

COLLEGE OF BIOLOGICAL SCIENCES

2019 ANNUAL REPORT



College of
Biological Sciences
UNIVERSITY OF MINNESOTA

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2019 HIGHLIGHTS

Re-imagining undergraduate research

The College opened the doors to the first active-learning lab at the University of Minnesota, providing a space for truly student-driven inquiry and authentic research experiences. The new space will serve hundreds of students each semester.

Increasing undergraduate enrollment

The College once again welcomed its largest incoming class to date, signaling continued demand for our undergraduate programs. CBS students remain among the highest achieving at the University.

Field-shaping faculty recognized

CBS faculty were recognized at the highest level for their research contributions. More than a half dozen faculty were among the year's most highly cited while two faculty were named National Academy of Sciences members.

Research funding successes

The College has the highest funding increase in fourth quarter of 2019, and, for fiscal year 2019, ranked second among its peers in sponsored expenditures per faculty member underscoring our high productivity.

A new home for the CBS Conservatory

The new CBS Conservatory & Botanical Collection is set to open to the public in early 2020, providing students, researchers and the public with access to more than 1,800 plant species from around the world.

Full speed ahead for field stations

In addition to the continuation of its Seed-to-Roots research program, Itasca Biological Station and Laboratories established a collaborative art-science exchange with Tulane University that includes local Native American artists. Cedar Creek Ecosystem Science Reserve welcomed a record number of K-12 students to the station and continued to generate field-shaping research with more than 70 publications in scientific journals.

Engaging more people in more ways

The College also continued to expand alumni and external engagement with regional alumni gatherings, including an alumni weekend at Itasca Biological Station and Laboratories, public-facing biology-themed discussions through the Petri Dish series, and the annual SciSpark event celebrating diversity in science.

Achieving a milestone in scholarship support

Starting from a baseline of zero four-year scholarships in 2015, the College exceeded its goal of providing 100 active four-year awards to CBS undergraduates.

Another record-breaking year for fundraising

In 2019, the College achieved its \$21-million Great Science at a Grand Scale Campaign goal and raised \$5.4 million, far exceeding the \$3.5 million annual goal.

COLLEGE SNAPSHOT

BY THE NUMBERS

- 2,235 undergraduates
- 279 graduate students
- 108 postdoctoral researchers
- 152 faculty members*

* including Medical School faculty in shared departments

DEPARTMENTS

- Biochemistry, Molecular Biology and Biophysics (joint with Medical School) - BMBB
- Biology Teaching and Learning - BTL
- Ecology, Evolution and Behavior - EEB
- Genetics, Cell Biology and Development (joint with Medical School) - GCD
- Plant and Microbial Biology - PMB

FIELD STATIONS AND FACILITIES

- Cedar Creek Ecosystem Science Reserve
- Itasca Biological Station and Laboratories
- College of Biological Sciences Conservatory & Botanical Collection
- BioTechnology Institute

SIGNATURE PROGRAMS

- Nature of Life Program (Itasca and on campus)
- Foundations of Biology Active-Learning Biology Courses
- Petri Dish Science Event Series
- Market Science Community Engagement Program
- InSciEd Out STEM K-12 Pipeline Program

STUDENTS

UNDERGRADUATE STUDENTS

The College welcomed its largest freshman class to date while remaining highly selective.

TOTAL ENROLLMENT [fall 2019]

2,235 undergraduates enrolled

- 1,527 from Minnesota (68%)
- 575 students of color (25%)
- 84 international students (4%)
- 622 first-year (NHS fall 2019)
- 61 transfer students (NAS fall 2019)

FRESHMAN CLASS [class of 2023]

622 NHS students enrolled from 7,832 applicants [fall 2019]

- 426 from Minnesota (68% of total)
 - 307 from Twin Cities Metro (49% of total)
 - 119 from Greater Minnesota (19% of total)
- 424 female (68%)
- 198 male (32%)
- 83 first-generation college students (13%)
- 17 international students (3%)
- 158 domestic students of color (25%)
- 90% average high school rank of 2019 freshman class

TRANSFER STUDENTS [NAS, fall 2019]

- 61 total
- 47 from Minnesota (77%)
- 37 female (61%)
- 24 male (39%)
- 25 first-generation college students (40%)
- 4 international (7%)
- 25 domestic students of color (41%)

MAJORS

Number of students enrolled in CBS majors from 2015-2019

	Fall 2015	Fall 2016	Fall 2017	Fall 2018	Fall 2019
Biochemistry B.S.	290	268	340	429	406
Biology B.S.	388	419	677	831	851
Cellular and Organismal Physiology B.S.				9	46
Ecology, Evolution and Behavior B.S.	81	74	70	95	87
Genetics, Cell Biology and Development B.S.	229	220	269	256	245
Microbiology B.S.	113	105	125	136	118
Neuroscience B.S. (and double majors)	207	234	305	372	381

BACHELOR DEGREES AWARDED

Degrees awarded by major in CBS from 2015-2019

	2015/16	2016/17	2017/18	2018/19
Biochemistry	115	116	86	92
Biology	158	187	204	176
Cellular and Organismal Physiology				
Ecology, Evolution and Behavior	30	29	21	32
Genetics, Cell Biology and Development	77	85	72	70
Microbiology	38	39	30	38
Neuroscience	55	62	82	87
Plant and Microbial Biology	3	8	1	5

RETENTION AND GRADUATION RATES

- First-year retention rates 95.8% (UMTC avg 93.4%)
- Four-year graduation rates 80.4% (UMTC avg 71.7%)

UNDERGRADUATE AWARDS AND RECOGNITION

The Class of 2019 received a number of major awards. Fifty-six graduating seniors were also welcomed into Phi Beta Kappa, one of the most esteemed honors societies in the country.

- Fulbright Scholarship - Gus Pendleton
- Goldwater Scholarship - Anna Nagel
- National Science Foundation Graduate Research Fellowship - Elizabeth Dean and Anna Nagel
- President's Student Leadership and Service Award - Katerina Hoffmann and Sophia Vrba
- Donald R. Zander Alumni Award for Outstanding Student Leadership - Katerina Hoffmann
- University of Minnesota Scholarly Excellence in Equity and Diversity Award - Emmanuel Okematti
- Thomas Burnett Advanced Leadership Program - Amber McLaughlin, Jocelyn Ricard, Sophia Vrba and Grant Zastoupil

UNDERGRADUATE RESEARCH

347 student directed research projects/studies were mentored by 204 faculty members.

LEARNING ABROAD

182 students participated in learning abroad during the 2018-19 academic year.

STUDENT SUPPORT [2018-19 academic year]

CBS Student Services saw continued growth in student usage with a total of 4,779 student appointments across academic advising, career development and student engagement.

GRADUATE STUDENTS

Enrollment in CBS graduate programs remained consistent with increases in PMB, BMBB and MCDB&G.

ENROLLMENT

A total of 279 graduate students were enrolled in the College's graduate programs in fall 2019.

	2015	2016	2017	2018	2019
Biochemistry, Molecular Biology and Biophysics	69	70	77	81	90
Ecology, Evolution and Behavior	65	61	60	69	61
Molecular, Cellular, Developmental Biology and Genetics	45	41	45	51	53
Genetic Counseling (M.S.)	14	16	16	20	20
Microbial Engineering (M.S.)	10	9	11	11	10
Plant and Microbial Biology	46	40	45	41	45

DEGREES AWARDED

	M.S. 2019	Ph.D. 2019
Biochemistry, Molecular Biology and Biophysics (Ph.D)	0	7
Ecology, Evolution and Behavior (Ph.D.)	0	8
Molecular, Cellular, Developmental Biology and Genetics (Ph.D.)	0	6
Genetic Counseling (M.S.)	10	N/A
Microbial Engineering (M.S.)	3	N/A
Plant and Microbial Biology (Ph.D)	0	8

EXTERNAL AND UNIVERSITY AWARDS

CBS graduate students received 35 fellowships, grants and awards, including two Fulbright Fellowships, four NSF Graduate Research Fellowships, a U.S. Department of Energy Fellowship, a U.S. Department of Agriculture Fellowship and an American Society of Nephrology Kidney STARS award in 2019. **See the complete list of external and University awards in the In Detail section at the end of this report.**

THESES AND DISSERTATIONS

Graduate students produced 42 theses and dissertations in 2019. **See the complete list of theses and dissertations in the In Detail section at the end of this report.**

FACULTY AND RESEARCH

FACULTY

The College has 152 faculty members, including Medical School faculty in shared departments. Of the 21 University of Minnesota faculty listed in Clarivate Analytics 2018 Highly Cited Researchers list, a third are associated with the College. Five of the seven are principal investigators at Cedar Creek Ecosystem Science Reserve.

FACULTY AWARDS AND RECOGNITION

In 2019, more than a dozen faculty received major professional, University or collegiate awards, including recognition from the National Academy of Sciences. **See the complete list of CBS faculty and staff awards in the In Detail section of this report.**

PROMOTIONS, NEW HIRES AND RETIREMENTS

Promotions

- Ran Blekhman (Genetics, Cell Biology and Development)
- Sehoya Cotner (Biology Teaching and Learning)
- Sivaraj Sivaramakrishnan (Genetics, Cell Biology and Development)
- Doug Mashek (Biochemistry, Molecular Biology and Biophysics, Medical School)

New hires

- Jannell Bazarro (Plant and Microbial Biology)
- Kathleen Greenham (Plant and Microbial Biology)
- Christina Camell (Biochemistry, Molecular Biology and Biophysics)
- Charles Willis (Biology Teaching and Learning)

Retirements

Three faculty members retired in 2019: Sue Wick, Carolyn Silflow and Pete Lefebvre, all Plant and Microbial Biology faculty members.

RESEARCH

The College has the highest funding increase in 4th quarter of 2019, and, for fiscal year 2019, ranked second among its peers in sponsored expenditures per faculty member underscoring our high productivity.

PUBLICATIONS

College of Biological Sciences faculty published nearly 437 studies and articles in 227 journals authored or co-authored by faculty with primary appointments in CBS including the following high-impact journals:

- *Nature**: 26
- *Science*: 2
- *PNAS*: 12
- *Ecology Letters*: 11
- *Molecular Biology and Evolution*: 3
- *Genetics*: 4

*Including associated *Nature* journals

See the complete list of CBS faculty and staff publications.

ACTIVE GRANTS

The College had 332 active grants, including 98 exceeding \$100,000 in expenditures. See the complete list of active grants. Major sources of funding included:

- \$28,616,162 (total sponsored research spend)
- \$ 10,841,939 NIH
- \$ 5,676,277 NSF
- \$ 2,384,219 LCCMR
- \$ 745,379 USDOE
- \$659,273 Other MN State Agencies

See the complete list of CBS faculty grants in the In Detail section of this report.

CBS SUPPORT FOR MULTI-COLLEGIATE INFRASTRUCTURE AND COLLABORATIONS

CBS provides critical financial support to shared research infrastructure and initiatives and multi-collegiate events that foster research collaborations to the following interdisciplinary facilities and initiatives. The College provided over \$5M of annual support in 2019:

- Cedar Creek Ecosystem Science Reserve
- Itasca Biological Station and Laboratories
- BioTechnology Institute
- MnDRIVE-Environment
- Center for Mass Spectrometry and Proteomics
- Characterization Facility

- University Imaging Centers
- University of Minnesota Genomics Center
- Developmental Biology Center
- Center for Genome Engineering
- Microbial and Plant Genomics Institute
- Center for Plant Precision Genomics
- Lewis-Burke Government Relations
- The University of Minnesota Lion Center

In addition, the College provides space for:

- Electronic Instrumentation
- Machine Shop
- Bio-Technology Resource Center
- Caenorhabditis Genetics Center
- Chlamydomonas Resource Center

In 2019, the College distributed more than \$150,000 to support interdisciplinary collaborations, events and symposia, including:

- Norwegian Centennial Chair Collaboration
- Emerge BioScience Program
- Moos Lecture Series
- American Society for Virology Conference
- Institute for Molecular Virology Symposium
- Great Lakes Nuclear Receptors Conference
- Midwest Population Genetics Meeting
- Chemical Biology Symposium
- International Conference on One Medicine One Science (iCOMOS)
- International Society for Behavioral Ecology Conference
- Speaking Science Conference
- Journal of Young Investigators

RESEARCH AND LEARNING TECHNOLOGIES

- **Protecting research investments:** With increased prevalence of cyberattacks and ransomware worldwide, RLT focused on prevention strategies. Custom per-device network filters were added to protect high-value or at-risk research equipment without interrupting operation. Additionally, our new managed backup service for labs is now available and in active use by 14 labs.
- **Providing new tools to manage lab data:** Partnering with the Greenham Lab, RLT now offers eLabJournal's electronic lab notebook software at a significantly reduced rate. eLabJournal enables labs to significantly streamline sample and chemical inventories, protocols and data collection. eLabJournal is in use by 11 labs.
- **Helping expand teaching offerings:** RLT has worked with several faculty to explore new online courses and genetic counseling to develop a course offering that satisfies continuing education requirements.
- **Supporting instructors:** RLT continued to put effort into enhancing teaching with technology. As part of the Center for Biology Online Education, RLT provides resources and mentoring to new online instructors. RLT is also providing deeper, more timely resources via our CBS-Tech Tips blog published worldwide in the Canvas Community.

OUTREACH & ENGAGEMENT

The College expanded outreach activities through continued investment in outreach, public engagement and science communication through a number of programs and initiatives. In addition, the College engaged alumni and donors through events designed to spark interest and enthusiasm for science, strengthen affinity with the College and build support for the Campaign for the College of Biological Sciences.

OUTREACH

- **Market Science:** Building on the momentum from previous years, Market Science offered more opportunities than ever for University of Minnesota faculty, students and staff to engage with communities across the state. Volunteers participated in 65 unique events (farmers markets and fairs), resulting in 9,000 interactions with the public – double the number just two years ago. Over 200 individuals volunteered with Market Science, more than the previous two years combined. The program also continued to grow its presence in greater Minnesota through a collaboration with Itasca Biological Station and Laboratories and nationally through ongoing support for the expansion of the Market Science franchise to the University of Pittsburgh.
- **Cedar Creek Ecosystem Science Reserve:** Cedar Creek had another record-breaking year for public engagement, including visits by 6,912 K-12 students and their teachers, 915 university students and their professors, and 6,364 members of the public. Citizen scientists assisted with projects on red-headed woodpeckers, raptors, bumble bees, invasive species, phenology, and wildlife track and sign. Hundreds of community members attended public programs, including a new monthly lecture and field tour series (Lunch With a Scientist), an ongoing ecology-themed book club and weekly open hours at the bison viewing gazebo. Artists in residence shared work created at and inspired by the reserve at galleries across the state and hosted art programs and classes onsite. In addition, more than 5,000 volunteers helped classify images of wildlife generated by online trail cameras through the Eyes on the Wild project.
- **Itasca Biological Station and Laboratories:** In 2019, Itasca introduced a rural art-science initiative – the Big River Continuum – developed in collaboration with Tulane University. Building on joint programming with Itasca State Park naturalists, the station also launched the Science in Nature series, which connects University researchers with Itasca State Park visitors and local community members. Seven programs were held as part of our new Science in Nature series (150+ attendees), which explores diverse science topics using the “natural lab” of the park. The Station also reached 125+ members of the public through station tours and interpretive hikes, and engaged thousands with a presence at local events and the Minnesota State Fair.
- **InSciEd Out:** The College continued to grow its presence in the K-12 space by expanding on InSciEd Out partnerships, adding a new partner school (Minnesota Excellence in Learning Academy). Through the program, the College works with 65 teachers across seven partner schools to deliver cutting-edge science experiences for nearly 3,000 students each year. In 2019, the program expanded opportunities for K-12 students to visit and participate in programming on campus. Dozens of students visited campus to present their InSciEd Out research projects alongside undergraduate researchers. The program also hosted the first annual CBS STEM Day, which brought over 100 students from InSciEd Out partner schools to campus to participate in hands-on science activities across the STEM disciplines.

- **College of Biological Sciences Conservatory & Botanical Collection:** The CBS Conservatory created a membership program and launched an advisory board to grow awareness and build a strong base of support. More than 250 K-12 students and teachers, 220 non-degree-seeking students and 80 students from other local colleges toured the facility, and more than 3,700 members of the public visited the Conservatory. The Conservatory also raised its visibility through outreach activities, including the Roots to Healing exhibit at the Arboretum and the Bell Museum, and exhibits at the American Swedish Institute and Art in Bloom at the Minneapolis Art Institute. The Conservatory was also recognized for its outstanding orchids at the Winter Carnival Orchid Show. For the first time, the Conservatory delivered curricular content in classrooms through the Botany Bus to Weaver Lake Elementary STEM School and created an educational display for the St. Paul Garden Club Flower Show. The conservatory was instrumental in organizing St. Paul Discovery Days, an open house that brought 5,000 families and individuals to the St. Paul campus in April.

PUBLIC EVENTS

- **Petri Dish:** The College's signature event series regularly attracts 80+ attendees, including alumni, donors, the public and members of the University community. Topics for spring and fall 2019 included synthetic biology, biodiversity loss, gene editing and extinction.
- **SciSpark:** The College's annual event focusing on women in science and STEM equity continued to attract a broad audience that included alumni as well as members of the public.

INDUSTRY OUTREACH

- **MnDRIVE Environment:** MnDRIVE Environment hosts regular listening sessions with industry and community stakeholders to discuss their individual remediation technology needs that will help drive Minnesota's economy. These on- and off-campus events allow University researchers and graduate students to build relationships with industry stakeholders from across the region and collaborate as they address the most pressing remediation challenges facing the state's private and public sectors.
- **BioTechnology Institute Industry Outreach for Workforce Development:** Outreach to industry and workforce development are core elements of BTI's mission. In 2019, the BioTechnology Institute and Takeda corporation entered into a multi-year partnership to train the next generation of biological technicians in good manufacturing practices that help meet demands at Takeda, and the region at large. The training program will be an integral part of BTI's updated Microbial Cell Production Facility, which will provide high-quality, affordable cell production services to support the University research community and the region's robust

ADVANCEMENT

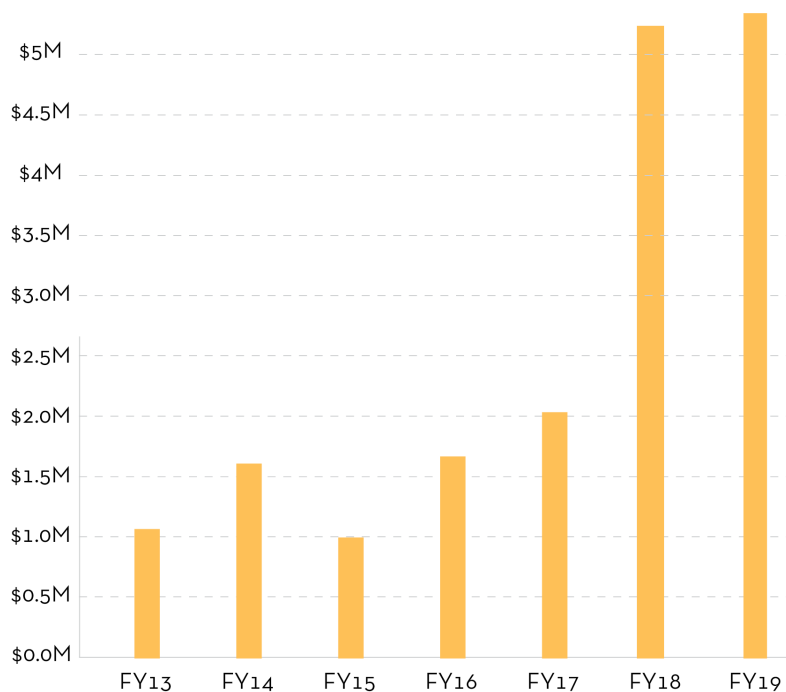
The College engaged more alumni and raised more money than ever before in 2019, and continued to raise the visibility of faculty research through PR, donor and alumni outreach, and public events.

DEVELOPMENT

At the end of 2019, the Campaign for the College of Biological Sciences was at 95% of its \$21 million goal.

- \$5.4M raised from private donors up from \$5.1M the previous fiscal year.
- 606 donors gave gifts that included:
 - 2 gifts of \$1M or more
 - 3 gifts of \$250K-\$999K
 - 6 gifts between \$100K-\$249K
 - 4 gifts between \$50K-\$99K
 - 20 gifts of \$2510K-\$49K
 - 58 gifts of \$1K-9.9K
 - 45 gifts of \$500-\$999
 - 243 gifts of \$100-\$499
 - 225 gifts of <\$100

GIVING HISTORY



SCHOLARSHIPS AND FELLOWSHIPS

In 2019, the College committed over \$700,000 in scholarships and fellowships awarding 106 scholarships, including 45 four-year freshman awards, and four graduate fellowships.

ALUMNI RELATIONS

The College continued to build on efforts to engage alumni in Minnesota and beyond with alumni socials, the alumni mentor network and an alumni weekend at Itasca Biological Station and Laboratories. Here are some of the highlights.

- **Alumni-student mentor program:** The College hosted several alumni-student networking opportunities throughout the year for industry and health-related professions. Approximately 140 students were in attendance.
- **Connecting with alumni outside Minnesota:** The College hosted alumni events in New York and Chicago in a continuing effort to connect with alumni who live outside of Minnesota.
- **Engaging alumni here at home:** Alumni were invited to attend public events including the Petri Dish, SciSpark and a special collaboration with CBS alums at two local breweries on a biology-themed beer event called Micro + Mash.
- **Itasca alumni weekend:** Based on the affinity many alums feel for Itasca based on their experiences as students taking classes at the station, the College launched the Great Itasca Get-together to provide an opportunity for them to reconnect with the station and the College. Approximately 40 alumni and their families attended the inaugural weekend.

Here's a snapshot of the CBS alumni community in 2019:

- Total alumni: 18,089
- Alumni with B.S. degrees: 14,290
- Alumni with M.S. or PhD degrees: 4,257
- Alumni living in Minnesota: 10,140

COMMUNICATIONS/MARKETING

CBS faculty and the College received 100+ media mentions including in national, local and University publications. Stories touching on CBS research and areas of expertise appeared in the *New York Times*, the *Minneapolis Star Tribune*, *The Atlantic*, *National Geographic*, *WIRED*, National Public Radio and elsewhere. Here are a few of the high-profile media mentions:

- "The First Gene-Edited Food Is Now Being Served" (*WIRED*)
- "Soviets Tried So, So Hard to Eliminate the Plague" (*The Atlantic*)
- "In real life, Simba's mom would be running the pride" (*National Geographic*)
- "Is A Diet That's Healthy For Us Also Better For The Planet? Most Of The Time, Yes" (National Public Radio)
- "As monarch butterflies vanish, the U investigates road salt as culprit – and cure" (*Star Tribune*)

Here are news releases that generated the most coverage:

- New methods promise to speed up development of new plant varieties
- A way of life in peril as inland lakes and rivers fail to freeze
- Nutritious foods have a lower environmental impact than unhealthy foods

FINANCIALS

FY19 OPERATING BUDGET

The College's FY19 operating budget included \$98,331,561 in expenditures.

Largest sources of revenue:

- \$29,153,716 tuition and fees
- \$25,089,075 state appropriation
- \$28,616,162 external faculty grants and contracts
- \$3,034,845 private gifts and endowment income

IN DETAIL

FACULTY AND STAFF AWARDS AND RECOGNITION

- Pew Scholar in Biomedical Sciences – Frank Albert, Genetics, Cell Biology and Development
- University of Minnesota Regents Professor – Marlene Zuk, Ecology, Evolution and Behavior
- Fulbright Scholar – Peter Kennedy, Plant and Microbial Biology
- American Association for the Advancement of Science 2019 Fellow – Craig Packer, Ecology, Evolution and Behavior
- 2019 Whitman Center Early Career Fellowship – Trevor Wardil, Ecology, Evolution and Behavior
- Academy of Microbiology Fellow – Daniel Bond, Plant and Microbiology
- Distinguished McKnight University Professor – Susan Jones, Ecology, Evolution and Behavior
- Ecological Society of America Fellow – Elizabeth Borer, Ecology, Evolution and Behavior
- John S. Anderson Leadership Award – Ruth Shaw, Ecology, Evolution and Behavior
- McKnight Land-Grant Professor – Michael Smanski, Biochemistry, Molecular Biology and Biophysics
- National Academy of Sciences Member – Daniel Voytas, Genetics, Cell Biology and Development
- National Academy of Sciences Member – Marlene Zuk, Ecology, Evolution and Behavior
- President-Elect of the Society for the Study of Evolution – Ruth Shaw, Ecology, Evolution and Behavior
- Stanley Dagley-Samuel Kirkwood Undergraduate Education Award – David LaPorte, Biochemistry, Molecular Biology and Biophysics
- University of Minnesota/Mayo Partnership Award – Dan Knights, BioTechnology Institute

GRADUATE STUDENT AWARDS AND RECOGNITION

External Awards

- American Association for the Advancement of Science Mass Media Fellowship – Daniel Ackerman (EEB)
- American Society of Nephrology Kidney STARS Award – Annie Shao (MCDB&G)
- COLCIENCIAS Fellowship, Colombia – Laura Toro (PMB)
- Engeseth-Rinde Restoration Fund Grant – Naomi Rushing (EEB)
- Foundation for Food and Agriculture “Future Leaders for Food and Agriculture” Fellowship – Kelsey Peterson (PMB)
- Fulbright Fellowship – Shan Kothari (PMB)
- Fulbright Fellowship – Rebekah Mohn (PMB)
- Minnesota Mycological Society Graduate Scholarship – Craig See (EEB)
- National Science Foundation Graduate Research Fellowship – Sarah Hammarlund (EEB)
- National Science Foundation Graduate Research Fellowship – Heather Hanson (MCDB&G)
- National Science Foundation Graduate Research Fellowship, Honorable Mention – Chaochih Liu (PMB)
- National Science Foundation Graduate Research Fellowship – Morgan Meissner (MCDB&G)
- National Science Foundation Graduate Research Fellowship, Honorable Mention – Kia Seehafer (EEB)
- National Science Foundation Graduate Research Fellowship, Honorable Mention – Redeat Tibebe (PMB)
- National Science Foundation Graduate Research Fellowship – Megan Wilcots (EEB)
- Schlumberger Foundation Faculty for the Future Fellowship – Laura Toro (PMB)
- U.S. Department of Energy Office of Science Graduate Student Research Award – Craig See (EEB)
- U.S. Department of Agriculture Predoctoral Fellowship – Molly Tillman (PMB)

University Awards

- Bell Museum Dayton Fellowship – Samuel Weaver (EEB)
- Bell Museum Dayton Fellowship – Sean Keogh (EEB)

- Bell Museum Dayton Fellowship – Zheng “Oz” Oong (EEB)
- Bell Museum Simons Fellowship – Tyler Imfeld (EEB)
- Doctoral Dissertation Fellowship – Alexander Harkness (EEB)
- Doctoral Dissertation Fellowship – Elizabeth Fay (BMBB)
- Doctoral Dissertation Fellowship – Maria Portales Reyes (EEB)
- Doctoral Dissertation Fellowship – Mayank Kohli (EEB)
- Doctoral Dissertation Fellowship – Noah Strom (PMB)
- Doctoral Dissertation Fellowship – Shan Kothari (PMB)
- GenoPitch Award – Rodrigo Zorrilla Gonzalez (EEB)
- Interdisciplinary Doctoral Fellowship – Joleen Khey (PMB)
- Interdisciplinary Center for the Study of Global Change Fellowship – Zheng “Oz” Oong (EEB)
- Interdisciplinary Doctoral Fellowship – Thomas Radomski (EEB)
- Outstanding Community Service Student Award – Siddharth Iyengar (EEB)
- Three-Minute Thesis Finalist – Annie Shao (MCDB&G)

THESES AND DISSERTATIONS

BIOCHEMISTRY, MOLECULAR BIOLOGY AND BIOPHYSICS – Ph.D.

- Luke Erber – *Functional proteomics analysis to discover and characterize oxygen-dependent cellular pathways.*
- Michael Fealey – *Structural and intrinsic disorder in the regulation of protein-protein interactions.*
- Amanda Hayward – *Conformational regulation of cell surface receptor proteolysis.*
- Chao Li – *Crystallization study of the resistance to cobalt and nickel repressor (RcnR) protein in complex with double-strand DNA.*
- John Rohde – *Myosin structural dynamics: Mechanistic insights and therapeutic technology developments.*
- Jiayi Wang – *The dynamic interplay between lentiviral Vif and human APOBEC3 proteins.*
- Jinhua Wang – *Structure and mechanism of chromatin remodeler SWI/SNF.*

ECOLOGY, EVOLUTION AND BEHAVIOR – Ph.D.

- Daniel Ackerman – *Anthropogenic impacts on high-latitude ecosystems: Shrubs will grow. Will nitrogen flow?*
- Danielle Drabek – *Characterizing the roles of coevolution and convergence in the evolution of venom resistance in mammals.*
- Miriam Gieske – *Linking inhibitory phenotypes of soil Streptomyces to resource inputs, resource-use tradeoffs, and soil microbiome composition and diversity.*
- Amanda Gorton – *The spatial scale of adaptation in common ragweed (Ambrosia artemisiifolia).*
- Virginia Heinen – *The information economics of social interactions.*
- Megan Kobiela – *Tale of three toxins: How butterflies respond to anthropogenic change.*
- Dakota Rowsey – *The roles of ecological opportunity and incumbency effects in macroevolution of the Luzon Island, Philippines “old endemic” murine rodents.*
- Meredith Steck – *The ecological context of individual specialization.*

MICROBIAL ENGINEERING – M.S.

- Maya Bourroughs – *Characterizing UshA cleavage activity in Shewanella oneidensis.*
- Lambros Tassoulas – *Novel discrimination of biuret and triuret degradation by enzymatic deamination, regulation and significance for slow-release nitrogen fertilizers.*
- Nisha Vishwanathan – *Comparison of oxygen sensitivities of nitrous oxide reductase of Pseudomonas aeruginosa PAO1 and Pseudomonas stutzeri ZoBell.*

MOLECULAR, CELLULAR, DEVELOPMENTAL BIOLOGY AND GENETICS - Ph.D.

- Bora Faulkner - *Involvement of histone deacetylase 4 (HDAC4) in osteoclast function.*
- Xueyang Pan - *Generation of gradient index optics with subwavelength metamaterials.*
- Sridhar Selvaraj - *Gene correction of limb girdle muscular dystrophy Type 2A patient-specific induced pluripotent stem cells.*
- Ambuj Upadhyay - *Multiple axes of inter-organ signaling regulate organ scaling.*

PLANT AND MICROBIAL BIOLOGY - Ph.D.

- John Benning - *Biotic interactions and edaphic variation modulate geographic range limits in *Clarkia xantiana* ssp. *xantiana*.*
- Anna Domenech Corts - *Efficient and precise genome editing in *Shewanella oneidensis* MR-1 using recombineering and CRISPR/Cas9-mediated counter-selection*
- Praphapan (Beera) Lasin - *AtSUC1 root expression and sucrose response leading to anthocyanin accumulation.*
- Lotus Lofgren - *Reciprocal informants: Using fungal bioinformatics, genomics, and ecology to tie mechanisms to ecosystems.*
- Katherine Muller - *Evolution of resource hoarding traits in symbiotic rhizobia.*
- Christina Smith - *Drivers of woody plant form and function in relation to water acquisition and use in seasonal forests.*
- Erik Solhaug - *Metabolic profilin of *Curcubita pepo* nectaries: Insights into carbon and nitrogen allocation during nectar secretion.*
- Noah Strom - *Fungal communities of soybean cyst nematode-infested fields under corn and soybean monoculture and crop rotation.*