



Department of Biology



Internships Needed

Do you work in an organization that could serve as a learning environment for an undergraduate Biology major?

You receive extra help plus the enthusiastic energy of a student eager to learn while the student learns practical application of the concepts they are learning in class.

A definite win-win!

Contact our Academic Support Team to learn more!

Meet the ASC Team on pages 3 and 4!

How to reach us:

970-491-7011



To donate:



Welcome from the Chair: *Dr. Dan Bush*



Greetings from faculty, staff and students in the Department of Biology. We just finished another great fall semester. The department is growing, and our numbers this fall really drove home how popular we've become. Our Freshman class this fall was a record, with over 480 new students at our door when instruction began. That was 100 more than the year before, which was 100 more than our five year average. WOW! With all these freshman, we have over 1450 majors, up 220 from fall of 2010 and more than 6% of all majors at CSU. These numbers reflect well on our programs and our ability to attract new students.

The faculty and students in Biology are doing remarkable things. We had three graduate students win NSF Graduate Research Fellowships, three postdoctoral students join faculty laboratories with their own independent research funds, and several undergraduates appeared as coauthors on peer reviewed publications.

Continued next page

ENROLLMENT HITS RECORD HIGH

CENSUS DATE ENROLLMENT, FALL 2011
DEPARTMENT OF BIOLOGY

	FR	SO	JR	SR	U-grad	Grad	Total enrollment
Major							
Biological Sciences	340	201	199	264	1004		1004
Botany		5	4	5	14	23	37
Zoology	138	68	76	79	361	24	385
Minor							
Botany		1	1	2	4		4
Zoology	1	3	12	9	25		25
Second Major							
Biological Sciences	1	5	9	19	34		34
Zoology		1	3	8	12	1	12
Grand Total	480	284	304	386	1454	48	1502

Data provided by CSU Office of Institutional Research: <http://www.ir.colostate.edu/enrollment.html>

WELCOME FROM THE CHAIR CONTINUED

Faculty successfully competed for federal research support, with greater than \$30 million dollars in active grants. Our success is highlighted by June Medford's grant for \$8 million dollars to develop plant sentinels (see accompanying story pg. 6). As a research intensive university, these funds are the lifeblood that supports undergraduate and graduate research, and advances our understanding of fundamental biological concepts.

Although the weak economy has continued to take a deep toll on state funding, our 6% cut this fiscal year was offset by a new source of funds supplied by differential tuition. This new funding, generated by high cost majors such as ours, largely covered our budget cut this year. We had hoped to do new things with that money, but were very glad it filled in and we didn't have to cut any people or activities. I continue to be hopeful that the economy will improve and the state will find a sustainable funding mechanism to maintain CSU as a strong institution that delivers outstanding education at an affordable cost.

We hope you enjoy reading through this departmental newsletter. There are several interesting stories in this issue, so please take a few moments to look them over. If you have questions, comments or updates you'd like to share, please send me a note at: dbush@colostate.edu. In the meantime, we wish you and your family a happy and prosperous 2012!

Biology Chair Newly Elected Fellow to AAAS American Association for the Advancement of Science

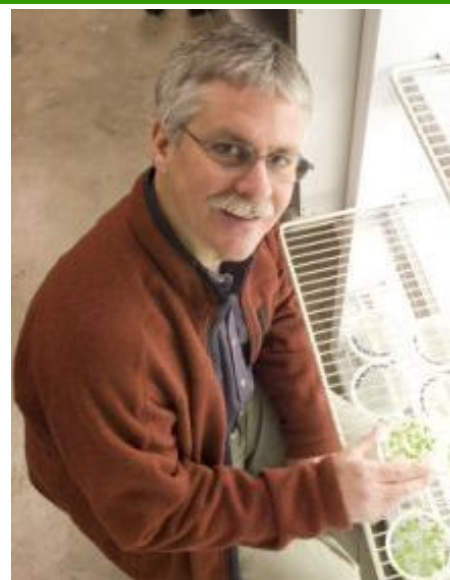
Two chairs of the College of Natural Sciences - Daniel R. Bush in biology and Ellen R. Fisher in chemistry - have been named Fellows of the American Association for the Advancement of Science, a prestigious peer honor awarded to a select group of scientists across the country each year.

Bush is being recognized for research on plant assimilate metabolism and for his service as president of the American Society of Plant Biologists and chair of the AAAS Section on Agriculture, Food, and Renewable Resources. Fisher is being honored for her important contributions to understanding of gas-phase and plasma chemistry and plasma-surface interactions.

They are the only Colorado State University scientists to be named in this year's class of Fellows.

Bush is a plant biologist who uses biochemical and molecular genetic tools to dissect plant function. His laboratory provided the first biochemical and molecular descriptions of several plant sugar and amino acid transport systems that are key contributors to resource allocation within cells and between plant organs

Earlier this year, Bush was one of three co-principal investigators to receive a \$1.35 million grant from the U.S. Department of Energy to discover genes that control plant biomass as a feedstock for biofuel. The award is the second for the multi-disciplinary team. In 2008, they received \$1.5 million from the DOE and USDA to use rice as a model grass for biomass gene discovery. Armed with that knowledge, they're now turning to switchgrass, a non-food crop that is being developed as a new energy crop for biofuels.



MEET OUR ACADEMIC SUPPORT TEAM

An Academic Support Coordinator (ASC) does many things besides help a student decide which courses they need to take to complete their degree. Taking the term “academic support” broadly, we realize that every student is unique and brings individual circumstances to the learning environment.

Our ASCs use a holistic approach within the context of higher education when considering each student’s circumstances and academic goals. As part of their on-going effort to support undergraduate students a monthly newsletter goes out to all students in our major.

Check out some of the past issues here: <http://www.biology.colostate.edu/undergraduate-newsletter>



Justin Reeves

JUSTIN L. REEVES PH. D.

Justin joined the center a year ago. He is a Colorado native, born in Colorado Springs, and he received his BA in Biology from Western State College in Gunnison. He continued his education with a Ph. D. in Ecology from Kent State University.

You might think that a Ph.D. in Ecology would indicate a future as a professor, but he was lucky enough to have been involved with Student Affairs in both schools and learned that working with students gave him a great deal of satisfaction.

As he explains, “I enjoy getting to spend most of the day talking to/helping students and then getting to go home every night knowing I made a difference in many peoples’ lives that day. Though the job can be stressful, it’s very rewarding and allows me to use both my biology and student affairs backgrounds.”

Justin urges students considering a degree in Biology to brush up on their math skills. He says, “Students need to realize that they have their work cut out for them, and can expect to do more math and chemistry than they might have thought.”

JENNIFER APRIL

Jenny graduated with a BS in Biology from Keene State College and continued with a MS in Education and Brain Research from NOVA Southeastern University. She grew up in New Hampshire, and lived in Key West FL for 6 years before moving to Fort Collins.

She says, “I am excited to explore winter sports again this season, although I have yet to be convinced that ‘winter camping’ is a good idea.”

Working closely with the students is what Jenny does best. She chose to major in Biology because she loves Biology and wants students to be successful. “I want the Biology students to really enjoy the courses they’re taking, and the material they are learning. This initial degree will help them in their chosen career field, and/or graduate school, so it should be something they enjoy learning.”

Jenny also appreciates alumni as an amazing resource for students. She continues, “They can be a source of guidance, a source of inspiration, and perhaps a source of new and exciting career ideas.”



Jenny April

ACADEMIC SUPPORT TEAM CONTINUED



Kayla Nuss

KAYLA NUSS

Kayla is another Colorado native returned home. Originally from Golden, she attended Cornell College in Mt. Vernon, IA for a degree in Psychology and Spanish. Later, she earned a Masters in Student Development in Postsecondary Education from the University of Iowa. She has worked in both college admissions (5 years) and residence life (5 years) which gave her a wealth of experience working with students. This is her first formal advising experience, but as she says, "I feel like this is what I've been meant to do all along!"

Her rich background working with students gives her unique insight into the experience of incoming students. She said, "With a major in the biological sciences, students will be working overtime. It can be a wake-up call to first-year students who, perhaps, didn't have to work as hard in high school. They quickly realize that the amount of material as well as the depth of understanding that is expected of them can be a lot to handle."

MEET OUR NEWEST FACULTY MEMBER: DR. GRAHAM PEERS

What attracted you to CSU?

I found the whole package attractive, from the location to the quality and diversity of research being done throughout the department and the other colleges.

What is the most surprising thing about Fort Collins?

I was surprised by how friendly everyone in town was! It's really refreshing to be in this social climate after spending nearly all my life in large cities.

How did you get started in your field?

I grew up in Vancouver, BC and got to go sailing nearly every weekend while I was growing up. It seemed logical to start studying oceanography at the time, and I found myself fascinated by the algae that form the basis of the ocean's food web. There were more faculty than students when I was an undergrad and that meant you could get a lot of face time with the professors. They did a great job of getting the students into doing primary research. After oceanography I found myself wanting to learn about molecular biology and photosynthesis and now I find myself concentrated in that area. I became particularly interested in how the photosynthetic machinery manages to do the most energetic set of reactions found in biology and not destroy itself in the process. Its a fine balance of physiological and genetic regulation. Now that biofuels are edging closer to becoming a reality its great to have a new target to direct my research towards.

What's the most interesting thing about your research that you wish everyone knew?

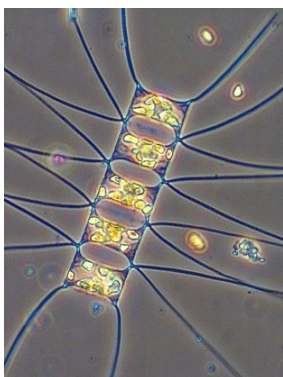
Photosynthesis is the most incredible process in biology! There is so much to say here. It's one of the few avenues of study where you can find yourself reading about evolution across geologic timescales and then pick-up another paper that addresses how light moves between photosynthetic pigments (literally at the speed of light). It's a field that really does touch on all the major fields of science.

What would you like alumni and friends to know about your work?

Nearly half of the oxygen you breath comes from algal photosynthesis and it has been evolving separately from plants for over half a billion years. There is a huge pool of biochemical diversity for us to discover in the algae and with modern biological techniques we can apply this diversity to improve productivity of both biofuels and traditional crops.

What do you do for fun and recreation?

I love cooking, which is a great hobby to have because you get to practice it at least once a day. I also love hiking and trail-running. I hope that once I get settled in I can start to play the drums again. I used to play in a few bands and it's what I've missed most in my life for the past decade.



Chaetoceros—one of the dominant bloom formers in the ocean

2011 THORNTON-MASSA DISTINGUISHED SPEAKER

DR. GEBISA EJETA



Gbisa Ejeta
12th annual Thornton-Massa Distinguished Lecturer

In a talk entitled “Global Food Security in the Face of Growing Challenges,” Dr. Ejeta spoke about his world renowned sorghum research

Ejeta is committed to easing hunger world-wide through his ground breaking research in sorghum. He has developed varieties of this cereal grain that are resistant to drought and parasitic weeds. These critical scientific advances, combined with Ejeta's field work with subsistence farmers, have eased hunger for millions of people in sub-Saharan Africa.



Dr. Ejeta takes a question from the audience

Dr Ejeta is the 2009 winner of the world’s most prestigious award for people who have made significant contributions to solving global hunger. The World Food Prize – known as the Nobel Prize for agriculture – recognizes international role models who inspire others to

address food security.

Though raised in a one-room hut in an Ethiopian village, Ejeta excelled as a student and ultimately earned a doctorate in plant breeding and genetics at Purdue University, where he has remained as an honored agronomy professor.

President Barack Obama recently appointed Ejeta to the Board for International Food and Agricultural Development.

“In my household, inasmuch as I had lots of love, because of a limited income, life was a struggle on a daily basis. So hunger is something I have personally experienced,” Ejeta said in a video produced by the World Food Prize.



Dr. Ejeta with Bobbie Thornton and Heidi Massa, heirs of donors Bruce and Mildred Thornton and Emil Massa.

The Thornton-Massa lecture is an annual event provided by funds donated by Emil Massa and Bruce and Mildred Thornton.

To view the World Food Prize video, use this link:

http://www.youtube.com/watch?feature=player_embedded&v=zdfu4DVe9Yw#

WATCHDOG PLANTS: FOLIAGE THAT KEEPS YOU SAFE



Dr. June Medford and postdoctoral researcher Peter Bowerman analyze the emergence of the next generation of plant sentinels.

Imagine that you're dashing through a plant-lined atrium rushing to catch your plane when you notice out of the corner of your eye one of the plants ahead of you looks funny – it's very pale, almost completely white. Suddenly, without fanfare, two guards guide the person that just walked by that plant away to a security area.

You have just witnessed a new concept in security: sentinel plants. The detection ability is computer designed and linked to an easy-to-see plant response. Under the development of Dr. June Medford, these plants can serve as detectors for explosives and environmental pollutants.

Dr. Medford and her team have spent the past seven years developing a system that enables plants to have a highly specific detection trait. The detector plants tell us that an explosive or an environmental pollutant is present by losing their green color and blanching to white.

"The idea to make detector plants comes directly from nature," Medford said. "Plants can't run or hide from threats, so they've developed sophisticated systems to detect and respond to their environment. We've 'taught' plants how to detect things we're interested in and respond in a way any human can tell there is something bad around."

Medford is working through the university's technology transfer office to commercialize the technology through her new company, Phytodetectors.

HOW IT WORKS

Computer design of the detection trait is done in collaboration with Prof. Homme Hellinga from Duke University and, more recently, Prof. David Baker at the University of Washington. Medford's lab enables this computer-designed detection trait to work in a plant by rewiring the plant's natural signaling process so that a detection incident is linked to the loss of green color.

Baker or Hellinga's laboratory uses a computer to re-design naturally occurring proteins called receptors. The receptors function like a Pac-man and close around a pollutant or explosive molecule. Medford's lab translates these Pac-man proteins (computer re-designed receptors) to a plant language, and targets them to the plant cell wall.

When a pollutant or explosive is in the air or in the soil near the plant, the plant detects the substance and sends a signal to the nucleus. In the nucleus, the plant initiates the loss of green color response turning the plants white. Medford said these initial or first-generation plants respond to an explosive in two hours, but research underway will reduce the response time to a few minutes.

For a short video explaining the concept:
http://www.youtube.com/watch?v=kObTt_dR7IM