

Plant Biology News

May 2011 Issue

On Kate's Desk

At the University of Minnesota, and in public higher education in general, change is afoot. Undergraduate applications and state support are experiencing opposite trends: student demand has been trending upward, while state investment has had a multi-year trend of cuts. In such a context of change, much of which seems unpredictable, one reaction might be to hunker down and wait to see where the chips fall. However, this is a compelling context for setting priorities, developing goals, and making plans for how to achieve them. With this in mind, the department is carrying out a

scan of its recent history and planning for the future.

Throughout the more than 120-year history of the Department of Plant Biology (and its predecessor, the Department of Botany), interactions with agricultural disciplines have been important. At our centenary in 1989, we became formally affiliated with the then-named College of Agriculture, while several years later the Bell Museum's move to the College of Natural Resources brought a relationship to that college, too. As CBS went through redesign in the nineties and COAFES and CNR merged in the aughts, PBio retained its relationship with the colleges of applied life sciences as well as with CBS. Now, a committee chaired by Jane Glazebrook is reviewing this relationship in order to summarize its goals and achievements, and to create a context for future planning. The two additional areas that PBio is currently examining are our space needs (chaired by Carolyn Silflow) and our priorities for future



**Kathryn
VandenBosch**
Professor &
Department
Head

faculty hires (chaired by Bill Gray). At our faculty meeting this Friday, all three committees will report on their work to date. These efforts will influence the development of a strategic plan for the department.

Stay tuned.

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Spotlight on Research

Nathan Springer—Variation in Genome Structure in Maize

Individuals within a species clearly resemble each other more than they do other species, but genome data now provide a view of the variation that occurs within species. Dr. Springer, an Associate Professor of Plant Biology, studies the amount and sources of genetic variation in cultivated lines of maize (*Zea mays*), or what Americans call corn. A story in UMNews[1] in 2010 focused on his study of epigenetics, but that is only one of the threads being followed by Springer's team.

Nathan Springer was hired in 2003 as part of the MCB Initiative, and was tenured in 2009. Three years ago, the Plant Biology department allocated a seed grant of \$75,000 in federal (Hatch) and state (Minnesota Agricultural Experiment Station) funds to Dr. Springer and Plant Biology colleague Peter Tiffin to develop a gene chip as a tool for his research. Springer's team has used the gene chip to evaluate changes in genome structure and gene expression during the domestication of maize from the wild grasses that were its ancestors. Under Dr. Springer's direction, this small investment was amplified for large impact, including current grants from NSF and USDA-NIFA totaling about \$1.5 million, on which he is PI, and many publications, including one in *Science* (Schnable et al., 2009).

In his research on genome structure, Springer is evaluating variation in gene copy number, gene presence/absence, and chromosome rearrangements. While much is known about variation in genome structure in humans and other animals, understanding of plants has lagged behind, even though genome structure is important to crop traits, possibly including those that contribute to hybrid vigor. Dr. Springer's team's use of these new tools has resulted in six publications in the last two years (out of a total of 17 refereed publications and 5 reviews or book chapters in the same period). Most recently, the group published a study in December 2010 in *Genome Research* (Swanson-Wegener et al., 2010) where they found that in maize and its ancestor teosinte, variation in copy number and gene loss occurs in about 10% of genes. In further research, the group wants to understand how plant species can tolerate such variation in gene dosage and gene loss, and in particular to learn the functions of these variable genes and their contributions to important traits.



Postdoc Corner

Spotlight on Anke Reinders

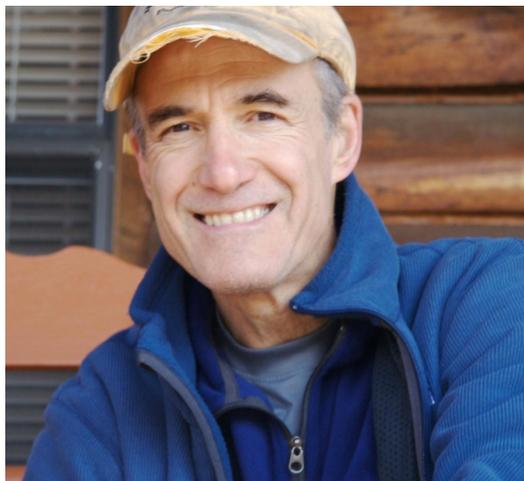


I was born in Bremen, a town in Northern Germany familiar to many either through the “Bremen Town Musicians” of the Brothers Grimm’s fairy tales or the fact that the Beck’s Brewery is located there. I studied Biology at the University of Bremen, finishing with a Biology Diplom (M.Sc.). I received my Ph.D. from the University of Basel in Switzerland where I worked at the Botanical Institute. My Ph.D. research was on “Trehalose Synthesis and Nutrient Signaling in the yeast *Saccharomyces cerevisiae*”. Following my Ph.D. I was awarded a DFG (German Science Foundation) fellowship to work on sucrose transport in plants at the newly formed ZMBP (Center for Plant Molecular Biology) at the University in Tübingen, where I started working with John Ward. I have been at the University of Minnesota since 2001.

Currently I am working on a DOE-sponsored project on plant sucrose transporters. These proteins are membrane proteins that are functioning in the uptake of sucrose into cells or into the vacuole. In many plant species sucrose transporters are required for the loading of sucrose into the phloem and therefore are one factor influencing assimilate partitioning. They are also important for the uptake of sucrose into sink cells, for instance pollen or seeds. After studying the function of different members of the sucrose transporter family by expression in *Xenopus* oocytes in combination with electrophysiology, and finding that there are large differences in substrate specificity we are now trying to determine which amino acid residues are responsible for these differences. In order to do so, I am using gene shuffling and so far the results look promising. One particular area I would like to work more on in the future is the role of sugar transporters in pollen development and function. Pollen tubes are symplasmically isolated and depend on transmembrane transport for the uptake of carbohydrate to support rapid growth. Transporter genes are overrepresented in the transcriptome of pollen but very little is known about the specific function of most of them.

Besides doing research in the lab I enjoy gardening. I also like hiking and in 2009 climbed Mt. Whitney. I am a member of the University Senate and the Faculty Senate and I am attending PBio faculty meetings as the postdoc representative.

Special Announcements



Plant Biology and PBS send our congratulations and best wishes to **Peter Reich** on his recent **election to the American Academy of Arts and Sciences**.

Professor Reich is a faculty member in Forest Resources and a member of the graduate faculty in Plant Biological Sciences. The Academy has been in operation since the American Revolution, when it was founded by John Adams, John Hancock and others to provide a forum for scholarly discourse among noted leaders in the arts and sciences. Professor Reich is the only person from the University of Minnesota to be selected this year, and one of seven awardees from the areas of Evolutionary and Population Biology and Ecology.

Let's hope he has ample opportunity to interact with his fellow awardees of 2011, including those in the arts such as Paul Simon, Dave Brubeck, Ken Burns, and Minnesota native Bob Dylan.

Plant Biology is bidding farewell to our Student Administrative Assistants,
Kelsey Morovic and Heidi Roeder.

Kelsey, who has been with the department for four years, has become a familiar face in the PBio main office. She is graduating with a B.S. in Biology and preparing for Grad School in the Fall. Heidi, though she's been with us just two semesters, was a great addition to the Admin team and her support has been greatly appreciated. Heidi is moving out of state and will be changing schools as a result.

Thank you for your contributions to the office and the Department.
Best wishes to you both!

Please welcome **Rachel Farr**, one of our new Student Administrative Assistants. Rachel is a CBS student, majoring in Genetics and has worked in the CBS teaching labs for a few semesters. We are pleased to have her as part of our Team!

Mystery Revealed!

In our **April Issue** we asked,
“What is this?”



David Nelson, a graduate student working in Dr. Pete Lefebvre’s lab, discovered this new species of Alga.

He discovered the alga while hiking in the Rocky Mountains around Breckonridge.

This novel species of algae grows at cold temperatures and accumulates large amounts of oil. Nelson, and his fellow lab members are investigating its potential for use in making biofuels and nutritional supplements.

May Issue - Department History Tidbit

What part did **Thomas Huxley and Darwin** play in the history of the Plant Biology Department? Check out the **May Issue of Plant Biology News** to find out!

Got a captivating fact you’d like to share?
Send it to pmyers@umn.edu

Upcoming Events

- ◆ **CBS All-College Staff Meeting** - May 20th, 2011 | noon –1:30 p.m. | [Rm 105 Cargill Bldg](#)
- ◆ **ASPB 2011**
American Society of Plant Biologists Annual meeting is being held in Minneapolis, MN this year!
August 6-10, 2011
Please click on “ASPB” to find out more information about this event and how you can get involved!

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Department of Plant Biology MISSION STATEMENT

To increase knowledge of, and to provide education in the basic plant sciences, by engaging in fundamental research from the molecular to the ecosystem level.

Teaching and Research programs in this vertically integrated department cover: Molecular, biochemical, cellular, developmental, physiological, organismal, ecological, and evolutionary biology of plants, algae, and fungi.

The programs allow for flexibility and the inclusion of courses from a variety of related areas.