New directions, new opportunities

Wow. These are exciting times in the Department of Genetics, Development and Cell Biology (GDCB)! In this newsletter, we share some of the highlights of recent months.

The state Board of Regents has just selected Wendy Wintersteen to serve as the 16th president of Iowa State University (ISU). Dr. Wintersteen has served as dean of the College of Agriculture and Life Sciences since 2006. The faculty, staff and students in GDCB programs look to the future with optimism.

The GDCB faculty and staff have leadership roles in multiple graduate and undergraduate programs, and our students continue to amaze and inspire us. We welcome the opportunities to celebrate them and their accomplishments.

We started the Fall semester by teaching some of our large-enrollment laboratory courses in the brand new Bessey Addition. The new labs are bright and airy and equipped for modern science. The additional lab space provides more opportunities for students to take core courses at times that fit their schedules. This, in turn, will encourage students as they progress towards their degrees.

Every semester provides new opportunities to inspire – and to be inspired by – our students.

Also, we look forward to the opening of the new Advanced Teaching and Research Building in 2018. It will house new teaching laboratories and will enhance life science research space on campus.

GDCB faculty members continue to push their fields forward through world-class research. In fiscal year 2017, GDCB faculty earned over $7 million in external grant funding. This achievement speaks to the importance of GDCB research, the reputations of the faculty for research excellence, and the continuing dedication of the faculty, students and staff to the longer-term goals of their grant projects. These goals include feeding the world, improving human health, and finding innovative ways to help students succeed.

We are grateful for the opportunities to advance these goals, in keeping with the university research and teaching missions.
Eight Department of Genetics, Development and Cell Biology students earned graduate degrees from Iowa State University in spring and summer 2017. The following four students graduated in spring 2017: Bhagyashree S. Birla, Bryan C. Gontarek, Aron Brian Nakama and Yunting Pu. Summer 2017 graduates included Jiani Chen, Rebecca Chowdhury, Jennifer Chang and Shibo (Hylia) Gao.

Birla’s major professors were Professor Eric Henderson and Associate Professor Carolyn Lawrence-Dill. Her major was bioinformatics and computational biology, while her Ph.D. dissertation was “Rational design and validation of DNA fragments for gene assembly based on thermodynamics.” She is a scientific manager at Genohub in Austin, Texas.

Chang’s major professors were Frances C. Craig Professor Basil Nikolau and C.F. Curtiss Distinguished Professor Patrick Schnable. Majoring in bioinformatics and computational biology, Chang’s dissertation title was “Developing an integrated system for biological network exploration.”

In describing her research, Chang said, “I help people make sense of complex data. As part of my Ph.D. work, I developed standards for combining different types of biological networks. Those standards allowed us to create the Mango Graph Studio software, which has been licensed to Complex Computation, LLC.”

Chang’s plan following graduation was to continue working at Complex Computation, LLC.

Chen’s major was plant biology, and Professor Yanhai Yin was her major professor. Her plan is to do post-doctoral training in academia. Chen’s dissertation title was “The functions and mechanism of WRKY transcription factors in brassinosteroid-regulated plant growth and stress response.”

Chen said her research focused on “studying the crosstalk between brassinosteroid signaling and stress response. I found a group of transcription factors called WRKY, which is involved in this crosstalk. WRKY46/54/70, which is regulated by BIN2 (a GSK3-like kinase), plays positive roles in plant growth and negative roles in drought stress response by coordinating with BES1.”

Chowdhury’s major professor was Assistant Professor Jeff Trimarchi, and her Ph.D. major was molecular, cellular and developmental biology. After graduating, Chowdhury joined the Neural Stem Cell Institute in Rensselaer, N.Y., working in a post-doctoral position with Dr. Sally Temple. She will be working on using stem cells to study and treat neurodegenerative diseases such as frontotemporal dementias and others.

Chowdhury’s dissertation was “Insights into retinal cell fate determination in vertebrates using transcriptomic profiling and genome editing.” Describing her research, Chowdhury said, “During retinal development, a retinal progenitor cell decides between several cell fates to ultimately give rise to a specific type of neuron. To understand the influence of gene expression on cell fate determination, I used a combination of single cell transcriptome analysis and functional studies in mouse and zebrafish to uncover...”
A faculty member of the Iowa State University (ISU) community since fall 1966, University Professor Harry T. (Jack) Horner was one of several people honored at the 2017 Department of Genetics, Development and Cell Biology Honors and Awards Recognition Luncheon. The event was held on April 18 in the Molecular Biology Building atrium.

Students, faculty, staff and special guests attended the event with around 100 students, faculty and staff recognized for varied awards, years of service and scholarships received over the past year.

GDCB Chair Dr. Jo Anne Powell-Coffman kicked off the annual celebration by recognizing faculty who are celebrating more than 25 years of service with the university. Faculty recognized included University Professor Drena Dobbs, Associate Professor Michael McCloskey, Professor Eric Henderson, Distinguished Professor Steven Rodermel, Professor Donald Sakaguchi, Professor Eve Wurtele and Horner. Horner was presented a crystal flame award “celebrating 50 years of scholarship and leadership” on behalf of the department by Dr. David Oliver, who was the former ISU interim vice president of research and economic development.

Other GDCB faculty members recognized during the event included Associate Professor Clark Coffman, College of Agriculture and Life Sciences Outstanding Achievement in Teaching; Distinguished Professor Steve Rodermel, College of Liberal Arts and Sciences Outstanding Teaching; Professor Diane Bassham, College of LAS Outstanding Achievement in Research; Professor Xun Gu and Distinguished Professor Stephen Howell, American Association for the Advancement of Science Fellows; and Assistant Professor Marna Yandeau-Nelson, who received the 2016-17 Miller Faculty Fellowship with Dr. Jelena Kraft, a member of the teaching staff.

The event also recognized several graduate students.

Recipients of the spring 2017 GDCB Travel Award included Hao Jiang, Carla Gao's major professors were University Professor Drena Dobbs and Affiliate Assistant Professor Amy Vincent. Gao received a master of science degree with a major in bioinformatics and computational biology. This fall, she joined Associate Professor Dennis Lavrov's lab in the Department of Ecology, Evolution and Organismal Biology to pursue a Ph.D.

Gontarek's major professor was Professor Philip Becraft, and his Ph.D. major was plant biology. His Ph.D. dissertation was “Genetic regulation of aleurone development in zea mays.”

Nakama's major professors were Associate Professor Michael McCloskey and Associate Professor Stephan Schneider. He earned a master of science degree with majors in neuroscience and molecular, cellular and developmental biology. The title of Nakama's thesis was “The asymmetric cell division machinery in early annelid embryogenesis: maternal and embryonic contributions.”

Pu's major professor was Walter E. and Helen Parke Loomis Professor of Plant Physiology Diane Bassham, and her major was genetics. While working on her research in Bassham's lab, Pu's research primarily “focused on regulation of autophagy in plant cells.” Her dissertation was “Interaction between regulation of autophagy, stress responses and growth in Arabidopsis thaliana.”

Currently, Pu is in a post-doctoral position at Iowa State working with GDCB faculty member Assistant Professor Dior Kelley where she will be studying auxin signaling in plant growth and developmental processes.

See Event on Page 6
**GDCB in the News**

**Link features Bai’s research**
Department of Genetics, Development and Cell Biology (GDCB) Assistant Professor Hua Bai’s research was featured in the fall 2016 edition of [link: connecting alumni and friends], an Iowa State University (ISU) College of Liberal Arts and Sciences (LAS) publication.

Titled “Prolonging our ‘Healthspan’: Molecular research could lead to longer, healthier lives free from disease,” the article focuses on Bai’s research with fruit flies and longevity. The article explores how scientists in LAS are working toward uncovering the secret to longevity in the depths of a fruit fly’s heart.

**Stories highlights professor’s work**
Carolyn Lawrence-Dill, associate professor in GDCB, is featured in *Stories in Agriculture and Life Sciences*. Stories is an Iowa State University College of Agriculture and Life Sciences (ALS) publication.

The article, “Making Data-Driven Discoveries Possible,” discusses how Lawrence-Dill and her group support scientists’ efforts and impact their work.

**Programming molecules**
As members of the ISU Laboratory for Molecular Programming (LAMP), GDCB Professor Eric Henderson, ISU College of LAS computer scientists and other researchers are translating programming design methods from computers to molecules.

Henderson and his former grad student, Divita Mathur, published an article in the peer-reviewed *Nature Scientific Reports*, describing their design for an autonomous DNA nanomachine that could detect Ebola.

Read about the LAMP research in the College of LAS news article, “Computer scientists research how to program molecules.”

**Yandeau-Nelson co-invents patent**
GDCB Assistant Professor Marna Yandeau-Nelson co-invented U.S. Patent No. 9,399,768 with ISU Professor Nikolau Basil and ISU alumnus Fuyuan Jing. The patent is “Materials and methods for using an acyl-acyl carrier protein thioesterase and mutants and chimeras thereof in fatty acid synthesis.”

“A key enzyme in the cellular production of fatty acids is thioesterase, which releases a free fatty acid from its precursor,” Yandeau-Nelson said. “Thioesterases are important targets for metabolic engineering of fatty acid end products within microbial factories, because these enzymes regulate the length of the corresponding fatty acid.”

She said the patented technology includes a set of thioesterases sourced from bacteria and plants and engineered for use in bacteria. “These designed thioesterases demonstrate either an enhanced level of activity and/or a specificity for a specific fatty acid end-product. The resultant ‘designer’ fatty acids have downstream applications as biorenewable chemicals or chemical precursors.”

**‘The Sky is the Limit’**
Thanks to a new learning community in the College of LAS that connects Open Option (undecided) students to career paths and opportunities at Iowa State, the sky really is the limit.

The Sky is the Limit learning community targets students who are interested in science, technology, engineering and math (STEM) and helps them explore career areas and choose a major. GDCB Associate Professor Clark Coffman is part of The Sky is the Limit’s leadership team. Read the complete “Soaring to opportunity” article in LAS News.

**Prototype biomimetic tree**
The prototype biomimetic tree built by GDCB’s Associate Professor Michael McCloskey and Professor Eric Henderson, as well as Iowa State Associate Scientist Curtis Mosher, was the subject of the ISU News Service article “Iowa State University scientists design electricity generator that mimics trees.”

The tree generates electricity when wind blows through its artificial leaves. These researchers believe this type of technology may help individuals charge household appliances without the need for large wind turbines.

**Identifying a genetic mechanism**
GDCB Professor and Plant Sciences Institute Faculty Scholar Yanhai Yin’s research identifies a genetic mechanism that governs growth and drought tolerance in plants. This development might lead to better performing traits in crops. An ISU News Service article, “Iowa State University researchers detail genetic mechanisms that govern growth and drought response in plants,” discusses this research and the study published in the peer-reviewed academic journal *Nature Communications*.

---

Associate Scientist Curtis Mosher (left), Professor Eric Henderson (middle) and Associate Professor Mike McCloskey (right) have assembled a prototype biomimetic tree that produces electricity. Such technology could appeal to a niche market in the future, according to the researchers. (Photo by ISU University Photographer Christopher Gannon.)
AAU grant to strengthen STEM
GDCB Professor and Chair Jo Anne Powell-Coffman discusses the $20,000 Association of American Universities (AAU) grant ISU received in the ISU News Service article, “Iowa State receives AAU grant to improve undergraduate education in science, technology, engineering and math.” ISU is one of 12 universities to receive the AAU grant, which will improve undergraduate education in science, technology, engineering and mathematics, or STEM disciplines.

Powell-Coffman, project coordinator for the grant, said, “These efforts will allow the Iowa State community to build upon some of our existing strengths in undergraduate STEM education.”

Untangling molecular mechanisms
An article by GDCB Professors Yanhai Yin and Diane Bassham, as well as GDCB students and ISU Assistant Professor Justin Walley, was published in the April 10, 2017, edition of the peer-reviewed academic journal Developmental Cell. The research and article were the focus of an ISU News Service release: “Iowa State University researchers untangle the molecular mechanisms connecting plant stress and growth.”

GDCB Ph.D. student Trevor Nolan was the lead author of the paper, which focused on a gene known as BES1.

Kids playing with science
GDCB Assistant Professor Julie Kuhlman helps fourth- and fifth-grade girls at Edward Elementary School in Ames experience the fun of science by finding experiments the adolescents can do that are “wow-worthy.” “I thought the kids just needed to do something fun,” Kuhlman said. Read more about Kuhlman’s work in the LAS News article, “Playing with science.”

Lab members involved in Professor Yanhai Yin’s lab, from top and from left, are Hongqing Guo, Jiani Chen, Zhouli Xie, Nicole Huser, Yin, Trevor Nolan and Hao Jiang. Photo by Priyanka Sandal.

Student talks science
Carla Mann, a graduate student in GDCB who is majoring in bioinformatics and computational biology, was one of three graduate students from the College of Liberal Arts and Sciences who participated in a Science Communication Fellowship hosted by Reiman Gardens during the 2017 spring semester.

The Science Communication Fellowship is a free professional development program designed to enhance science communication skills through three workshops and a few public presentations. The students developed a hands-on activity related to their work. Read the LAS News article, “Talking Science.”

GDCB student Carla Mann shares her research through the Science Communication Fellowship hosted by Reiman Gardens.
Mann, Nancy Manchanda and Melanie Torrie.

Dale W. Young and W.E. Loomis Fund Travel Award recipients for fall 2016 and spring 2017 are Bibechana Adhikari, Trevor Nolan, Jiani Chen, Sharu Paul Sharma, Mingze He and Weijia Su.

The fall 2016 and/or spring 2017 Sui Tong Chan Fung Fund Travel Award recipients are Benjamin Bastin, Laura Schultz, Jeffrey Haltom, Jordan Welker, Lauren Laboissonniere, Wesley Wierson and Maira Pedroso de Almeida. Laboissonniere and Bhavika Patel are the recipients of the 2017 David Gladson Scholarship. Kerui Huang was recognized as being a recipient of Glenn/AFAR Scholarships for Research in the Biology of Aging, while Jennifer Chang was honored for her Iowa Women of Innovation: Collegian Innovation and Leadership Award and Scholarship.

Teaching and Research Awards
Mann, Kevin Natukunda and Chen were honored for receiving Graduate College Teaching Excellence Awards in fall 2016 or spring 2017.

Assistant Professor Marna Yandeau-Nelson and Dr. Jelena Kraft provided a Special Recognition from the Biology 313 Lab for GDCB student Alfredo Kono as an Exemplary Senior Graduate Teaching Assistant.

Other graduate students recognized include Sweta Roy-Carson, first place winner in the university’s Fall 2016 Three-Minute Thesis Contest. Laboissonniere (first place) and Roy-Carson (second place) were also recognized for receiving outstanding speaker awards at the 8th Annual Neuroscience Research Day.

In addition, a GDCB Departmental Award was presented to Linda Wild, program coordinator II in the Genetics and Genomics Interdepartmental Program. Teaching staff award recipients honored include Lois Girton – Advising Impact, College of Liberal Arts and Sciences (LAS); Chanda Skelton, teaching lab coordinator – Professional and Scientific Excellence Award, College of LAS; and Linda Westgate, senior teaching laboratory coordinator – Institutional Service Award, College of LAS.

A complete listing of all faculty, students and staff honorees can be viewed by visiting the 2017 Honors and Awards Recognition Luncheon Program.
Exploring innovative teaching: Project Bio Whiz

Eager to explore new ways to engage her Biology 212 students, Dr. Sayali Kukday (lecturer in genetics, development and cell biology) developed Project BioWhiz. Project BioWhiz is a semester-long project that touched hundreds of undergraduate students during the 2016-2017 academic year. In the project, the hundreds of students were divided into teams that work on research and develop posters. Students worked in teams to develop and present posters that focused on scientific evaluation of real-world issues. The main learning goals for this project are to enable students to explore a course-related topic beyond the extent to which it is discussed in class, find credible resources on the internet including primary research and review articles from peer-reviewed journals, and develop critical skills by working in teams, presenting to an audience, and critiquing peer work.

The project culminates in a final presentation week called the Project BioWhiz Poster Symposium. Teams with the best posters are recognized. During the past year, presentations were held in Troxel Hall and in the Molecular Biology Building atrium.

Dr. Sayali Kukday, genetics, development and cell biology lecturer, uses a semester-long program, Project BioWhiz, to engage her hundreds of Biology 212 students. At the end of the semester, teams of students compete in the Project BioWhiz Poster Symposium and the top teams are recognized. In spring 2017, Team 15 (Tyler Budde, Cortney Elkin and Amali Stephens) won Most Creative; Team 32 (Christian Perez, Kristin Krumm, Shaundra Shepherd and Hannah Bird) won Best Presentation; and Team 46 (Shayla Holland, Trenton Houston, Mitchell Winters and Devan Vander Veen) won Best Overall. Front row, from left, are Perez, Krumm, Stephens, Shepherd, Elkin, Holland and Kukday. Back row, from left, are Brent Mortensen (graduate teaching assistant), Bird, Budde, Vander Veen, Winters and Houston. (Photo courtesy of Emelyn Frohm.)
Thank you for support

The Department of Genetics, Development and Cell Biology appreciates the continued gifts from its alumni, family and friends. Your contributions help the department continue its tradition of academic excellence. Your support helps our students thrive.

If you plan to make a contribution to Iowa State University, please consider making a direct donation to the department by clicking here.

Stay in touch

GDCB enjoys hearing from its former students and others. Let GDCB and your fellow alumni know what’s going on with you. Share your news by emailing gdcbnews@iastate.edu.

In addition, email your comments and requests for additional information to gdcbnews@iastate.edu.

Unsubscribe

GDCB needs your help in making sure its mailing list is current and contains only GDCB alumni and affiliates. If you have been reached in error or wish to not receive the newsletter, please accept our apologies.

Email gdcbnews@iastate.edu to have your name removed from future e-mailings. Type the word “unsubscribe” to have your name removed. If you have unsubscribed and still receive this newsletter, please email your unsubscribed address again to gdcbnews@iastate.edu.

Address

Iowa State University
Department of Genetics, Development and Cell Biology
1210 Molecular Biology Building
2437 Pammel Drive
Ames, IA 50011

gdcbnews@iastate.edu

“IA State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran.

Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, IA 50011, Tel. 515-294-7612, Hotline 515-294-1222, email eaooffice@iastate.edu”

Coffman receives Outstanding Achievement in Teaching Award

Clark Coffman, an associate professor in the Department of Genetics, Development and Cell Biology, received the Outstanding Achievement in Teaching Award from the Iowa State University College of Agriculture and Life Sciences on March 9.

Coffman began teaching at Iowa State in 1998 and is dedicated to helping students develop critical and creative thinking skills.

Coffman said, “The greatest reward that I receive as a teacher is seeing students learn. I am convinced that every student can learn if provided with an appropriate opportunity.

“Fortunately, I have been able to work with colleagues in the School of Education, the Department of Psychology, and the Department of Chemical and Biological Engineering to create inclusive classrooms that allow diverse student populations to learn. We have been able to test hypotheses about student learning and motivation, applying what we have learned in our classrooms. Knowledge needs to be shared, and I have also had opportunities to share what we have learned with colleagues here at Iowa State, at national meetings focused on biology education, at invited seminars, and via web-based modes of interaction. It is exciting to see change happening in science education.”

Read CALS news release for a complete listing of faculty and staff award recipients.

Neuroscience group hosts Brain Day for Kids

More than 70 children attended the Neuroscience Graduate Student Organization’s first event, Brain Day for Kids, on January 21 in the Molecular Biology Building. Twenty Iowa State University undergraduate and graduate volunteers, as well as one University of Northern Iowa volunteer, participated in the event.

Brain Days for Kids featured 10 different themed stations ranging from sensory tasks, optical illusions, brain facts quiz, anatomy and more. Attendees enjoyed a movie, snacks and refreshments. After completing tasks and receiving stickers for them on a Brain Bingo Card, the children selected a prize.

Established in fall 2016 with its main mission being outreach and public education, the organization’s first elected officers are Lauren Laboissonniere, president; Patricia Izbicki, vice president; Emir Malovic, treasurer; and Bhavika Patel, secretary.

The Neuroscience Graduate Student Organization (NGSO) held its first event, Brain Day for Kids, in early 2017. From left are Abbie Burney (undergraduate in Assistant Professor Jeff Trimarchi’s lab), Lauren Laboissonniere (president), and Patricia Izbicki (vice president).