduate students, and undergraduate students include: Computer Forensics, Computer Viruses, Secure Communication, Identity Theft, Authentication, Information Assurance, Sensor Webs, and Network Design. For more information see the ASSERT website at <http://assert.uaf.edu> or [fyassert@uaf.edu](mailto:fyassert@uaf.edu).

No. 4011) and System Administrators in Information Systems Security (NSTISSI No. 4013), and qualifies UAF to certify students in these areas. These standards reflect the federal awareness that consistency in training and education for information assurance is critical to the national infrastructure. This recognition is a major step towards UAF being approved by the National Security Agency as a Center of Academic Excellence in Information Assurance Education (CAEIAE). Only 50 higher education institutions across the country have earned the designation since the program's inception.

Universities across the nation are being asked to work with the federal government to meet nationally recognized training and education standards to prepare systems security professionals for the 21st century. In response to this demand, the UAF Computer Science faculty has focused on developing information assurance courses designed to train the cyber security workers of the future, and developing laboratory and research potential in this important area. Funded through generous grants from the UAF Technology Advisory Board, NASA, and the National Science Foundation, the Computer Science Department now houses the Advanced Systems Security Education, Research and Training (ASSERT) Lab.



Photo by Kara Nance

**Students in the ASSERT using computer forensics tools to analyze and recover deleted files from a hard drive.**

The ASSERT Lab, created over the past three years under the direction of Kara Nance and Brian Hay, has proved to be an invaluable resource for students, faculty, and staff. The lab hardware consists of an array of network equipment, approximately 30 computers, KVM devices, a printer, and a projector. The operating systems, software packages, and network configuration can be custom tailored to meet the needs of the various user groups, ensuring that the lab can be utilized for a variety of classes and projects. To allow such modifications to be made quickly and effectively, several utilities are available in the lab, allowing, for example, users to restore a previously saved software configuration with a single command. VMware is also available on many of the lab machines, allowing several virtual machines to be installed and operated concurrently on a single host. These virtual machines essentially function no differently than a real system, and the VMware software offers several useful functions, such as the ability to add new virtual hardware, to define networks of virtual machines within the host computer, or to easily save and restore configurations.

**Kristin O'Brien**, Assistant Professor Biology, has received a two year, Beginning-Grant-In-Aid award from the American Heart Association for research entitled, "Cellular Defenses Against Nitrosative Stress." The award total is \$130,785.

**Donald (Skip) Walker**, Professor Biology & Wildlife, and Director of the Alaska Geobotany Center at the Institute of Arctic Biology, has been awarded \$829,460 from the National Science Foundation for a three year project entitled "Towards an Arctic Geographic Information Network: A Web-Based Plant-to-Planet-Scale Geobotanical Atlas Centered on the Toolik Field Station, Alaska."

**Nicole Mölders**, Associate Professor in the Atmospheric Sciences program, and scientists from hydrology, climatology, soil sciences and environmental engineering wrote a book entitled "Coupled Models for the Hydrological Cycle - Integrating Atmosphere, Biosphere and Pedosphere." For more info, contact **Nicole Molders** 474-7910 or email: [SDC-bookorder@springer-sbm.com](mailto:SDC-bookorder@springer-sbm.com)

**Lara Dehn**, Ph.D. student in Biology, was awarded the Larus Prize from the AAAS Arctic Division for the best student presentation at the meeting last fall in Anchorage. Dehn's presentation as a poster was *Stable Isotope and Trace Element Status of Subsistence Hunted Bowhead and Beluga Whales in Alaska and Gray Whales in Chukotka*. The prize included an all expense paid trip to the national meeting held in Washington D.C. in February. Professor Erich Follmann is Dehn's advisor.

**Perry Barboza**, Assoc Professor Biology & Wildlife, received \$2,500 from the National Park Service for his proposal, "Nutritive Value of Moss for Muskoxen in Winter."

**Audrey Taylor**, Ph.D. student in Biological Sciences, received \$15,000 from the UA Foundation via the Angus Gavin award for her proposal, "Premigratory distribution & movement of shorebirds staging on the Arctic Coastal Plain." Associate Professor Abby Powell is Taylor's advisor.

**Link Olson**, Assistant Professor Biology & Wildlife, and Curator, Mammalogy Collection, UA Museum of the North, received \$10,000 from the Geographic Society's Committee for Research and Exploration for his proposal, "Distribution, conservation status, and molecular phylogeography of Madagascar's web-footed tenrec (*Limnogale mergulus*)."

**Zhao Li**, Ph.D. student in Atmospheric Sciences, gave a poster presentation entitled, "Analysis of water recycling in CCSM" at the American Meteorological Society conference in San Diego. Associate Professor Nicole Mölders is Li's advisor.

**Dana Greene**, Ph.D. student in Biological Sciences, received a \$750 Eli Lily travel award to attend the 2004 Society for Neuroscience Annual meeting in San Diego.

**Balachandrudu Narapusetty**, Ph.D. student in Atmospheric Sciences, received a travel grant from the American Meteorological Society to attend the 85th Annual AMS Meeting in San Diego. Associate Professor Nicole Mölders is Narapusetty's advisor.

**New Undergraduate Student Research** funded through the Office of Sponsored Programs:

**Seth Adams; Lee Taylor, Advisor**  
"Fungal Associations in Orchids"

**Anna Kober; Michael Harris, Advisor**  
"Vasopressin and Hypercapnic Sensitivity in a Model System Used to Investigate Neural Control of Breathing."

**Brendan Bruns; Michael Harris, Advisor**  
"Low Cost Automation to Support Physiological Investigation: Application of computer-aided process automation to precision gas blending in a laboratory setting."

**James V. Warner; Barbara Taylor, Advisor**  
"Vertebrate Freeze Tolerance: Do cells isolated from the freeze tolerant frog retain a metabolic adaptation to freezing?"

**Top Right:** UAF AISES Chapter accepted the 2004 Chapter of the Year Award at the National AISES conference in Anchorage in November.

**Lower Right:** AISES National President, Robert Whitman, Ph.D., left, presented the AISES 2004 Professional of the Year Award to UAF alumnus, Richard Savik Glenn. Glenn is Vice President of Lands for Arctic Slope Regional Corporation. Photos by Dea Strunk

## UAF AISES Chapter Named 2004 Chapter of the Year



### by Sue McHenry, AISES Staff Advisor

A delegation of UAF students, faculty and alumni attended the 26<sup>th</sup> national conference of the American Indian Science and Engineering Society (AISES) which was held in Anchorage November 11-13. Richard Glenn from Barrow, a 1991 UAF graduate (MS Geology), was the keynote speaker at the opening ceremony. He informed, entertained and challenged the audience of 1800 college students, professionals and exhibitors.

Richard's heartfelt and humorous presentation was followed by the announcement that the UAF chapter of AISES had been selected for the Stelvio T. Zanin Distinguished Chapter of the Year Award. Later in the week, Richard Glenn was presented with

the AISES Professional of the Year Award in recognition of his roles as geologist, ice scientist, and whaler. He is currently Vice President of Lands for Arctic Slope Regional Corporation. Lee DeWilde and Wily Splain, UAF mechanical engineering alumni now employed by Alyeska, presented a session on "How the Pipeline Traverses Permafrost."

All in all, the conference was an inspiring experience for the UAF participants as well as for all the visitors from the lower 48 who were enthralled with their Alaskan experience.



# k-12 & community outreach

## UAF Alaska Summer Research Academy

University outreach program for students in grades 8-12

CIVIL ENGINEERING



### 2005 July 18 – 29

The College of Natural Science and Mathematics is now accepting applications for the 5th annual UAF Alaska Summer Research Academy (ASRA).

The 2005 camp will be two weeks long, July 18–29, and offers an expanded range of academic opportunities for students. New & returning favorites in the fields of science, computer science and engineering will be joined by new offerings in business and the liberal arts.

ASRA provides an opportunity each summer for pre-college students in grades 8-12 to work with university faculty, staff and industry professionals in one of many diverse fields and experience residential life as a student on the UAF campus.

Abstracts and application materials for the 2005 camp are available online at [www.uaf.edu/asra](http://www.uaf.edu/asra). Space is limited so students are encouraged to apply early for placement in their area of interest.

[www.uaf.edu/asra](http://www.uaf.edu/asra)

HEALTH SCIENCES



AVIATION

#### MODULES OFFERED IN 2005:

AVIATION

BIOTECHNOLOGY

BUSINESS & ENTREPRENEURSHIP

CIVIL & ENVIRONMENTAL ENGINEERING

COMPUTER SCIENCE

CREATIVE WRITING

ELECTRICAL ENGINEERING

ELECTRONIC MINIATURIZATION

FILMMAKING

HEALTH SCIENCES

LAW

MARINE BIOLOGY

NEUROBIOLOGY

ROBOTICS

SEISMOLOGY

WEB DEVELOPMENT

## CNSM Faculty, Staff & Students Lend Expertise to Countless Outreach Activities

ALASKA STATEWIDE HIGH SCHOOL SCIENCE SYMPOSIUM

ALASKA SUMMER RESEARCH ACADEMY

FAIRBANKS DISTRICT SCIENCE FAIR

FIRST LEGO LEAGUE ROBOTICS

MATHCOUNTS

OPERATION SANTA

RURAL ALASKA HONORS INSTITUTE

SCIENCE JUNIOR EVENT DAY FOR GIRL SCOUTS

SCIENCE POTPOURRI

AND, MANY OTHERS IMPORTANT TO CNSM FACULTY, STAFF & STUDENTS EACH YEAR

CNSM faculty, staff & students are supportive and engaged in K-12 and community outreach throughout the year. The list is long and the commitment and enthusiasm toward educating and inspiring young people about the sciences is genuine.

Most outreach activities, such as the Alaska Statewide High School Science Symposium, Fairbanks District Science Fair, and Science Potpourri, depend on numerous scientists and faculty/graduate student mentors each and every year. Others are more simple, like the annual

CNSM OPERATION SANTA adopt-a-family project, and require only the kindness and generosity of many in the college. Thank you to those who help guide, mentor and support such a wide range of K-12 & community outreach activities and events.

Watch for the launch of a new resource on the web this spring; the UAF Science Education Outreach Network. The website will provide one-stop access to the multitude of outreach activities in the sciences at UAF. For more info prior to launch, contact the Network Coord, [Becky Lindsey](mailto:Becky.Lindsey@uaf.edu), 474-7999.

## Man of Fire

by Marie Gilbert

“Man of Fire” is an apt description of Terry Chapin, yet it belies the gentle, thoughtful, and disarming nature of this world-famous ecologist and Alaska’s only National Academy of Science member.

One smoky afternoon late last summer when most Fairbanksans and many Alaskans in the Interior were desperately trying to escape the wildfires’ smoke and haze, Chapin was literally running toward the smoke and cinders as he bounded down the stairs of the Institute of Arctic Biology on his way to check out recently burned forests along the Steese, Taylor, and Dalton highways and at the Caribou-Poker Creeks Research Watershed, one of the major study sites of Chapin’s Bonanza Creek Long-Term Ecological Research program.

Chapin wanted to know how much nutrients were returned to the soils of different burn sites immediately after a fire. By comparing his 2003 data with subsequent years’ nutrient data Chapin will be able tell how effective burn sites are at retaining their original store of nutrients and the capacity of those sites to support forest regrowth, in other word, the resiliency of the boreal forest.

“The 2004 fire season was the largest area burned, 6.7 million acres, in Alaska since records were initiated in 1950,” Chapin said. “Climate models suggest that these severe fire years will occur more frequently in the future and there have been several large fire years in the last 15 years. We have known for a long time that fire is a natural part of Interior Alaskan ecosystems and there is still a lot of black spruce out there, so this is likely to happen again.”

“Fire is the dominant disturbance in the boreal forest and is becoming more frequent as climate warms,” Chapin said.

## Professor of Ecology

## F. Stuart (Terry) Chapin III



“One of the most profound ways humans can influence high-latitude ecosystems and climate is by altering fire regime - both by lighting fires and by putting them out.”

“The costs of fire to society are fairly clear to Alaskans after last summer: risks to life and property leading to evacuation of communities, health risks from smoke, and the losses of income from tourists who went south to avoid the smoke.” Chapin said.

“There are benefits to fire as well, including the rejuvenation of forests to produce wildlife habitat and more productive forest types, the reduced risk of pest outbreaks or of future fires,” Chapin said. “Even in short-term economics, there was a net stimulation of the Fairbanks economy by fire activity, and the fire wages brought back to Native communities can enhance subsistence opportunities.”

“One of the biggest challenges facing the world is sustainability of aspects of social-ecological systems that people really care about, such as Native culture and Alaska fisheries, at a time when many of the key controls over these systems, such as climate change and fire regime, are changing directionally,” Chapin said.

“To meet this challenge requires an integration of natural and social sciences because many of the drivers of change involve social-ecological interactions,” Chapin said.

UAF’s Resilience and Adaptation Program (RAP), directed by Chapin, focuses on addressing such major problems at the regional scale using ecologically, economically, and culturally sustainable approaches.

“Alaska may provide keys to the resilience and sustainability puzzle,” Chapin said, “because it faces many of the same issues as developing nations, an extractive economy but with the cultural diversity to provide many potentially innovative solutions. It has the resources to solve the problems if it chooses to do so and figures out what to do. Any solutions to these problems must be ecologically, economically, and culturally sustainable, if they are to work. That’s what the RAP program trains students to address.”

Chapin’s RAP integrates ecology, resource management, climate dynamics, economics, anthropology, political science, philosophy, and community and regional development to understand the functioning of regional systems. The program emphasizes high-latitude ecosystems.

“The ideal outcome would be for the University of Alaska Fairbanks to become an international leader in training students to seek solutions for the societal consequences of global changes. This is a big task, and no single project can address the whole enchilada, but RAP is working in the right direction.”

### FOR MORE INFORMATION:

F. Stuart (Terry) Chapin III:  
[terry.chapin@uaf.edu](mailto:terry.chapin@uaf.edu)

Resilience and Adaptation Program (RAP):  
[www.rap.uaf.edu](http://www.rap.uaf.edu)

Institute of Arctic Biology: [www2.iab.uaf.edu](http://www2.iab.uaf.edu)  
Marie Gilbert: [marie.gilbert@uaf.edu](mailto:marie.gilbert@uaf.edu)

faculty profile